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# **Environmental Legislation Impacts on the Protection of Nature in Developing Countries: the Case of Banned Categories of Plastic Packaging in Cameroon**

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**ABSTRACT:** Demographic growth and urbanization are the principal causes of the multiplication of various types of waste with multiple damaging effects on the environment. Managing waste has as such become a subject of great concern in all countries even developed ones. In Cameroon, waste management is a much thornier problem to solve as most market items are packaged in non-biodegradable plastic materials. Investigations were made in collaboration with the government to assess these materials and it revealed their overwhelming effect on environment and human health. Thus, a joint ministerial order was taken in favor of plastic packaging ban. This study was carried in-between 2013 and 2015 so as to gauge the capacity and assess the reliability of this order on plastics in nature. Throughout this period, a 6% (2625.04 kg) reduction in the amount of plastic packaging was observed.

**KEYWORDS:** Cameroon, Developing countries, Environment, Order, Plastic packaging

## **I.INTRODUCTION**

Till date, waste management in countries especially those with developing economies still remains a challenging problem to solve. Though these countries do have specialised structures in charge of waste management, an important fraction of these wastes are still left uncollected and thus abandoned in nature. According to [1]; [2] the level of domestic waste collection in most African cities in general and Yaounde in particular does not exceed 60% with an average value within 30% - 40%.

In addition, most developing countries have very little pragmatic regulations as far as waste management is concerned. Some laws may exist on waste management in these countries, however at the level of implementation much is still to be done.

Poor urbanisation planning, poor road infrastructure, rapid growth rate, inadequate waste collection structures are some of the main factors that further complicate the effective management of waste in developing nations. These parameters encourage the rising rate of unauthorised dumping of waste in nature and because of their heterogeneous nature, they decompose at different rates.

In Cameroon for instance, many researchers [3]; [4] have identified that the solid domestic waste produced in Yaounde in particular regroups the following main categories: *Plastics; paper/cartons, food waste, compound green waste, bottles/glass, tins/cans, fibre*. The non-biodegradable components include paper/cartons, plastics, bottles/glass, tins/cans and fibres. The term 'non-biodegradable' is rather vaguely used because with time, materials like paper, carton, leather, textile and fibre do decompose. Nevertheless, for convenience the term is used here to put into one group those wastes that are not readily decomposable by the biological agents such as bacteria, microbes and fungi [3].

From all the above category of waste, plastics constitute the most abundant, bulky, and harmful category, a nuisance to the environment and society. It is used at every aspect of daily life such as bagging of food and water for direct consumption, conservation of food, transportation of materials, etc. The indefinite period of time that it takes for the average plastic packaging to breakdown can be literally hundreds of years.

Till date, all plastic packaging that are used in Cameroon are made from non-biodegradable materials. They impact considerably on the economics, environment and human health. When found in nature, they end up scattered throughout and once on agricultural lands for instance, they affect rate of water infiltration into the soil thereby



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impacting negatively on agricultural productivity. Also, when found in the aquatic ecosystems they impact on the flora and fauna. It's worth mentioning that they are one of the main causes of floods during rainy seasons as they clog the drainage systems. Additionally, due to the lightweight nature of the plastic packaging they are easily being blown and littered throughout the streets which hindered the numerous efforts of the country to keep clean. The plastic packaging which discarded are frequently being burned and this generates toxic fumes to be released in the air.

Because of all these negative aspects link to plastic packaging, its manufacturing, use, detention, importation and commercialisation within the country's boundaries has been prohibited. By October 2012 a joint ministerial order was signed by the Ministry of Environment, Protection of Nature and Sustainable Development and the Ministry of Trade on the manufacturing, importation and commercialisation of plastic packaging. Its implementation effectively took place as from April 2014. In-between signing the order and its effective implementation, a massive sensitisation campaign over the national territory was carried out under the leadership of the Ministry in charge of the environment.

Nonetheless, not all the plastics were banned, because a total plastic packaging ban is highly improbable since the government had provided little or no socially acceptable alternatives. Only plastics packaging of thickness less than 60 microns were banned (1micron=1/1000 mm). These were found to be the most abundant fraction of the plastics used within Cameroon. Retailers across the country preferred using these thinner packaging because they got more pieces per unit weight. This profuse availability of plastic packaging makes its control very difficult.

However, plastic packaging of thickness greater than 60 microns (and other non-biodegradable materials) though authorised for commercialisation were subjected to strict environmental regulations.

Despite the order, many people kept on utilising and commercialising illegally these plastic packaging. For instance, between 2014 and 2016, the Cameroon Environmental Authority confiscated 44982 kg of plastic packaging (though large numbers still slip through) from the Abiergué drainage basin [5].

The aim of this paper is to analyse the impact of the law on plastic regulation within Cameroon in general and Yaounde in particular. More specifically it will be to:

- ❖ Assess the dynamics of plastic within the environment (drainage system) before and after the implementation of the Joint ministerial order.
- ❖ Carry out a situational analysis of the Joint order No. 004 of the Ministry of Environment, Protection of Nature and Sustainable Development and the Ministry of Trade

The concentration of plastic packaging in nature is a key indicator of its use thus, carrying out such an investigation is not just going to enable appreciate the potential impact of plastic on the environment via their amount, but equally the success of the implementation of the order.

## II, METHODOLOGY

### A.Presentation of the Area of Study

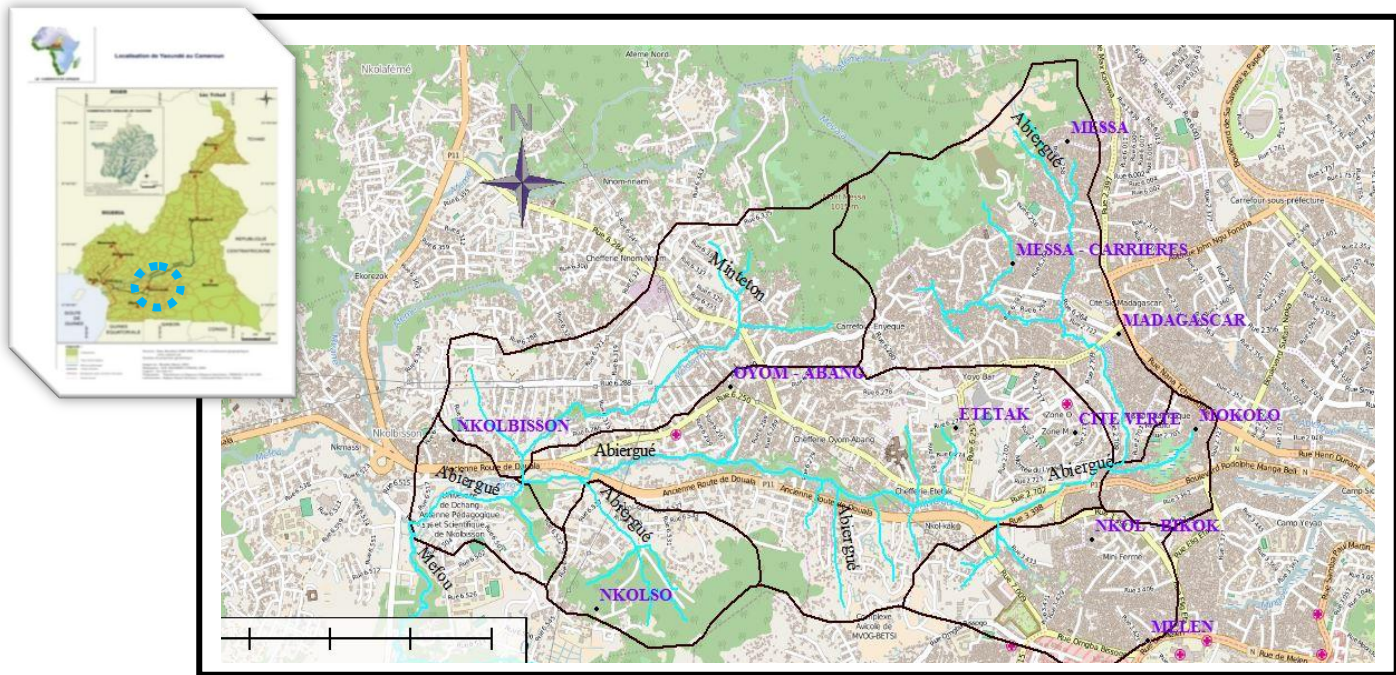
Yaounde is the administrative and political capital of Cameroon, located between latitudes 3° 47'-3° 56' North and longitudes 11° 10'-11° 45' East (Fig 1). A drainage basin (Abiergué) was selected in this town among many others in order to carry out a study. This basin is characterized by a dense hydrography and high rate of urbanization. It was chosen because it regroups all the different settlement patterns found in the city of Yaounde in particular and in Cameroon in general. It encloses as well residential, commercial and administrative districts.

This drainage basin is as such well positioned (with respect to the context) to illustrate the consuming habits of the population of Yaounde and consequently, provide representative information on the flux of plastics within the society and environment.

The relief of the study area also has the main features found in Yaounde which is that of high hills, low lying areas with swamps etc. The population of the study area is estimated at 201 677 inhabitants, with a growth rate of about 3.1% [6]. This rapid increase in population pushes people to seek and occupy land, in risky areas (steep slopes, valleys) of existing districts.

Yaounde is a highly cosmopolitan city regrouping most of the ethnic groups of Cameroon. The average altitude of the city is estimated at 726 m with a surface area estimated in 2012 at 136.14 km<sup>2</sup>. Yaounde has witnessed a very rapid growth estimated at over 3 % a year with a population estimated at 1 881 876 inhabitants [7].

The rainfall pattern in Yaounde is bimodal with two dry seasons and two wet seasons. The average annual precipitations are about 1600 mm [8]. The inter-annual average monthly temperatures vary from 22.4°C and 25.7 °C with 1500 – 1750 hours of annual sunshine [9].



**Figure 1: localization of Yaounde in Cameroon (top left) and the Abiergué drainage basin (right)**

### **B. Households and Housing Structure**

Just like the majority of the towns of tropical Africa, Yaounde for the past four decades had known a rapid growth [10]. Unfortunately, the absence of a coherent urban policy has led to uncontrolled urbanization. The city of Yaounde is characterized by structured and spontaneous settlements [6]. Spontaneous districts are characterized by poorly constructed houses which are much closed one from the others and relatively average road conditions. The density in these districts varies but could be as high as 320 persons/ha.

Structured districts have a moderate population density of about 200 inhabitants/ha. These districts are usually characterized by buildings of very good quality (with permanent construction material being used for the construction purpose) and good road configurations (nature and size). The study area is drained by the principal stream from which its name was derived: “Abiergué”.

### **C. Data collection**

The plastics collected together with other domestic wastes at the level of the drains are an effective indicator of the amount and frequency of their use. The presence of plastic waste within these drains is due to the high rate of unauthorized dumping in nature.

When the solid particles were conveyed to the drainage channels by runoff, they were retained by structures (soil traps) designed to play this role. These soil traps were constructed, and install within the experimental channels with respect to their corresponding dimensions. They were made up of a wooden frame on which wire gauze were attached. Small spacing were chosen for the wire gauze but not too small either. Indeed, the objective was not to prevent water

from flowing but to retain gross particles and slow the flow of water so as to enhance the efficient collection of solid domestic waste. The wire gauze had net spacing of 2 cm.

In Yaounde in particular and in Cameroon in general two main types of channels exist (with respect to their nature): natural channels and artificial channels. After every rain event a field visit was done in order to collect, sort, weigh and readjust the trap before the next rain events. After removing the waste in the drain most often with a spade, the various components were measured using an electronic spring balance of carrying capacity 50 kg.

The data were collected for a period of two years (periods of rainfall), from 2013 to 2015. Microsoft Excel was used to save, edit and process the multitude of data collected.

**D.Data collection points**

The Abiergué drainage basin counts within its boundary 11 neighborhoods characterized mainly by two settlement patterns: Structured and Unplanned (TABLE 1). Four neighborhoods were chosen after a general classification of the entire neighborhoods found within the drainage basin (two among structured neighborhoods and two among spontaneous neighborhoods) as illustrated in fig 2. Within each neighborhood both natural and artificial channels were targeted for the experimental purpose.

**Table 1: Settlement pattern of neighborhoods in the Abiergué drainage basin**

District	District type	(Household per ha)	House density	Road accessibility
Cité-Verte	Structured	15	(Low)	Good
Nkolbisson	Structured	19	(Average)	Good
Oyomabang	Structured	24	(Average)	Average
<b>Average</b>		<b>19</b>	<b>Low to average</b>	<b>Average to good</b>
Etetack	Spontaneous	30	(High)	Poor
Melen	Spontaneous	35	(High)	Average
Messa	Spontaneous	32	(High)	Poor
Nkolso	Spontaneous	13	(Low)	Poor
Nkolbikok	Spontaneous	14	(Low)	Average
Mokolo	Spontaneous	33	(High)	Average
Carrière	Spontaneous	32	(High)	Average
Madagascar	Spontaneous	37	(High)	Average
<b>Average</b>		<b>28</b>	<b>Low to high</b>	<b>Poor to average</b>
<b>Average</b>	<i>Both district type</i>	<b>26</b>		

Source: [11]



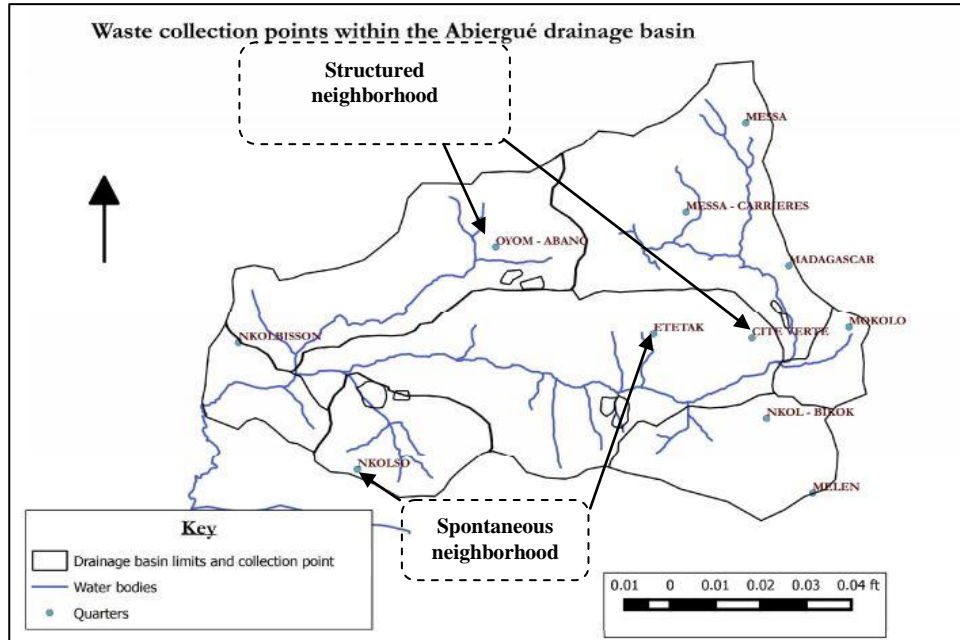


Figure 2: spatial localization of experimental points within the area of study

### E.The joint ministerial order on the ban of non-biodegradable packaging [12]

Introduced in Cameroon with colonization, plastics have become the most used material. They are imported, locally produced and commercialized; their forms and quality vary in order to meet the needs of the consumers. Nevertheless, though useful, they have become a major environmental preoccupation. Generally dumped in nature, they considerably affect the soil infiltration rate due to the fact that they get embedded in the soil and its impact on the drainage system is alarming. Unfortunately, little or no recycling process exists to control this material. Moreover, they are used in the majority of homes to package cooked food and when these plastic materials dilate under these hot conditions they release chemical compounds that bind with the food and on the long run can give rise to serious health problems. These are the main reasons that induced the creation and implementation of this joint order. The banning concerns in priority non-biodegradable plastic packaging which have thickness equal or less than 60 microns as well as materials such as glasses or metals. According to the Ministry in charge of the environment, this type of packaging is light, easily carried away by wind, difficult to recycle, often of single use and discarding it in nature which severely contributes to pollution. The waste collection company 'HYSACAM' as well affirmed that, 6 % of household waste is made of non-biodegradable plastic packaging among which plastic packaging of thickness less than 61 micron accounts for 3 % [13]. About 40.000 tons of non-biodegradable plastic wastes are as such produced yearly, in which 22.000 tons accounts for the category of plastic packaging of thickness less than 61 microns.

The ministerial order also known as “joint order n°004/24 October 2012, of the Ministry on Environment Protection of Nature and Sustainable Development and the Ministry of Trade”, aims on a short term to limit the quantity of non-biodegradable plastic packaging in the environment by 30%.

In order to achieve a better management of non-biodegradable materials in general and other plastic wastes in particular, the comprehension and adhesion of the population to the joint order is required. For an efficient implementation of the ministerial order, both environmental and criminal penalties have been provided. As a matter of fact, the seizure and destruction of these materials began in April 2014, without prejudice of the above stated penalties.

The joint ministerial order encompasses the following:

It categorizes the type of non-biodegradable plastic packaging and specifies and stated banned those equal or under 60 microns (1micron=1/1000 mm) of density (paragraph 7 (1)). It limits the production, importation, holding and trade of these materials and its base components to an environmental authorization. (Paragraph 7 (2)). It imposes the producer or manufacturer to add a comment or note on the packaging. This note should include: the thickness, the nature (biodegradable or non-biodegradable), the name and address of the producer, imported or locally produced. (Paragraph 8). All the legal manufacturers or processors of non-biodegradable plastic packaging are imposed to manage their

produce once found in nature. They will do this by increasing the support for recycling, reuse and other forms of valorisation. (Paragraph 3). Legal producers and distributors of plastic packaging are to provide a management system in order to collect, recycle or destroy these packaging. (Paragraph 6). Legal producers have to put in place a waste management and follow up plan in regard to the national strategy on waste management, a quarterly report should be addressed to the Ministry in charge of environment. (Paragraph 5).

The management of non-biodegradable packaging especially plastic material is a crucial fact in Cameroon. The banning of these materials is a respond to the environmental preoccupation and the waste management in hole.

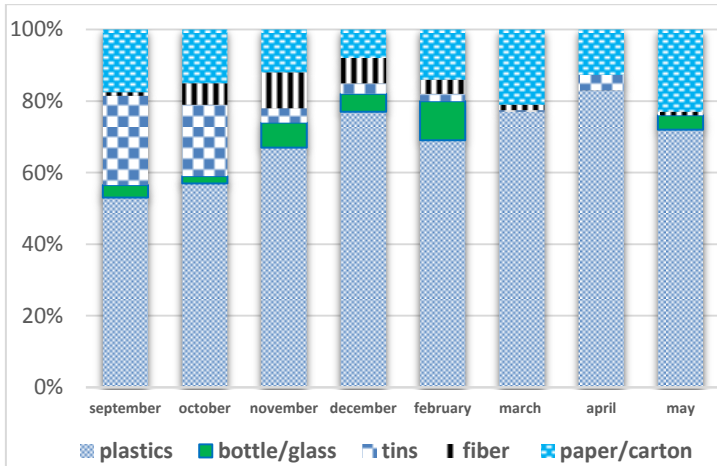
**III. RESULTS AND DISCUSSION**

**A. Dynamics of plastics packaging within the environment**

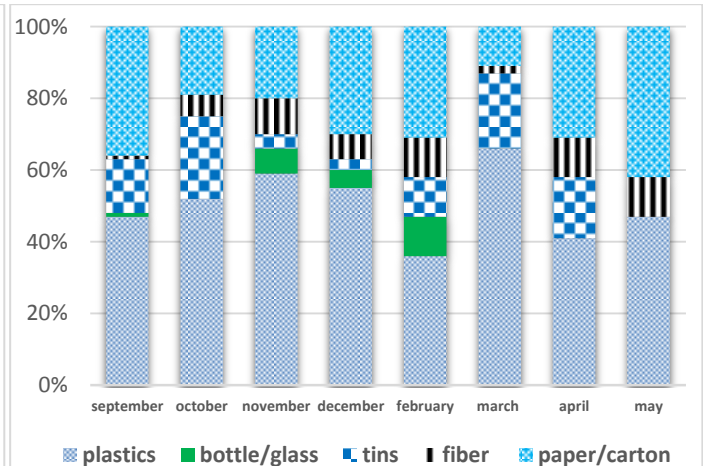
Once the waste was collected from the drain, a detailed analysis of the non-biodegradable components was carried out. As indicated earlier the waste collection process was done in two phases: *before* and *after* implementation of the *joint ministerial order* on banning, use and commercialisation of plastics packaging of thickness less than or equal to 60 microns. The same periods (months of rainfall) and experimental sites were targeted for the experimental purpose so as to minimise any bias of the final results. The various components were weighed and the results were converted as percentages of the entire non-biodegradable.

Fig 3 and fig 4 illustrate the percentage value of the various components of non-biodegradable waste collected on the field on monthly basis by 2013-2014 and 2014-2015 respectively.

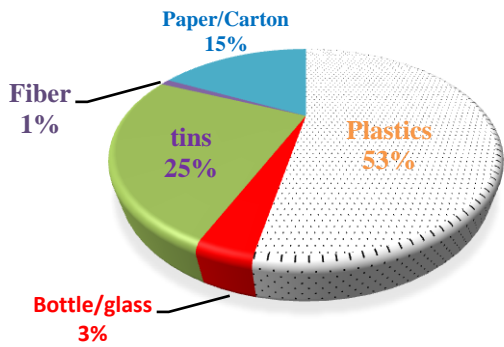
A look at both figures shows a general variation in the components of the non-biodegradable waste. Over the 2013 and 2015 period, a reduction of about 6%, in the concentration of plastics was observed, 18% increase in the concentration of paper/cartons, 10% reduction in the concentration of tins, 2% reduction in the concentration of bottles/glass and a relative stability in the concentration of fibre (1%). This is better illustrated in fig 5 and fig 6.



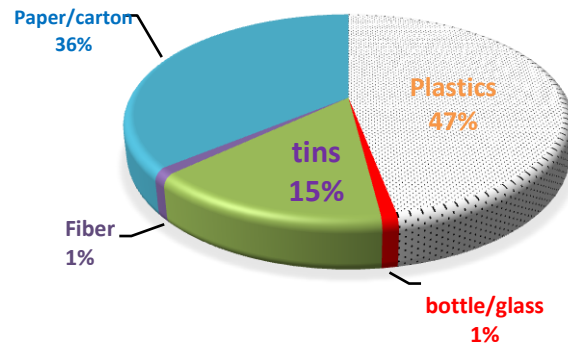
**Figure 3: percentage value of the components of the non-biodegradable waste on monthly (rainy months) basis for the period 2013-2014**



**Figure 4: percentage value of the components of the non-biodegradable waste on monthly (rainy months) basis for the period 2014-2015**



**Figure 5: Proportion of the components of non-biodegradable waste 2013-2014**

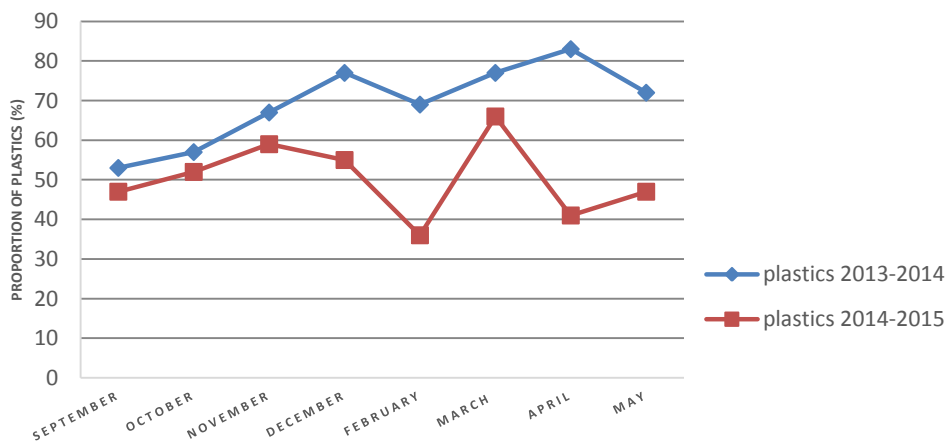


**Figure 6: Proportion of the components non-biodegradable waste 2014-2015**

**B. Plastic variation**

The plastic component was observed to have reduced though relative lower compared to tins. Nevertheless, looking at the concentration or proportion of plastic in the society a 6% decrease can be considered of significant importance with regard to the surface area of the drainage basins. Indeed, the 6% decrease corresponds to 2625.04 kg collected on the drainage basin.

Fig 7 illustrates the variation of plastic packaging over the period of experimentation (from September 2013 to May 2015). A general decrease of the plastic packaging is observed though not very significant at the beginning. However, by 2015 a more remarkable decrease is observed in the concentration of plastic packaging in nature despite the fact that an important increase is as well observed. This can be justified probably by the illegal commercialisation of the plastic in nature.



**Figure 7: Plastic evolution over time (2013-2015)**

**C. Analysis of the joint ministerial order**

The ministerial order related to the ban of non-biodegradable packaging, aims to solve environmental pollution problem. Yet, it does not respond to all the preoccupations and opens a debate on it success.

If it is acknowledged that this order is a capital instrument in the preservation of the environment, nevertheless, some relevant observations are to be done. Through an objective analysis, good points of the joint ministerial order are observed in its content. This is an innovation in the waste management process looking at its objectives and the awaited



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results. In a specific approach the ability to impose a code of conduct to the economic operators of the plastic sector is praiseworthy although it has an economic impact on them. Also, rendering compulsory the tracking of non-biodegradable waste by the producers, importers and distributors, enables a control of waste production through a waste data base obtained with the quarter reports.

Moreover, the most noticed points are: firstly, the substitution of what can be called a “pollution economy” with a “green economy”; which implies a suppression of non-biodegradable plastic packaging less than 60 microns in the market with an alternative biodegradable material. On the other hand, the success of this project to fight against non-biodegradable plastic waste lies on the implementation of the stated environmental and criminal penalties.

Based on the Cameroonian blueprint law on environmental management of 1996, the environmental penalties promote the polluter-pays principle; which impose charges on polluters aimed at prevention, reducing and fighting against pollution and the rehabilitation of polluted areas. (art.9c). Criminal penalties are provided by both Cameroonian environmental law and criminal code with sanctions of imprisonment and a fine to pay.

Nonetheless, this order encloses structural weaknesses. Theoretically, the joint order is a major achievement but on the practical aspect, some of its content and other phenomenon could render its implementation difficult. Looking at the tracking and collection conditions in the field of production of non-biodegradable plastic packaging, the success still remains a thorny issue. This because of the precarious waste collection system, the sale system (distribution and sales are done not only in the supermarkets but also through peddler and retailers) and the absence of a recording system of the purchaser. Instead, it should have been mentioned in addition, the organization of the plastic waste collection in households and precarious neighborhoods between the distributors, the sanitation enterprise and the identified recycling associations (for there is no major recycling known enterprise in Cameroon). The other difficulty is the absence of a platform grouping waste management stakeholders in other to harmonize the process and reinforced the various associations involved in plastic waste recycling.

Likewise, there is no existing instituted empowered commission to conduct, manage and control the stocks of seized plastic packaging (the seized packaging are place in the warehouses of the Ministry in charge of environment over the national territory. The control from the seizure point to the ware house is not efficient).

Furthermore, the implementation of this order has a serious impact on economic sector. This issue could easily favor illegal transaction (from the producer to the consumer), corruption (between the controllers in charged and the distributors), and smuggling (porous borders generally cause the illegal entry of products). The ban of these non-biodegradable plastic materials has cost to the government treasury the loss of taxes as well as the loss of good numbers of jobs.

The relation between waste management and drainage system in flood management is evident. The joint order is a quite praiseworthy means chosen to mitigate floods risk and their impacts, also, to preserve environment and human health. However, the economic stake is important enough to enable a substitute to these banned materials, which up till now are still used because of the scarcity and the cost of the recommended materials. Actually, the implementation of the joint order is effective, but goes on with difficulties, for non-biodegradable plastic packaging are still present in markets and homes.

## IV.CONCLUSION

As long as humans have lived in settled communities, solid domestic waste generation has been an unavoidable and decisive issue both in developed and developing nations. In developing nations much is still to be done in the domain of waste management. Little or no pragmatic laws exist on controlling imported or manufactured products that end as waste. The concentration of plastics in nature has as such exploded and its impacts on both man and his environment are of paramount importance. Indeed, plastics are used in everyday life aspect especially in the domain of packaging of food items cold or hot. This intensive use increases the amount of plastic in nature as such, affecting the various ecosystems but most important the fact that these materials are used for packaging food items especially hot food causes the latter to release hydrocarbon compounds that bind in food and cause serious diseases such as cancer.

Because of these negative aspects, the Cameroon government via the Ministry of Environment Protection of Nature and Sustainable Development as well as the Ministry of Trade signed a joint order so as to control plastics, glasses and metals within the Cameroon territory.

This work is carried out to analyze the joint order relating to the use manufacture, importation and commercialisation of plastics packaging of thickness less than or equal to 60 microns and also, assess its impact within the society through a keen study on the quantity of plastics in nature before and after implementation of the order.





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It was observed that between 2013 to 2015 plastics materials had decreased by 6%, 10% reduction in the concentration of tins and 2% reduction in the concentration of bottles/glass. However, the absence of a sorting mechanism in waste management at household and market levels makes their effective decrease difficult.

The joint order initiated by the government is a major achievement as far as waste management is concerned on the theoretical aspect but on the practical aspect, some parts of its content and other phenomenon could render its implementation difficult. This is because of illegal transactions, corruptions and smuggling that hinder the efforts of the state to efficiently manage plastic waste.

For this management to be efficient, the population should be continuously sensitized on the danger of using these materials and their impact on the environment. Furthermore, the state through different ways should propose and put in place socially acceptable solutions that will cause people to tend toward its utilization while leaving away plastic materials.

## REFERENCES

- [1] Thuy, T. T., 1998. Pour une gestion efficace des déchets dans les villes africaines : les mutations à conduire. Les Cahiers du PDM (Programme de Développement Municipal), n° 1, 59 pp.
- [2] Syriaque, T., 2007. Appui à la protection et à la Régénération de l'Environnement et des Ressources Naturelles (APREN) : plans de gestion durable des déchets solides dans les sites pilotes de la ville de Yaoundé, Cameroun, 179 pp
- [3] Achankeng, E., 2004. Sustainability in municipal solid waste management in Bamenda and Yaounde. Ph.D. dissertation. University of Adelaide, Adelaide, Australia, 350 pp.
- [4] Ngnikam, E., Tanawa, E., 2006. Les villes d'Afrique face à leurs déchets. In: Yves-Claude, Lequin., (editors), University of Technology of Belfort-Montbéliard, 281 pp.
- [5] MINEPDED, 2015. Assess report on the implementation of the joint ministerial order, relating to some plastic packaging categories prohibition. Regionaldelegation, Center, Yaounde, Cameroon, 12 pp
- [6] Berger, L., 2010. Élaboration d'un plan de déplacements urbains de la ville de Yaoundé. Rapport diagnostic version final, 329 pp.
- [7] INS., 2013a. Évolution de la densité de la population du Cameroun par région et par département entre 1987 et 2013. Retrieved April 06, 2014 from [http://www.stat.cm/downloads/Statistique/Structurelle/Evolution\\_densite\\_population\\_Cameroun\\_region\\_1987\\_2013.htm](http://www.stat.cm/downloads/Statistique/Structurelle/Evolution_densite_population_Cameroun_region_1987_2013.htm)
- [8] INS., 2013b. Étude pilote sur la pollution des eaux de surface et souterraines à Yaoundé et son impact sur la santé des populations riveraines (epess) rapport technique. Retrieved April 06, 2014 from [http://www.statistics-cameroon.org/downloads/La\\_population\\_du\\_Cameroun\\_2010.pdf](http://www.statistics-cameroon.org/downloads/La_population_du_Cameroun_2010.pdf)
- [9] Kouam, K. G. R., 2013. Vers une gestion rationnelle de l'eau dans une situation complexe d'urbanisation anarchique dans un pays en développement : Cas du Bassin Versant de L'Abiergué. PhD. dissertation. Université de Liège, Wallonia, Belgium, 265 pp.
- [10] Mougoué, 2001. Analyse des mécanismes de densification du site parcellaire : cas de Yaoundé. Séminaire sur l'étude comparative des réseaux des services urbains à Barcelone et Yaoundé. Leseau. Ensp. Univ de Yde I pp. 47-68
- [11] Ndongo, B., Fonteh, M. F., Ngu, J. L., Lako, M. S., 2016. Residential solid waste management in cities with developing economies: case study of Yaoundé, Cameroon. IOSR Journal of Environmental Science, Toxicology and Food Technology. Volume 10, Issue: 2 (Version- I), pp 34-43
- [12] The joint ministerial order n° 004 MINEPDED/MINCOMMERCE of October 24<sup>th</sup>, 2012; related to the production, importation and commercialization of non-biodegradable plastics.
- [13] Government and civil society dialogue 31<sup>st</sup> October 2013
- [14] The blueprint law relating to environmental management, 1996, n°96/12 of 5<sup>th</sup> August.