International Journal of Science Academic Research
Vol. 01, Issue 07, pp.401-408, October, 2020
Available online at http://www.scienceijsar.com

ISSN: 2582-6425

Research Article

CONSTRAINTS ON THE ESTABLISHMENT OF A MANAGEMENT SYSTEM FOR SOLID HOUSEHOLD WASTE AND HUMAN EXCRETA IN THE MUNICIPALITY OF AGUÉGUÉS

***Toussaint Cokou Dan, Bénoît N'Bessa, Thierry Azonhe, Boko Dominique and Tchinkoun Carine**

[1]Faculté des Sciences Humaines et Sociales (FASHS) de l'Université d'Abomey-Calavi, Benin

Received 20th August 2020; **Accepted** 25th September 2020; **Published online** 15th October 2020

Abstract

The management of solid household waste and human excreta remains an area that has not yet been completely successful in developing countries and particularly in lake areas. Many constraints hinder the implementation of an adequate management policy for this waste. This is the case of the Lacustrine Municipality of Aguégués, whose geographical location and sociological contexts do not favor good management of solid household waste and human excreta. This is what justifies this research, the objective of which is to determine the constraints linked to the implementation of a management policy for solid household waste and human excreta. The methodological approach adopted consisted in collecting the perceptions of resource people from the Municipality of Aguégués on the state of health of their living environments, the sociological and economic constraints to good waste management. Cartographic data was collected and made it possible to produce a geomorphological map of the study environment, in order to determine the natural constraints that lead populations to behave unfriendly towards their waste. Thus, it was discovered that throughout the Municipality of Aguégués, there is no formal system for the management of household waste and excreta. The results from household surveys on the constraints linked to the establishment of an adequate waste and excreta management system show that the physical setting (65%), the types of latrines (20%) and the appearance culture (15%) are the main constraints to the establishment of a sanitation system in the municipality of Aguégués. Regarding the geographical aspect, the Municipality does not have road infrastructure to ensure the transport of waste by heavy machinery. Likewise, the nature of the soils in the municipality of Aguégués (hydro morphs) is the most important limiting factor for the hygiene and sanitation sub-sector. This type of soil does not favor the construction of sanitation infrastructure such as waste collection points and latrines that meet ecological standards.

Keywords: Waste management, Constraints, Aguégués.

INTRODUCTION

Many wetlands are open-air receptacles for illegal dumpsites of waste Most of these dumps are uncontrolled and open-air dumps, waste is rejected there in a mixed form (household, industrial and hospital) and without any treatment. prior. They cause serious damage to the environment and to human health. Among these nuisances, we can cite the problems of degradation of underground and surface water, soil, the atmosphere and public health risks (Landéou *et al.,* 2019). The increase in various nuisances and the resurgence of disasters have led to a progressive awareness of the usefulness of preserving the environment. Thus, world conferences and summits: London (1933), Algiers (1968), Brundtlnad (1987), Stockhol (1972), Rio de Janeiro (1992), Johannesburg (2002), New York (2015), have contributed to the adoption of conventions and treaties to resolve the pressing issue of environmental management (Koné, 2008 and Seibou, 2016). In Benin, this concern has been paramount in government policies. To this end, the country has ratified international agreements (Rio de Janeiro in 1992, NEPAD in 2002), signed conventions (Ramsar convention), promulgated laws, and taken practical measures in order to promote a healthy environment for all its citizens (Gbinlo, 2010). Despite the various laws, the issue of the environment in general and of waste management in particular is an inescapable reality and a topical issue, because it constitutes a burden for the populations who live mainly in lakeside areas. Indeed, lake environments are dumping grounds for waste.

Corresponding Author:** ***Toussaint Cokou Dan
Faculté des Sciences Humaines et Sociales (FASHS) de l'Université d'Abomey-Calavi, Benin.

The results of the study on the pollution of water bodies show that in general, a high proportion of the lake population dumps garbage into Lake Nokoué. Likewise, a few private pre-collection structures in some districts of Cotonou also dump waste (household and biomedical) on the shore of Lake Nokoué in Ahouansori, Agbato, Gankpodo, Ladji and Minontchou (Dovonou, 2013). The lakeside town of Aguégués has undergone strong population growth in recent years. This urban dynamic has not been accompanied by the establishment of infrastructure, basic services and an adequate waste management policy. In addition, the municipality of Aguégués, due to its proximity to the various rivers, the outcrop of the water table and the non-existence of intermediate and final landfills, faces a real waste management challenge. The hygiene and sanitation diagnostic report in 2015 shows that the town is flooded each year by water from the Ouémé River (July-November) except for the village of Agbodjèdo, the only one spared from the flooding phenomenon. The erosion of the banks and the filling of water bodies seriously threaten the environment of the town. Public and family latrines are almost non-existent. The problem of defecation management is acute and constitutes the fundamental element of pollution and the primary source of water-borne diseases. No household waste management structure exists and the problem of public and domestic insalubrityarises with acuity (wandering animals, invasion of grasses, etc.).

Material framework and study methods

Study framework: The commune of Aguégués is located between 6 ° 24'04 "and 6 ° 33'24" north latitude and 2 ° 27'12 "and 2 ° 35'56" east longitude. Covering an area of 103 km²,

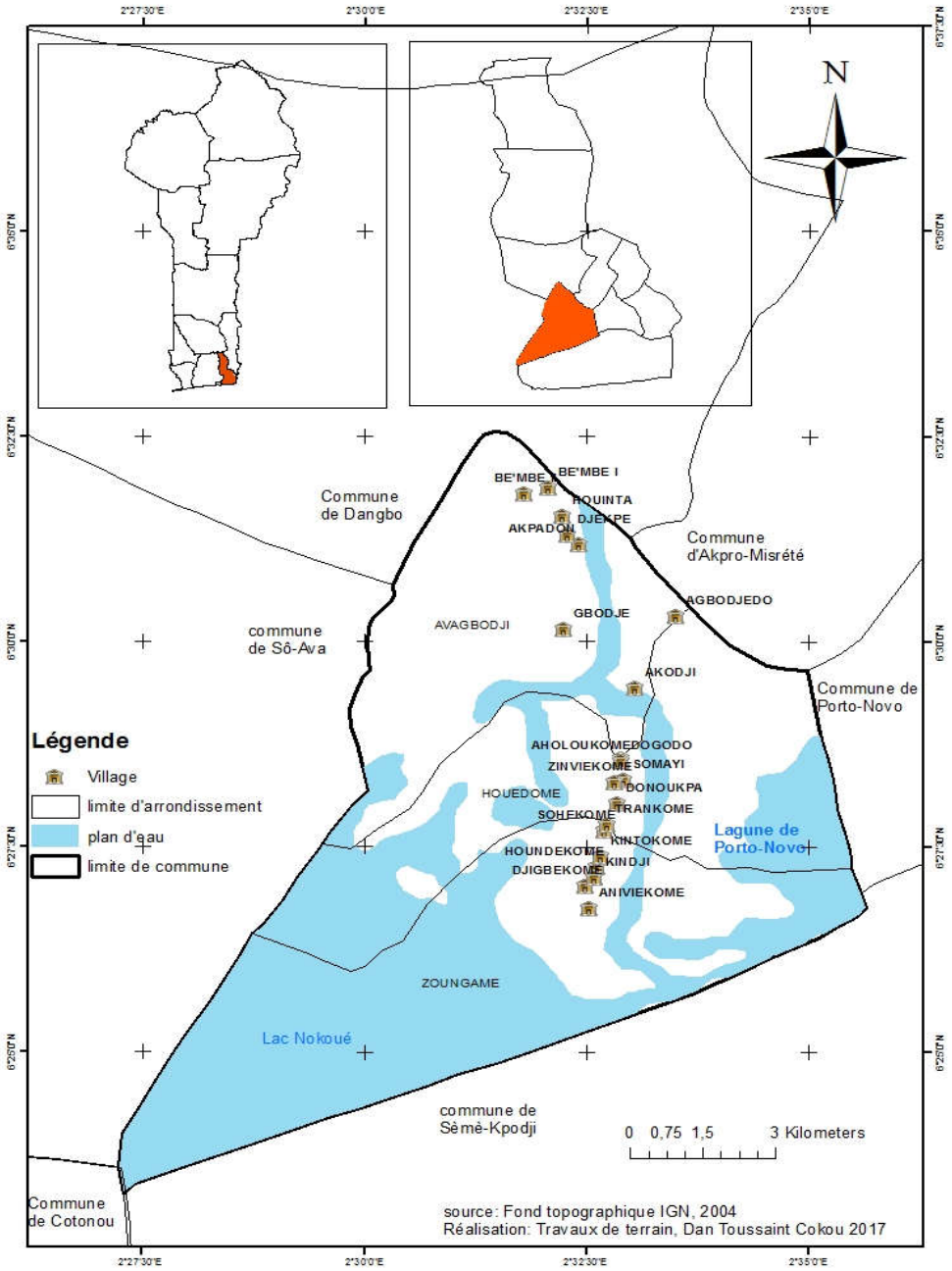


Figure 1. Geographical location of the municipality of Aguégués

i.e. 8.04% of the area of the Department of Ouémé (1,281 km²), it is bounded to the north by the Communes of Dangbo and AkproMissérété, to the south by Lake Nokoué and the Municipality of SèmèKpodji, to the east by the Municipality of Porto-Novo and to the west by the Municipality of So-Ava. It is divided into 21 villages spread over 3 districts namely: Avagbodji, Houédomè and Zoungamè (figure 1). Its population was estimated at 50,998 inhabitants in 2013. The commune of Aguégués has hydromorphic soils with black clay suitable for agriculture. These soils receive alluvial deposits during the flood which maintain its fertility. The Municipality enjoys a humid tropical climate characterized by the alternation of two rainy seasons and two dry seasons. The whole Municipality is flooded from July to October except the village of Agbodjèdo in the district of Zoungamè. The relief is characterized by two levels of elevation gradually running from south to north. In the Municipality of Aguégués, we find plains made up of floodplains crossed by the Ouémé river and its tributaries, the edges of which constitute swells of land where the populations live.

Materials and study methods

Type of studies: This is a descriptive study that took place in the Municipality of Aguégués. It aims to describe the natural constraints that condition the establishment of an adequate waste and excreta management system.

Study population: The study population involved the resource persons of the Municipality. Their perceptions of the state of health of their living environments and the causes of the waste management methods observed were collected from them. Apart from these resource persons, this study also focused on politico-administrative officials, the services of the departmental management of the living environment, the executives of the town hall, with whom the efforts made within the framework were collected. Sanitation of the study environment and obstacles related to good waste management.

Data typology: The data used within the framework of this study concern the soil, geomorphological and hydrographic

maps. These different maps made it possible to analyze the soil conditions of the environment. In addition, it was collected from the administrative services, the types of hygiene and sanitation infrastructure installed in the study environment.

Data collection tools and techniques: The cartographic data were collected at the National Center for Remote Sensing (CENATEL). An interview guide was also developed and administered to resource persons.

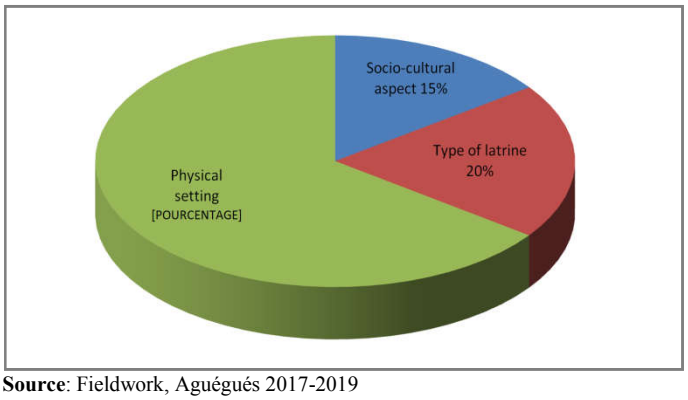
Data processing

The first step was to georeference the landfills in the study environment. It made it possible to precisely delimit the zones and the sectors of regrouping of the DSM by cartographic coordinates. Layers of various kinds (roads, localities, geomorphological structures, rivers, etc.) were superimposed. To ensure this superposition, the different layers of geographic information must have the same projection system. A geospatial reference system to identify any point on our planet from where the use of Universal Transverse Mercator (UTM). WGS 84 (World Geodetic System 1984, Zone 31N) associated with GPS. These operations were performed using ArcGIS 103 software. The ArcGIS environment was used for the map digitization operations. In the second step, the coordinates of the points taken using GPS in the different villages are processed and exported into the ArcGIS 10.3 software. The export of the maps enabled the creation of the database of dumpsites and public toilets. These data made it possible to map dumpsites and washrooms.

RESULTS AND DISCUSSION

Components linked to the establishment of an ecological management system for waste and excreta in the Municipality of Aguégués

Field surveys revealed that throughout the territory of the Municipality of Aguégués, there is no formal system for the management of household waste and excreta. As a result, it is clear that the management of household waste and excreta is in a state of total lethargy. This component really lacks vision as evidenced by the absence of pre-collection structures for waste, a final fitted out landfill and a drainage structure. The results from household surveys on the constraints related to the establishment of an adequate waste and excreta management system are presented in Figure 2.



Source: Fieldwork, Aguégués 2017-2019

Figure 2. Constraints linked to the implementation of an adequate waste and excreta management system in the Municipality of Aguégués

As shown in figure 2, the physical framework (65%), the types of latrines (20%) and the cultural aspect (15%) constitute the main constraints to the establishment of a sanitation system in the municipality. of the Aguégués.

Physical setting of the environment

Geographical position: The Municipality of Aguégués is a flood area located in the valley of the Ouémé river, the water level of which rises every year during the flood period (August-September-October). The variation in the water level in one place can reach coasts with variations of between 1 m and 2 m in places. It is a non-expandable inhabited space, under the permanent influence of the river waters, especially floods. Two land routes provide access to the town whose practicability is difficult especially in periods of high water (Street n ° 1 connecting the RNIE 3 (Vakon branch) to the Atissato crossroads-Akpadon - Kodjizoun - Avagbodji crossroads - Akodji pier + slip road Akpadon crossroads-Akpadon pier and Street n ° 2 connects Atissato crossroads to Akodji pier passing through Mami and Agbodjèdo villages). These roads, which are in poor condition, will not allow access to the study area for trucks emptying latrines and transporting solid household waste. The municipality of Aguégués is lakeside and has little non-floodable farmland. This substratum presented by the study environment does not allow the construction of adequate sanitation infrastructure such as collection points for solid household waste and ecological latrines. The most used means of transport are boats. This means of transport, although mastered in the context of transporting goods and people is not without risk, requires more precautions in the event of transporting polluting products such as excreta. In addition, accessibility of the equipment for emptying pits, which traditionally consists of heavy equipment (emptying trucks), is difficult, if not impossible, in most localities of the municipality of Aguégués, particularly in the districts of Houédomè. and Zoungamè. This state of affairs is also identical in the case of the management of Household Solid Waste (DSM) where the garbage collection machines for landfills or treatment usually required are heavy machines.

Type of soil: The Lacustrine Municipality of Aguégués is particularly affected by hygiene and sanitation problems due in particular to its physical setting which does not encourage the construction by the population of low-cost family sanitation facilities (Figure 3). In general, the nature of the soils in the commune of Aguégués (hydro morphes) constitutes the most important limiting factor for the hygiene and sanitation sub-sector (Diagnosis of hygiene and 'sanitation of Aguégués, 2015). Taking the management of excreta and wastewater, the soils encountered in the town of Aguégués do not allow low-cost technologies to be considered. In fact, the pits created can only be masonry and / or waterproof, to deal with the risks of flooding. Thus, in addition to the cost price of a latrine, a sump or a lost well to be built in the town of Aguégués which would be much higher than in the case of traditional infrastructures built on ferruginous or lateritic soils, the problem would arise of too frequent filling and emptying of pits. Moreover, this is the current situation with the public latrines that have been built on the municipal territory. There is a very short period of use of the existing public latrines due to the absence of a system for evaluation and treatment of faecal sludge. Hence, the latrines once filled are abandoned (Plate 1).

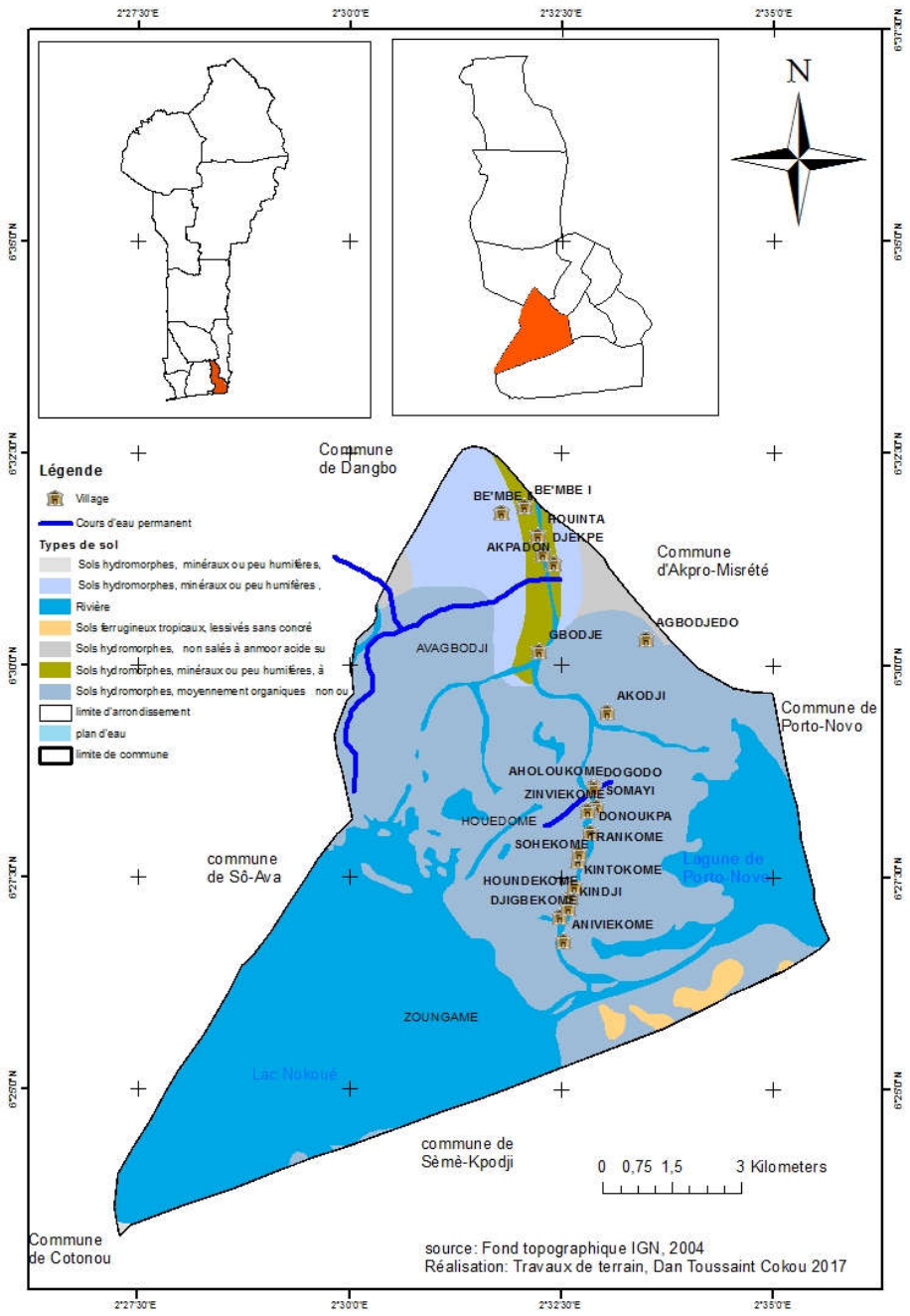


Figure 3. Morphology of the Municipality of Aguégués

Shooting: Dan Toussaint, 2018

Plate 1. Abandoned latrines in the district of Zoungamey

The lack of an adequate faecal sludge collection and treatment system forces the population to practice Free Air Defecation (DAL) and especially in the lake where wastewater and solid household waste are also dumped. However, it should be noted that in the municipal territory of Aguégués, there are two types of latrines: self-emptying latrines and emptying latrines. Self-draining latrines are latrines with leaking pits and covered with slabs supported by T-shaped joists. These latrines were built at schools, health centers and administrative offices set up under the project «Improvement of the living conditions of the populations of the Aguégués", with funding from the United Nations Development Program (UNDP). As for the latrines to be emptied, these are public latrines, with watertight pits and covered with solid slabs, built on the bank on behalf of each village. These latrines are funded respectively by Japanese cooperation, the National Community-Led Development Program (PNDCC), the Benin Environment Agency (ABE) and the Town Hall. Analysis of the two types of latrines reveals that the majority of "to be emptied" type latrines are filled and abandoned, because no device has been put in place to ensure their emptying. As for self-draining latrines, interviews with the populations show that they are the most preferred. However, the risks of pollution of the water table are high. Ultimately, considering the nature of the soils in the commune of Aguégués, the appropriate excreta management infrastructure must be characterized by watertight pits or with masonry walls, and presenting a technology allowing light emptying, that is to say say not with heavy machinery which has the handicap of not being able to access households and public places. The latrine par excellence in this context is the ECOSAN type latrine, which offers, in addition to all these characteristics, the possibility of reuse of excreta; thus the investment for maintenance and emptying. The latrines listed on the municipal territory are mainly with masonry pits. In the commune of Aguégués, there is no possibility of making latrines with unassembled pits because of the nature of the soil. All in all, given the low coverage and access rates, the situation in terms of excreta management is very critical.

Floods: The inhabited space stretches about one thousand (1000) m wide along the Ouémé River. Each year, during the period of July-November, the whole town is flooded and becomes lacustrine with the exception of a small tongue of land which connects it to the plateau through the district of Houédomè (diagnosis of hygiene and sanitation of Aguégués, 2015). However, these natural causes alone do not explain this state of affairs. Floods are also caused by human activities. These include: destruction of trees and clearing. The primary effects of such practices are the change in the level of the water table, the destruction of plant cover and fauna and the stripping of soils, the interruption of outlets linked to the exploitation of the commune's lowlands. Indeed, the restriction of outlets by their operation leads to an increase in the level of groundwater (raising the water table). Floods are a major problem for the municipality, insofar as the entire municipal territory is liable to flooding during the flood period. This factor, added to the poor management of excreta and solid household waste, greatly increases the hydro-faecal hazard in all the localities of the municipality. These floods therefore have negative consequences on the living and sanitation conditions of the populations. Obviously, floods are a factor favoring the resurgence of faecal hydro diseases because they are conducive to the development of breeding sites and the establishment of general unsanitary conditions as well as poor water hygiene which are the main determinants of these affections. According to the information gathered during the focus groups, is that another inconvenience of the floods is the destruction of houses and crops, which affects productivity and constitutes a factor of food insecurity. In addition, when floods occur, many households are forced to abandon their homes and thus become victims. In view of these various problems caused by flooding, the search for a solution is essential. However, this solution is not within the reach of the municipal administration alone. This is a cross-municipal problem, even transnational which should be the subject of a process supported by the central government.

Sociological constraints

- **Type of latrine:** Put in place consistent implementation steps in the choice of a sanitation and hygiene system in an environment must refer to the sociological aspects that characterize the inhabitants. According to data collected in the field, in the Aguégués, the installation of the current latrines did not take this sociological dimension into account. The evocation of sociology in matters of hygiene and sanitation aims to seek explanations and understandings that are typically social, and not mental or biophysical, of observable phenomena, in order to show their sociological behavior. Storing excreta in a tank near the house and smelling the gas resulting from decomposition is unbearable for the inhabitants of the Aguégués. According to the cultural habits of the area, faeces are taken in by water and not stored in a tank. These social principles have had an impact on the durability of the structures because of the options (simple latrine). Investigations also reveal that the inhabitants of the Aguégués appreciated the presence of water in the toilets. The presence of water in the latrine should be one of the criteria that should guide the options to be taken in terms of latrine construction. Finally, the majority of the Aguégués population uses water as an anal cleanser, each block should be equipped with a connection to the water network.

- **Cultural habits:** A number of traditional latrines are built on the bank at the edge of the stream. People prefer to use this type of latrine, because the excreta goes directly into the water, so there is no need for emptying. And even this type of traditional latrine costs 25F / use. Despite this method of payment, the population prefers to use it to the detriment of public latrines built on dry land. According to the sociological survey, this behavior of the population finds its explanation in the habits of the environment which dates from the time of the ancients. The reasons given by the population for their preference or rejection of latrines are:

Rejection of modern public latrines: public latrines are poorly maintained, no hygiene with public latrines, public latrines emit foul odors. Preference of traditional latrines: proximity to a toilet and home, everything that is poured into the water disappears, some respondents say that they do not like to sit on the excreta of others, others say that two holes do not face each other, the anus being considered one hole and the latrine another. For part of the population, the type of latrine used depends on the season. In the rainy season or in the period of flooding, she uses the river or traditional latrines. In the dry

season or period of recession, the population says they are forced to go to public latrines. Indeed, beyond individual motivations, the additional potential obstacles alluded to in the international literature are cultural factors that make beneficiaries of sanitation and hygiene promotion projects reluctant or resistant to new facilities. Some cultural differences are due to gender: the variations in perspective between women and men regarding sanitation systems are noted by many commentators. Views also vary between adults and children. The situations in which households find themselves are also very diverse. Different ethnic groups also have varying beliefs and customs, and attitudes towards sanitation and hygiene can vary significantly between urban and rural contexts. Latrines and hygiene practices were also subject to local taboos and traditions. For example, there is the practice of making the child drink water in which the whole family has washed their hands. They believe that this practice makes the child stronger. Regarding latrines, there is a taboo among the Fulani according to which "two holes should not look at each other". On a more general level, some participants in the discussions felt that walking into a latrine was like walking into a house that smelled badly and as such was not pleasant at all. Being in an enclosed space was considered an inappropriate space for defecating (Tearfund 2007).

This is the case for the communes of Sô Ava, Aguégués and the suburbs of certain communes such as Aplahoué, Natitingou, Djougou and Glazoué and even Cotonou. Many people living in these communities continue to defecate in the open and enjoy the practice despite the existence of latrines. The reasons given are cultural and mainly relate to the sociological realities of the environment. This therefore poses a real problem of reluctance on the part of communities to receive messages for a change of behavior in relation to hygiene and sanitation issues (final report on hygiene and sanitation in Benin, 2012). The focus group participants find it inappropriate that the latrines for women and men are in the same block. Separating the latrines for men and women at the community level should help prevent problems and misunderstandings such as infidelity, discovering the nudity of other people's wives, etc. According to them, tradition also demands it and problems of ethics, shame or indecent exposure are likely to arise. Other factors affect the importance of separating men's and women's latrines, for example, period of menstruation, different positions adopted which require a higher level of cleanliness for women than for men, etc. The observations made within the framework of the present research then show a certain synonymy of behavior vis-à-vis waste and consequently, vis-à-vis garbage. Most populations in general opt for the easy solution and this for lack of constraint, by throwing the garbage produced in their immediate environment.

Administrative and financial constraints: The commune of Aguégués like the other communes of Benin is competent to ensure the prerogatives of project management in the hygiene and sanitation sub-sector. The law gives it all the legal and regulatory means. However, one gets the impression that the commune of Aguégués is struggling to invest in this sub-sector. Indeed, hygiene and sanitation issues, although being an important public health and especially development issue, it is clear that actions in the sub-sector tend to remain in the background. This is evidenced by the share of the budget (4.2%) devoted to activities related to the improvement of the living environment in the second generation PDC. Supporting documents were given in an attempt to clarify the sources of this poor performance. For some, the financial resources available to the municipality are very limited and for others, the transfer of skills is not accompanied by that of resources (technical, human and financial).

Human constraints: Human activities contribute to flooding. In the Aguégués people devote themselves to the destruction of mangroves and trees. This favors the filling of water courses which, in times of flooding, can no longer contain runoff, especially those coming from the upper basin of the Ouémé river. Suddenly, these waters overflow their beds and flood towns. The slabs of the public latrines built in the villages are broken by the population and in times of flooding the water enters and undoes the structure and the broken latrines are self-draining, leaving the faeces in the river (Plate 2).

Shooting: Dan Toussaint, 2018

Plate 2. Broken latrines in the Commune of Aguégués

In many developing countries, insufficient capacity in terms of human resources inhibits development, particularly at the decentralized level. The multifaceted nature of WASH means that a whole range of different disciplines and skills are needed to improve the provision of sanitation and hygiene. Although the water sector is often "dominated by engineers who are comfortable with technical problems and who tend to lean towards technical solutions" (Jenkins and Sugden 2006), household sanitation "requires finer, relationship-based skills that lead engineers into situations where they feel uncomfortable". Promoting behavior change at the household level is an area "in which most countries have little skill and limited capacity." Most public agencies know little about this role or are unable to fulfill it"(Evans 2005).

Discussion

The lakeside town of Aguégués is particularly affected by hygiene and sanitation problems, particularly because of its physical environment which does not encourage the construction by the population of low-cost family sanitation facilities. Thus, to deal with this crucial deficiency in family latrines, public latrines have been built in the various districts.
The various problems identified in the area of excreta management are:

- Insufficient public latrines in relation to the number of households to be served;
- Lack of maintenance of latrines;

- Lack of an adequate faecal sludge collection and treatment system;
- Defecation in nature and especially in the lagoon (during the day, women go to the other shore to meet their needs away from prying eyes and to protect their privacy. At night, they do so directly in the river) ;
- Abandonment of public latrines once full;
- Lack of functional management committee for public latrines;
- Release of foul odors from public latrines and proliferation of flies;
- Inappropriate public latrine technological options;
- Non-involvement of local craftsmen in the construction of public latrines.

In view of the number of households to be served, the public latrines currently available are insufficient. They barely cover 0.49% of the population and have a very short duration of use, because once filled, they are abandoned. In the municipality of Aguégués, no organization has been set up for the management of faecal sludge. There is no emptying truck on the municipal territory and the nature of the soil does not allow access to this type of machine in most areas of the municipality. Thus, in the absence of an adequate system for collecting and treating faecal sludge, the latrines once filled are abandoned. Since the management of faecal sludge is not a reality in the commune, the investment in the acquisition of emptying equipment just for the commune of Aguégués would not be profitable. However, an inter-municipal emptying management authority with the surrounding municipalities could be considered. Sustainable development is a very topical global concern. The implementation of the SDGs and their adoption by States is a concrete expression of this. This requires the establishment of an adequate policy in all the areas concerned and well-thought-out implementation strategies. But many challenges exist that hinder the achievement of these goals, including the efficient and effective management of sanitation. Taking charge of this strategic sector in the municipality of Aguégués is complicated by the specific nature of the aquatic environment and the absence of reliable data, and demographic pressure. The situation of the latrines currently full and not emptied with all the health risks clearly expresses the seriousness of the situation. From an economic standpoint, we deduce an absence of objective analysis of the supply and demand for emptying and sludge treatment; an economic activity that can prosper easily. This non-existent sector must therefore be created and animated in accordance with the environmental rules in force. A potential source of employment, the sanitation of the municipality and specifically the efficient management of faecal sludge throughout its process will therefore promote the local economy, sanitation, ecotourism and therefore sustainable development. Throughout the municipal area, there is no formal system for the management of household waste. As a result, it is clear that the management of household waste is in a state of total lethargy. This component is truly lacking in vision, as evidenced by the absence of pre-collection structures for waste and a final developed landfill. Characteristically, the waste produced in the municipality is mainly composed of plastic bags, organic waste, artisanal waste (iron), bottles, cardboard / paper. Household surveys have identified three (03) modes of solid household waste management in the municipality of Aguégués. These include the accumulation of waste, the open burning in the yard, the discharge into the lagoon. Opinion polls and especially direct observation show that the predominant method of household waste disposal is that of discharge into nature. This method of waste disposal, practiced by most households in the town, has led to the proliferation of small piles of rubbish around the concessions. It should be mentioned that the waste management method varies depending on the period (flood or flood). In times of flooding, the garbage is poured directly into the lagoon. During the dry season, it is crowding and burning that is mainly practiced.

The problems identified in the field of household solid waste management are:

- Absence of pre-collection structures for solid household waste;
- Absence of garbage cans in households;
- No solid waste disposal site;
- Lack of initiative to transform household waste into compost;
- Scattering of household waste in built-up areas and in public places;
- Discharge of household waste into the river during flood periods;
- Burning of small piles of garbage during recession;

Solid household waste seen from the point of view of nuisance must be collected and treated in order to spare the environment and the population from its negative effects. The accumulation of this waste involves many risks for the environment and the health of populations. They can contribute to the spread of disease, but also pollute soils, rivers and groundwater (Gbinlo, 2010). Therefore, the collection, storage or elimination of this waste are fully sustainable development issues, hence the need for an efficient organizational mode of the household waste collection and treatment service (Nkituahanga, 2010). This sector of activity must be created and organized both to reduce the risks of nuisance relating to the current mode of management, but for the creation of wealth and employment.

Conclusion

The lakeside town of Aguégués is particularly affected by hygiene and sanitation problems due in particular to its physical environment which does not encourage the construction by the population of low-cost family sanitation facilities. It is a non-expandable inhabited space, permanently under the influence of river water, especially floods. The nature of the soils in the municipality of Aguégués (hydromorphic) constitutes the most important limiting factor for the hygiene and sanitation sub-sector. Access to the equipment for emptying pits, which traditionally consists of heavy equipment (emptying trucks), is difficult, if not impossible, in most towns in the commune of Aguégués. Sociological, administrative and financial constraints are limiting factors to the establishment of an appropriate sanitation system in the Aguégués.

REFERENCES

Dovonou, C. 2013. Qualité des eaux de puits de la commune de Zè. Mémoire de DESS ; CIFRED/UAC/72p.

Evans, B. 2005. SecuringSanitation: The compelling case to address the crisis. Rapport produit par le Stockholm International Water Institute (SIWI), en collaboration avec l'Organisation mondiale de la santé (OMS) et commissionné par le gouvernement de Norvège pour

contribution à la Commission pour un développement durable.

Gbinlo R. E. 2010. Organisation et financement de la gestion des déchets ménagers dans les villes de l'Afrique Sub-saharienne : Cas de la ville de Cotonou au Bénin, Laboratoire d'économie d'Orléans, Thèse de Doctorat 237 p.

Jenkins, M., etSugden S. 2006. Rethinking Sanitation – Lessons and Innovation for Sustainability and Success in the New Millennium, document thématique du PNUD sur l'assainissement, London School of Hygiene and Tropical Medicine, Janvier 2006.

Kone B. *et al.* 2002. Problématique des programmes de développement en milieu urbain et périurbain pauvre : cas du programme IMUP/ECED dans la commune de Yopougon, CSRS, Abidjan, 14 p.

Landeou R.C., Akpoyètè D. H., Azonhe T., Houssou C.S. 2019. Conséquences de la mauvaise gestion des excréta humains et des eaux usées domestiques sur l'environnement et la santé humaine dans la commune de Dassa-Zoumè. Centre Béninois de la Recherche Scientifique et Technique 03 BP 1665, ISBN: 978 – 99982-929-0-1.

Nkituahanga Yenamau A. 2010. Problématique de la gestion des ordures ménagères dans la ville de Kinshasa, cas de la Commune de Masina, mémoire de maîtrise, Faculté des Sciences Agronomiques / Université de Kinshasa, 34 p.

SeibouIdrissou, M.A. 2016. La communication comme outil de gestion et de valorization des déchets dans la ville de Cotonou au Bénin. Thèse de doctorat, EDP/FLASH/UAC, 317p.

Tearfund, 2007. Assainissement et hygiène dans les pays en voie de développement: identifier les obstacles et y apporter des réponses Étude de cas au Burkina Faso. Rapport 48p http://tilz.tearfund.org/Research/Water+and+ Sanitation.

****