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B. RESEARCH AND DEVELOPMENT

Paper's Title

Logical Controversy of African Universities in the Promotion of Sustainable Development: the Universities, in between Protective Theories and Destructive Practices of the Environment. The Case of UCAD's waste management

By

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ABSTRACT

The Regional Conference on Higher Education in Africa (RCHEA) which was held in Dakar from 10th to 13th November 2008, ended with very interesting conclusions. In order for Higher Education to be outstanding in terms of effectiveness, and be result oriented, the Conference recommended to policy makers and institutions to see to it that this sub-sector of the Educational System “*contributes in a decisive manner in the establishment of democracy in sustainable development and in the achievement of the millennium goals for a holistic development.*”

The role of Higher Education in achieving sustainable development is fundamental. More importantly, as the United Nations’ General Assembly, during its 57th summit in December 2002 has declared the period of 2005 – 2014 as the UN’s Decade for Education towards Sustainable Development (DESD), having UNESCO to see to the implementation of this goal.

The concept of sustainable development is an issue of polysemy. The ambiguous nature of this concept holds, as there are many (demographical, environmental economic etc) dimensions to it. It is therefore essential to note that sustainable development generally goes with proper environmental management especially, with respect to natural resources. In this regards, countries amending the OMD declaration aim at assuring sustainable environment before the 2015 deadline:

- Integrating the principles of sustainable development in national programmes and policies and put an end to the loss of environmental resources.
- To improve on the standard of life of at least 100 millions of people before 2020
- To reduce to half the proportion of the population without continual access to portable water and basic health care before 2015.

The promotion of sustainable development by Higher Education is faced with problems. In Africa, universities that must seek the good cause and invest without restrain in sustainable development are carrying out ambivalent actions. In this sense the universities present a logical controversy in the sense that they make room for protective theories and destructive practices of the environment in their activities. Waste management in the university communities is a clear example.

The universities are equipped with superstructures. Most often than not, they are very magnificent in terms of their surface dimensions on one hand and their demographic sizes on the other hand. The universities produce dangerous wastes (such as biomedical wastes and alloy residues, waste of toxic products) capable of having harmful effect on the proper functioning of the ecosystem and hinder the proper management of the environment.

In terms of sustainable development, the UCAD has in place schools and institutions that serve as training centres on environmentally related issues through education and research. In this respect, the university offers varieties of result-driven programmes. In addition, it also organizes activities for the benefit of the scientific communities and assists the government in terms of decision making. Finally, the university also serves as a capacity building centre for Environmental activists by organizing environmentally related intensive courses, seminars and industrial attachments. The University carries out a result-driven programme (UCAD’s Citizens Activities) by which students contribute to the development of Senegal.

However, teaching and research activities in (Applied Medicine, Chemistry, and Physics carried out in the laboratories) as well as in sanitation amenities within the university generate a great deal of biomedical waste and toxic alloy wastes. The management of these wastes is faced with numerous problems. From the collection to the discharge of these wastes, solid as well as liquid, is done in an unpleasant manner. Solid wastes are not sorted out. Worst of all, they are incinerated creating health and hygiene related problems to the public. This situation exposes the university community to the risk of contracting diseases related to the breathing of toxic gas. wastewaters are not channeled to a purification centre, but are left in their raw state without considering the fact that they are made of large quantities of detergents, oily as well as toxic products. By discharging these wastes into the sea, the university remains a potential vector for marine pollution. With respect to this, the university is unavoidably participating in the degradation of the marine ecosystem and poses serious problems in terms of managing natural resources especially, the fishery resources.

ORGANS AND ACRONYMES

ADEA	: Association for the Development of Education in Africa
AAU	: Association of African Universities
ICFDS	: Inter-States Committee for the Fight against Drought in Sahel
CMAE	: African Ministerial Conference on the Environment
CSGC	: Main UCAD Campus
EDEQUE	: Doctoral School for Studies on Water, its Quality and Usage (Ecole doctorale Eau, Qualité et Usages de l'Eau)
ED-ETHOS	: Doctoral School for Studies on Man and Society (Ecole doctorale Etudes sur l'Homme et la Société)
ED-JPEG	: Doctoral School of Law, Politics, Economics and Management (Ecole doctorale Sciences Juridiques, Politiques, Economiques et de Gestion)
ED-PCSTUI	: Doctoral School of Physics, Chemistry, Science of the Earth and the Universe and engineering (Ecole doctorale Physique, Chimie, Sciences de la Terre, de l'Univers et de l'Ingénieur)
ED-SEV	: Doctoral School of Science, Health and the Environment (Ecole doctorale Sciences de la Vie, de la Santé et de l'Environnement)
EISMV	: Inter-state School of Medicine and Veterinary Science (Ecole Inter-Etats des Sciences et Médecines Vétérinaires)
FLSH	: Faculty of Arts and Humanities (Faculté des Lettres et Sciences Humaines)
FSJP	: Faculty of Law and Politics (Faculté des Sciences Juridiques et Politiques)
FST	: Faculty of Science and Techniques (Faculté des Sciences et Techniques)
GIDEL	: Integrated Management and sustainable Development of Littoral Zones and the West African Coast (Gestion Intégrée et Développement durable des zones Littorales et côtières Ouest africaines)
GIRMAC	: Integrated Management of Marine and Coastal Resources (Gestion Intégrée des Ressources Marines et Côtières)
ISE	: Institute of Science and Environment (Institut des Sciences de l'Environnement)
IST	: Institute of Science of the Earth (Institut des Sciences de la Terre)
IUPA	: Institute of Fishing and Aquaculture (Institut Universitaire de Pêche et d'Aquaculture)
MPE	: Professional Master Degree in Environmental Studies (Master Professionnel en Environnement)
OMD	: Millenion Development Goal (Objectifs du Millénaire pour le Développement)
ONG	: Non Governmental Organisation (Organisation Non Gouvernementale)
PNUE	: United Nations Programme on the Environment (Programme des Nations Unies pour l'Environnement)
SME	: UCAD Students Medical Service center (Service Médical des Etudiants -UCAD)
SVT	: Science of Earth and Live (Sciences de la Vie et de la Terre)

UCAD : Cheikh Anta Diop University, Dakar
(Université Cheikh Anta Diop de Dakar)

UICN : International Association for the Conservation of the Earth
(Union Internationale pour la Conservation de la Nature)

UNESCO : United Nations Educational, Scientific and
Cultural Organization
(Organisation des Nations Unies pour l'Education, la Science et la
Culture)

Wetlands International works to sustain and restore wetlands and their resources

WWF (WAMER) : World Wildlife Fund (West African Marine Ecoregion)

I. Introduction

Since 1992, following the Earth Summit held in Rio de Janeiro (Brazil), sustainable development became an issue of abuse of jargon. Practically, the totality of socio-professional categories are getting more interested in the concept. However, the issue remains very polysemous as it raises some level of ambiguity.

The most welcomed definition of sustainable development is a development that allows the present generation to satisfy its needs without compromising the opportunity of generations yet unborn to satisfy theirs. For this reason, natural resources such as floristic, faunistic, hydric, pedologic resources and among others must be applicable. Owing to this, the environment plays an important role in the quest for a sustainable development. In the face of multiples of environmental problems such as coastal erosion, the degradation of mangrove forest ecosystem, the pollution of water bodies and climatic changes, sustainable development has become an issue of research oriented.

It is therefore expected that higher education plays a paramount role in the quest for sustainable development. Hence the question remains whether the promotion of sustainable development, by universities especially African Higher Institutions of learning, done in a controversial manner? The institutions of higher learning on one hand offer theory-based trainings with respect to environmentally related issues. On the other hand, their actions are nature unfriendly capable of having harmful effects on the environment.

II. The UCAD, a place for promoting sustainable development

a. Environmentally related and sustainable development oriented trainings offered by the UCAD

Through varieties of educational programmes, the university is seen as a major figure spearheading the promotion of sustainable development. The university has in place many institutions whose teaching and training in the field of environment cannot be over emphasized. This is well appreciated by many experts and international organizations.

The issue of environment is transversal. For this reason, many institutions have integrated this in their educational and training programmes. At the UCAD, the Faculty of Science and Technology in collaboration with Animal Biology, Plant Biology, Geology and Chemistry departments, offers environmentally related programmes. Since 2003, the Faculty of Science and Technology began a Professional Masters in Environmental Studies. The programme is structured in two options: one option in Hygiene, security and protection of the environment and the other option is on Environmental Chemistry.

The Institutes of Environmental Sciences (IES) and Earth Sciences (IES) are affiliated to the Faculty of Science and Technology (FST) the IES is a tertiary institution mandated to train and offer environmentally related programmes, and research on environmental issues.

The Institute of Fishing and Aquaculture (IFA) is part of UCAD institutions that offer opportunity to students to be trained in environmental and sustainable development issues.

Relating to educational programmes, the institute is mandated to give training in the area of science and halieutic technology and the management of aquatic and littoral ecosystems.

The UCAD is well equipped on pertinent issue related to sustainable development. In addition to the FST and its institutions, the Inter-State School of Science and Veterinary Medicine (ISSVM) offers a Masters programme on “Animal production and sustainable development”. The Faculty of Law and Political Sciences (FLPS) is also equipped with a department of Environmental Law.

The department of Geology in the Faculty of Arts and Humanities (FAH) offers a programme on modular basis on environment. Since 1997, a UNESCO chair on “Integrated management and sustainable development of coastal regions and small islands” is established in the department of Geology. The chair is a transdisciplinary institution. It is opened to Science students of various disciplines (natural science, social, Law, socio-economic as well as medicine) and it attaches great importance and interest to sustainable development. Since the 2007/2008 academic year, the DEA of the UNESCO chair is transformed into Masters in GIDEL (Integrated Management and Sustainable Development of West African Coastal and Littoral Zones).

Five out of the seven doctoral schools of UCAD (Doctoral School of Quality Water and Usage – DSQWU, Doctoral School of Health Science and Environment –DSHSE, PCSTUI, JPEG and ETHOS) offer to students a research programme oriented towards the environment. Students can, in their specialized thesis, on sustainable development related issues, do their doctoral research in at least 17 doctoral programmes divided in nine research topics.

The offer of the UCAD in terms of sustainable development is a step in the right direction. The university allows the students to be aware of problems associated with the degradation of natural resources and brings their attention to the need to preserve the environment, a guarantee for a sustainable development of our countries. Aside teaching, the university also provides services.

b. The UCAD, a service provider in the field of environment and sustainable development

The Ministry of Environment and the Protection of Nature has mandated the Institute of Science and Environment to coordinate and see to the management of Biodiversity in Senegal. It equally organizes meetings to share experiences and its findings with the scientific communities. For instance, we can note the number of colloquiums, workshops, forums and seminars that were held between 1982 and 1997. (Refer to the table below)

Table 1 : Meetings held by the ISE from 1982 to 1997

Manifestations	Themes	Year
Colloquium	Management of the Wild life, a factor for development	April 1982
Colloquium	Guiers Lake : Problematic to the Environment and Development	May 1983
Colloquium	Forest, environment and development	1989
Forum	Environment and Development, an issue of debate	June 1982
Seminar	Application of methods of modeling complex systems to the environmental management in Senegal (co-organised with IFIAS Canada)	1987
Regional Seminar	The integration the Environment in university education in Africa (co-organised with UNESCO)	1988
workshop	Deforestation and Reforestation in Senegal	1991
National Workshop	The planning of national Strategy for Biodiversity : evaluation of data and analysis of Opinion	1997
Source : Institute of Science and Environment, Prospectus, 1998		

Following activities that it organizes, the ISE do publications in order to bring to the public domain their acquired knowledge. Aside being a centre of excellence of la Francophonie, the ISE was selected by the United Nations' Programme on Environment to be one of the six Centres of Excellence of the Education and Environmental Training of African Ministerial Conference for the Environment with respect to the Cairo Programme.

The UNESCO Chair of the Department of Geography is in collaboration with institutions working in the field of sustainable development. Institutions such as: UICN, Wetlands International, WWF (Warmer) and GIRMAC. Technicians and experts on environmental matters from these institutions come to reinforce the teaching staff of the chair. In the case of ISE, the institution is in partnership with many institutions (the Foundation of Luxembourg Universities, Aarhus University of Denmark, Leiden University of Nederland) etc.) and with international development organizations such as: the Inter-State Committee for the Fight Against Drought. The university formulates a project entitled: the Activities of the UCAD citizens. The aim of this project is to organize holidays by students through which the students are expected to carry out activities among other to help in the reforestation process. (See table below)

Table 2 : Activities undertaken by Citizens of UCAD, 2007 edition

Localities	Sites	Surface area reforested	Spieces planted	Number of trees
Gandon	Gandon Regional Forest (1000 Ha)	40 ha	<i>Prosopis chilensis</i> L., <i>Eucalyptus alba</i> L.	8.100
Gossas	forêt Régionale de Malka (775 ha)	85 ha	<i>Acacia senegal</i> L.	20.100
Niakhène	Ndemène Forset Reserve (700 ha)	55 ha	<i>Acacia senegal</i> L.; <i>Jatropha curcas</i> L., <i>Acacia melifolia</i> L.	11.000
Nianing	Nianing Forset Reserve (130 ha)	36 ha	<i>Prosopis chilensis</i> L.	7.200
Ross-Béthio	Grande muraille verte (Axe Ross-Béthio/Richard Toll)	50 ha	<i>Prosopis chilensis</i> L., <i>Eucalyptus alba</i> L.	21.000
Sokone	Sokone Regional Forest	22 ha	<i>Jatropha curcas</i> L., <i>Eucalyptus alba</i> L., <i>Anacardium occidentale</i> L.	7800
Tessekéré	Tessekéré Regional Forest	55 ha	<i>Acacia senegal</i> L., <i>Jatropha curcas</i> L.	15.550
TOTAL		343 ha	<i>Acacia melifolia</i> L., <i>Acacia senegal</i> L., <i>Anacardium occidentale</i> L., <i>Eucalyptus alba</i> L., <i>Jatropha curcas</i> L., <i>Prosopis chilensis</i> L.,	90.750

Source : <http://acu.ucad.sn/reboisement.htm> (13/03/2009)

Despite an academic feat, the UCAD perpetrates destructive moves on the environment. Waste management in this institution brings us to the logical controversy with respect to the promotion of sustainable development. The UCAD is the reflection of all major universities producing dangerous waste materials as a result of their teaching and research activities (relating to Medicine, Chemistry, Physics, Analysis and Experimentation carried out in laboratories) and in its hygiene related structures and amenities.

III. The UCAD and the destructive practices of the environment

a. The Issue of Solid Waste Management

Biomedical waste and alloy residue of toxic products are produced from many sources. Aside faculty laboratories, the Students Medical Services center produces the most dangerous waste. These are “those that can promote health and the environment for reasons of their nature and quantity that call for special techniques of specialized destruction” (KONE D., 1997). Because of the toxic and harmful nature of the wastes, the Basel Convention recommends their control. At the national level, Hygiene and Water related laws drafted in collaboration with the UCAD’s experts in Environmental Law brings home their aims.

“Any waste capable of transmitting a bacterial or virus-based or parasitic illness to human beings or animals either in a medical centre, in a laboratory, in a veterinary hospital etc is termed as a biomedical waste” (DIOP A., 2001).

As such, sanitation wards, (laboratory, dental clinic, care centre, emergency, consultation and observation wards), the UCAD main campus, emanate various kinds of infectious biomedical wastes. With respect to sick bays, these wastes are often: gloves, pieces of cotton that are

often soaked with blood, saliva, or pus as the case may be, emanation of gas, compresses and plasters.

In the digestive endoscopy consultation wards and the radiology unit of the Students Medical Service (SMS) centre, tongue depressors, shooting gloves, which allow easy vaginal operations, are thrown into the bush. The laboratory of the SMS center evacuates biowastes containers (faeces, urines, and blood). These are cotton swabs meant for sampling vaginal bacterial, end fittings, pots, and tubes either in plastic, glass, or tubes. We equally have vaccinostyle for thick drop.

Care and emergency Ward produces more dangerous waste. Generally, we often have waste from these units in the forms of surgical knife blade, syringes, syringe needles, stainless steel needle or glucose serums. Butterfly needles and catheters thrown away are all forms of pickling items. The laboratory often evacuates needles and dental operatories, anesthesia bums and among others. With respect to the category of pickling or sharp waste items, we can equally mention antibiotic ampoules or adhesive solvent thrown away after use. Leakproof vials (lignocaine), salutes (glucose, syringes, NaCl) and baneocin, of distilled water are all thrown into the dust bins after use. Suture wires such as cut-guts and microdrip infusion sets are equally thrown in the dust bin. The dental operator in particular, throws broken and uprooted teeth into waste bins. *“Bottles containing toxic substances, expired chemical products are scattered on campus or find their ways into the soil after their contents are used”* (TENDENG P. S., 2005)

From the collection to the discharge of solid wastes, the manner in which this is carried out is more often than not, undesirable. On the main campus, waste containers are left in the open air. They always meant for collecting and discharging of day-to-day and dangerous wastes (biomedical and toxic wastes) (Cf. photo 2)

Whereas *“it is forbidden to mix household wastes with anatomic or contagious waste, with pharmaceutical products or with any toxic product as well as waste generated at slaughterhouses”* The reason is that, *“fumes from these waste can at long run cause very dangerous diseases”* ». (TENDENG P. S., 2005). Medicines due for incineration are not sorted out. The products are grouped without distinction between solutes, bottles and capsules (Cf. photos 3).

Added to the problem of not sorting out these items before incineration, is the issue of incinerating them in the open air. This practice is very often at the UCAD. The Students' Medical Service (SMS) center pharmacy incinerates biomedical wastes during holydays on the bare field lying between pavilions M, D and the infirmary. Wastes generated by FMPOS are equally incinerated at the same spot (Cf. photos 4).

The incineration poses problems in the sense that it diffuses toxic gas and inhaling it exposes people on the UCAD campus to its consequences: contraction of diseases that are likely to become complicated in the long run. With respect to chemical complex solutes, the ether is inflammable. Aside an adequate incinerator, the incineration of biomedical wastes in the open air can lead injuries and serious infections. This is because after the explosion of this materials (bottles, needles, blades), they are left on the ground.

The incineration of wastes in the open poses hygiene related problems and affects public health. It exposes the university community; as the university has many individual (more than

60,000 individuals of all walks of life in 2007), to the risk of contracting diseases related to the breathing of toxic gas. (Cf. photos 5).

During rainy seasons, the residues of burned materials (Cf. photos 6) are washed away into the sea by running water via canal IV which is connected to the university or by drainage system of the university.

The establishment of universities near the sea is not without any consequence. The UCAD is today, a coastal city. The incineration of wastes materials contributes to the degradation of the coastal ecosystem and poses problems relating to sustainable management of natural resources especially the marine ecosystem. As *“the discharge of these products leads to soil pollution and even exposes water bodies to percolation phenomena”*. » (TENDENG P. S., 2005)

b. Problematic of liquid wastes management

The wards generate quite a huge volume of liquid wastes. Digestive endoscopy activities usually known as fibroscopy calls for the use of Korsorex which is a 2.1% glutarildehyde mixes with water to disinfect the endoscopies. The Korsorex is a bacteriacid. After cleaning the equipments the bacteriacid is poured into the washstand.

Blood samples, vomiting and stools are the kinds of biological liquid wastes often found in the laboratory purposes carrying out laboratory tests and in the patient observation wards. The liquid waste (blood samples, urines and stools) used in the laboratories are evacuated into wastewater drains.

“Blood and human blood derived substances, organic liquid etc can be eliminated via wastewater drains. It is for this reason that our wards produce biomedical wastes therefore using 85% of the wastewater drains for their evacuation. (...) The inconvenience is that many of these wastes are not treated before evacuation. In addition, many wastewater drains are opened and are not disinfected by any disinfection company as stated in Article L3 of hygiene Code.” (KONE D, 1997).

The conditioning of sharp or pickling equipment such as needles and blades as well as the disinfection of working material (scissors, tongs, speculums, and trays) generates liquid wastes. During operations of removing teeth, the patient uses antiseptic solutions (aladone hextril, betadine,) which are meant for mouth wash. Sodium alginate residue, (eugenata and amalgam) spitted by the patient go through the washstand before another patient is attended to.

Dental operatories and wards of the SMS centre evacuate toxic liquid. Among the composition of these waterwaste is also heavy metals. *“Heavy metals are metallic elements whose mass is more than 5g/cm³. These are often found in the environment in the form of traces: mercury, lead, cadmium, steel, arsenic, nickel, zinc, cobalt, manganese. The toxic among them are: lead, cadmium, and mercury.”* The SMS centre evacuates zinc, lead, arsenic chlorine, mercury and sodium hydrochloride. The wards evacuate fluoride and mercury.

The solutions used at the dental operatory, in the treatment wards in the emergency wards and in the laboratories are prepared by the SMS centre pharmacy. These are ethanol, Dakin solution and easin. These products sometimes generate liquid wastes.

The volume of wash water discharged into the sea by the CSGC (the main university students' resident) cannot be over emphasized. Washings with 361 soaps monthly, 863 litres of liquid soap, 391 litres of eau de javel, 264 litres of non diluted gresyl, 306 litres of non diluted acid and a variety of powdered detergents for cleaning the pavilions, and the residents. In addition to this detergents are those used in the restaurants, and students who use them for washing things or themselves. The restaurants also use a good number of these products (Cf. tableau 3).

Table 3 : monthly Consumption of cleaning products by “Restaurant Argentin”

items	Quantity/month
Liquid soap	900 litres
Gresyl	240 litres
Eau de javel	240 litres
Acid	24 litres
Scouring Powder	80 kg
Source : ‘Restaurant Argentin’ 2007	

The discharge of wastewater with chemical products into the sea leads to pollution. *“Not all washing related residues are toxic but they are discharged in such a large volume hence causing serious pollution problems.”* Water used on campus ends not in a purification basin but into the sea in polluted as it is. As *“there is no purification centre for pretreatment of the liquid before discharging it into the sea”* consequently, due to bioaccumulation, fishes, keep toxic substances in their fat. (TENDENG P. S., 2005).

The discharge of used water into the sea leads to the issue of nutriment which facilitates the proliferation and the quick decomposition of alga. Deprived of oxygen, the water can cause the death of fishes of other marine lives. The detergents can lead to increasing inhibition of sea plants irreversibly their necrosis. *“The algae have a limited life span. By dying in large number, they get rotten and this leads to the acidification of the water”* (GUEYE A., 2004).

By discharging wastewater, toxic and biomedical wastes into the sea, the university remains a vector of marine pollution. The evacuation of wastewater with chemical products poses the risk of water pollution or leads to the degradation of sea quality. More especially as, *“the quantity of treated water as of now is minimal (only 10% of the 100.000m³ of water for domestic use is treated in Dakar)”* (MBEGUERE, 2002). With a continual discharge of wastewater, toxic and biomedical wastes into the sea, the alteration and degradation of the ecosystems is obvious.

“...the presence of heavy metals in wastewaters has negative and dangerous effect on microorganisms present in the water (EDELIN F., 1980). These heavy metals can undergo complexing and hydration reactions.” (TINE M., 2005). Heavy metals are not biodegrading waste materials. They gradually accumulate in the biotope, therefore, affecting the marine fauna. Even if they are *“mostly present in the trace state, they are not very dangerous as their*

toxic nature develops by bioaccumulation in the organisms". The discharge of heavy metals into the sea can be harmful to the marine biodiversity. For, the water carries chemical substances and this drains into the food chain. (Algae, fishes, and aquatic birds). The consequences of this are very dreadful because "*when the contamination of fishes attains mg/kg, the quantity accumulated by the predators, birds and aquatic mammals can in the short term attain a lethal dose*" (AZIEU (1976) quoted by BOUTIBA Z. and all, 1999). Whereas, the Senegalese coasts are reputed to be rich in halieutic resources due to good hydrodynamic, climatic and geomorphologic conditions.

IV. Conclusion

The UCAD is a big university. Since 1957, it is considered in the West African sub-Region as a true temple of knowledge. A good number of intellectual especially, Francophones happened to be trained at this noble institution. However, in terms of sustainable development, it is at the same time a bridging point but also an ambivalent institution.

The UCAD has a variety of institutions whose educational programmes present a holistic vision of sustainable development. These institutions continually address environment issues; in order to enable the students drive home the necessity of conserving natural resources. Because the issue of natural resources is a matter of transnational heritage to be preserved by all means. In addition to the lecturers the university can boast of in this field, the UCAD also provide services of great importance in this field. It organizes meetings (scientific) – conferences, seminars, workshops, colloquiums etc -. It serves as an advisory body to the government and assists Non Governmental Organizations (NGOs) working in the field of sustainable development. The university engages its students in reforestation activities in order to revive nature.

Paradoxically, the university badly manages its immediate environment. The manner in which rubbishes and waste materials are evacuated on the campus poses serious sanitation and environmental risks. Be it the incineration of toxic and biomedical waste materials in the open, the evacuation of part of biomedical wastes or the evacuation of wastewaters in the raw state into the sea: none of these practices seems reassuring. On the contrary, the management of waste materials on the university campus poses danger and needs to be given a second thought and serious attention as it is harmful to the littoral ecosystems and can cause "*an ecological harm*".

In a nutshell, the management of waste materials on the university campus must call for the attention of the administrative management of the university, state and local authorities as well as international organizations whose interest is in higher education (UNESCO, AAU, ADEA...) and in sustainable development. (UICN, WWF, Wetlands International, PNUE...).

BIBLIOGRAPHY

1. BOUTIBA (Z.) AND BOUDERBALLA (M.)
Holders of heavy metals by cetaceans found at the western Algerian Coast; preliminary studies (pp 205-213). In circulation of water and pollution of the Mediterranean coast of Maghrebian countries. Published by INOC, IZMIR Turquie, November 1999, 307p
2. DIOP (Abdou)
Management of biomedical waste materials in Sénégal: the case of Dantec and the Main hospitals.
Thesis of DED in Environmental Sciences (ISE/UCAD), July 2001, 57p
3. GUEYE (Aminata)
Environmental Studies on the discharge of dangerous waste materials in the Dakar Harbor zones
Thesis of DED in Environmental Sciences (ISE/UCAD), 2003/2004, 148p
4. KONE (Djiby)
The contribution to establish a national plan for proper management of dangerous waste materials in Senegal the case of biomedical waste materials in the Dakar Region.
Thesis of DED in Environmental Sciences (ISE/UCAD), December 1987, 35p
5. MBEGNOUGA (Moussa)
The waste management and its influence on the littoral on the UCAD campus: the case of UCAD's main campus.
DEA Thesis of the UNESCO Chair on integrated management and sustainable management of coastal areas and small islands UCAD, 2007, 53p
6. MBEGUERE (Mbaye)
Treatment of domestic and urban wastewater by natural means under tropical climate
A study on the performances of purifiers of five land artificial ecosystems within the Hierarchical Mosaic of the Artificial Ecosystems.
Doctoral Thesis in Environmental Science (ISE/UCAD, DAKAR), 2002, 181p
7. TENDENG (Paul Silaï)
An assessment of environmental problems at the University Cheikh Anta Diop: proposition of an environmental management system of natural and artificial background radiation
Thesis for a Professional Master's Degree in Environmental science, Option: Hygiene, Security and Environmental Protection, UCAD, 2005, 66p
8. TINE (Maïmouna)
Experimental analysis study on purification of urban wastewaters by means of nit filtration with sand in tropical zones.
DEA Thesis in Environmental Science (ISE/UCAD), 2004/2005, 76p

INTERNET REFERENCES

<http://www.lenntech.com>
<http://www.penntybio.com>
<http://www.ucad.sn>

REFERENCES ON NATIONAL INSTRUMENTS

- . Law n° 81-13 of 4 March 1981, Bill on water
- . Law N° 83.71 of 5 July 1983, Bill on Hygiene
- . Law N° 2001 - 01 of 15 January 2001, Bill on Environment

REFERENCES ON CONVENTIONAL INSTRUMENTS

- . United Nations Convention on the Right to sea, Montego Bay, of 10th December 1982
- . Convention on wetlands of international importance especially as habitats for aquatic birds d'eau, Ramsar, Iran, 2.2.1971