



“Bridging Gaps between the Universities and the Community”

Seminar

The Environment and The Community

Organized by The Faculty of Natural and Applied Sciences

In coordination with the offices of Public Relations and Sponsored Research

Monday: June 10, 2013.

Venue : Notre Dame University-Louaize, Zouk Mosbeh. Abou Khater Auditorium.

Welcoming Address: Dr. George Eid, FNAS Dean.

To be able to face the recent local and global environmental challenges resulting from the destruction and pollution of the natural resources and their impact on human health, **sustainability and environmental protection** are becoming of major responsibility in our social and professional lives. The Faculty of Natural & Applied Sciences (FNAS) at Notre Dame University-Louaize, conscious to the need of experts in this emerging field and to the role that an educational institution plays for the service of the community, introduced into the University curricula a major in “Environmental Science” since 1997.

The curriculum encompasses natural, social and managerial sciences, given the interdisciplinary nature of environmental Science. Topical courses on water/soil/air pollution, environmental impact assessment and environmental ethics were designed. These integrate theory and practice. Our graduates are prepared for managerial, communication and most importantly ethical competences to be able to implement best practices in environmental protection and play an active role in the community in the public, private, industrial and educational domains.

At an inter-faculty level the program was successful in offering General Education Requirements courses on environment, sustainability and ethics, which helped in raising sustainability awareness among the students’ population and strengthened the inter-faculty community relationships.

Our graduates were equally well prepared for higher studies in Lebanon and abroad as well as for the job market. Indeed, they are now employed in private sectors and in the ministry of environment.

Research is also in our mission. The Sciences Laboratories are being equipped with state of the art analytical instruments and funds are allocated for this purpose. Research applied to the needs of the community are prioritized.

Abstracts

Session I: Air Pollution

Air Pollution in Beirut City

Dr. Najat Saliba, American University of Beirut.

Abstract

Beirut can be considered an interesting city for the study of air pollution. In addition to its unregulated emission sources, its location between the Mediterranean Sea from the west and an urban environment from the east presents a cross road for air mixing in the region. Beirut experiences a long range transport of high emission from episodes originating in the Saharan desert in North Africa, and Arabian deserts during the winter, summer and spring seasons. At the local level, traffic and diesel generators related sources are considered to be major factors affecting the urban air quality. In particular, particulate matter (PM) of various sizes and concentrations are shown to be abundant in different sites and micro-environments. Airborne particles of smaller sizes have been associated with adverse health effects. This presentation will summarize the variation of PM levels at different sites in Beirut and relates the levels to the relative toxicity of PM emissions.

Air Quality in the Area of Zouk Mosbeh.

Dr. Layla Khalaf-Kairouz, Notre Dame University-Louaize.

Dr. Najat Saliba, American University of Beirut.

Abstract

Air Pollution is one of the major environmental degradations that the world is currently enduring. Besides the aesthetic impacts on the landscape and the burden on the ecosystems, the impacts on health are very severe. This study presents the case of the coastal city Zouk Mosbeh in Kesrwan, which is home to a major fuel-fired power plant in the country and to two main highways, the first extending on the coastline bridging the main Lebanese cities and the second going up to the high mountainous towns. It is of major importance to monitor the air quality in the region in order to find out the degree of the environmental air pollution impact. This study is a precedent for the area as no previous qualification or quantification of the extent of pollution of the air has been undertaken.

The Sciences department at Notre Dame University-Louaize and the Chemistry Department at the American University of Beirut collaborated in a research project to sample the ambient air with respect to the Particulate Matter with aerodynamic diameter below 2.5μ . The sampling extended for one year. The fine Particles PM 2.5 are critical for health as they get inhaled easily

into the lungs and cause serious respiratory and allergic problems including some cancers. The results showed relatively high concentrations exceeding the WHO guidelines of the annual mean of $10 \mu\text{g}/\text{m}^3$. Especially the summer months' values surpassed even the WHO daily mean of $25 \mu\text{g}/\text{m}^3$.

It is recommended by the WHO that countries with such levels of air pollution take action to improve their air quality.

The results make it imperative to proceed with the research to be able to cover a larger geographical area, to expand the chemical composition analysis to the other criteria pollutants and carry out epidemiological studies to assess the health impacts on the inhabitants.

Session II: Solid Waste Management: The Academic Role

Sustainable Environmental Management for Olive Oil Processing Wastes in Akkar Region

Dr. Mervat El-Hoz, The University of Balamand.

Abstract

The main objective of the study is to develop an environmentally sustainable system to manage solid waste from the olive oil extraction processes. It covers baseline data related to olive waste produced in Akkar, one of the main regions of olive production in the country. Alternative treatments and site locations were studied and the windrow composting system was found economical and commercially feasible. A pilot olive waste composting facility with a surface area of $5,000\text{m}^2$ that composts up to 500 tons/year of olive waste mixed with cattle manure is planned. The main Environmental Management Plan (EMP) of this project is to ensure that the environment is properly considered during the operation phase of the olive waste composting; negative impacts are minimized or prevented at an early stage and positive impacts are improved. The EMP is realized in accordance with the "EIA General Format" provided by the Lebanese Ministry of Environment. Mitigation measures for adverse environmental impacts and environmental monitoring measures are set during operational works in order to ensure that identified impacts are kept within the permissible levels. The benefit of this project will be a sustainable waste management system that prevents environmental pollution from irrational disposal of oil mill waste as well as the ability to convert waste into assets thus contributing to sustainable and responsible farming practices.

Management of Agricultural and Landscaping Waste: Municipal Solutions

Dr. Sophia Ghanime, Notre Dame University.

Abstract

This abstract addresses agricultural/landscaping waste, namely the byproduct of all planting, harvesting and landscaping activities. This type of waste is not collected by Sukleen and therefore, is considered as an additional burden on most municipalities. Accordingly, this brief glance at available technologies intends to provide general guidelines for selection of viable solutions for the treatment/disposal of agricultural/landscaping waste in small (mostly rural) municipalities. A brief case study is also presented to serve as an example for other municipalities.

Current practices

Most municipalities are currently dumping their agricultural/landscaping residuals in remote areas or burning them on the town outskirts. Both options are equally undesirable, not only because of their negative environmental impacts, but also because they are considered as waste of resources. Alternatively, engineered solutions that provide environmentally safe and sustainable options should be considered.

Potential alternatives

The most popular and mature technologies (landfilling, incineration, anaerobic digestion and composting) are discussed below.

Landfilling may not be a viable alternative due to the high public opposition. Often, locals are afraid that an agricultural waste landfill may be transformed into a municipal solid waste dump for the nearby villages.

Incineration is an expensive and sophisticated technique which required qualified personnel. It reduces the waste volume by 90% while generating some energy. However, it produces toxic gases that require advanced air pollution control equipment. The latter need adequate maintenance and cost around 30% of the total cost.

Anaerobic digestion may be the best suited method for this type of waste. It transforms the organic substance into biogas that contains 60-70% methane (CH₄) which can be used as a source of energy. It doesn't produce any toxic gases and is driven only by biological reactions.

Composting is the easiest and cheapest method. Plant wastes are composted for ~60 days and, when mature, redistributed and used as soil enhancers. The Lebanese climate provides favorable conditions (moderate temperature and high humidity) for optimal biological activity. However, the gases produced during composting (mainly CO₂ which is a greenhouse gas) cannot be used for energy generation.

Case study

Considering the Lebanese context, composting would be the most practical alternative with high chances of fast implementation. In order to give insight into the applicability of

composting techniques, a case study of the municipality of Okaibeh, Kesrwan, was conducted and the outcome was summarized below.

The agricultural/landscaping waste is produced only over a 4 months season. The municipal expenses incurred due to composting were approximated at 4660 USD per season (yearly), in addition to the shredder cost (5000 USD). In contrast, the savings on transportation cost due to reduction of the waste volume upon shredding is about 2800 USD. In addition, the income from selling the produced compost (at a rate of 50 USD/ton compared to 300-500 USD/ton market price) was estimated at 5600 USD.

The expected net benefit is 3,800 USD per season and can reach up to 14,000 USD if the compost selling price is raised to 300 USD/ton (lower boundary of the market price).

Table 1. Waste generation and composition:

Parameter	Quantity
Waste generation	85 tons
Period	4 months/year
Composition:	
Road landscaping	70 %
Small agricultural activities	15 %
Yards, parks, gardens	10 %
Tree trimming	5 %

Table 2. Net benefit from composting:

Parameter	Unit price or salary	Total allocated amount	Assumption
Labor:			8 workers and 2 supervisors are needed
Worker	480 USD/month	3,200 USD/season	2 hr/day (5 days/wk) allocated for this activity
Supervisor	800 USD/month	1,300 USD/season	Waste generation over 4 months
Shredding:			The shredder consumes 1L of gasoline per hour
Operational cost	40 USD/month	160 USD/season	Gasoline price is 30,000 per 20 L
Total Cost		4,660	
Transport:			Shredding reduces the waste volume to 12%
Fuel	40 USD/day	- 2,800 USD/season	5 days/week allocated for this activity
Compost selling	50 USD/ton*	- 5,600 USD/season	Recovery rate = 67%
Total savings/income		8400	Compost generation = 53.6 t/yr
Net Benefit:		3,800 USD	Transportation vehicles are available & no additional maintenance cost is incurred
			Shredder is available (price = 5,000 USD)
			The land is made available for free

* Vie Verte and Dobaline are sold at rates of 300 and 500 USD per ton, respectively

Session III: Solid Waste Management: The Community role.

On The Path to a Zero Waste Society

Mr. Ziad AbiChaker, Cedar Environmental.

Abstract

Waste management is not voodoo science. Zero waste societies are an emerging reality around the world. Lebanon, despite appearances, is not far behind in creating Zero Waste communities. Cedar Environmental has been doing the work since 1999 to make Zero waste a reality for Lebanon. Imagine a community that fertilizes its organically grown crops from its own Solid waste...Imagine a municipality that enjoys Bus Stops, Outdoor public garden furniture, & even green roofs and green vertical walls all made from plastic bags: This is a reality now happening here in Lebanon.

Current Status of Municipal Solid Waste Management

Mr. Dany Azzy, Okaybe Municipality.

Abstract

This study discusses the current status of municipal solid waste management in The Okaybe area in Kesrwan.

The geographical location and topography of Okaybe gives some difficulties in the management process due to the mountainous and rural nature of the region.

The major solid waste management and collection problems are due to the location, the inhabitants misbehavior, lack of environmental awareness and ethics, in addition to little cooperation from the people.

In this respect, the municipality took some decisions and implementations on the ground regarding the agricultural and yard waste. A shredder is purchased and there are plans for a composting facility. The municipality in this line activated the cooperation with the universities and especially Notre Dame University-Louaize for the cultural and environmental development of the community.

The Neighbourhood We Live In.

Mr. Roy Zinati, Miss Rita Alam, Notre Dame University-Louaize.

Abstract

Solid waste constitutes a serious problem in Lebanon. The waste generated is not entirely collected and from the waste collected, only a fraction receives proper disposal. The inappropriate and chaotic dumping of solid wastes represents a source of water, soil and air pollution and poses risks to human health and the environment.

Over the past decades, wars, rapid population and economic growth, in addition to urbanization, tend to further deteriorate the waste management and control. This study presents the solid waste management situation in the residential areas of Adonis and Zouk Mosbeh in Kesrwan, shedding the light on municipal, commercial and yard wastes. Representative examples of the current status of waste disposal and collection will be viewed. Eventually, solutions will be proposed to sustain such a beautiful neighborhood.