ENVIRONMENT WASTE MANAGEMENT

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Foreword

We only have one planet to live in, so taking care of it should be well considered. Many people might be aware of this, but not all know how to do it right. Waste problems continuously grow with the incessant innovation in the field of technology. This has become another reason why it becomes even harder to deal with such problem than ever.

With a lot of concerns recently regarding being economically friendly and greener, waste management has become an extremely crucial subject. Companies and people are beginning to realize that those things they utilize as well as the way they have them disposed off could make a huge impact on the environment and to the whole world.

Waste management may involve a number of things. It comprises the collection of waste material as well as having it processed in a certain way, or attempting to have it recycled. It may have both environmental and health implications. Companies and residents are on search for the least expensive and best ways to deal with the continuously growing issue.

In this book, you will be able to know and understand how waste affects the environment and what ways you can do in order to handle well these problems. This book basically intends to inform you of what you can do in order make a better and more comfortable place to live in. Read on along the chapters and learn more about waste management and environmental control.

Environment Waste Management

Chapter 1:

The Amount of Landfill Waste Each Day

Just about every individual contributes to the daily production and increase of landfill waste on the daily basis. It probably includes you as you are also an occupant of the environment. When collected, yours and other people's waste can surely produce a massive amount. Know just how significant the amount of landfill waste produced on a daily basis.

Your Waste On The Daily Basis

The average individual produces around 4.3lbs of waste each day. This amount is 1.6lbs more as compared to most wastes generated back in year 1960. So, where do all of these go?

Around 55 percent of the total 220 million tons of wastes that have been produced every year only within the United States normally end up on a single landfill of more than 3,500. Local solid waste landfills have become the 2nd biggest source of the human-related methane emissions within the United States. This accounts for about 22 percent of those emissions within the year 2008.

Around 2/3 of your total household waste could be composted. When compost is not the option, vermiposting or composting using worms can be a well known choice within the apartment settings. In addition to this, a lot of urban areas are currently gaining increased interest in urban gardening. You can view around the neighborhoods and communities to locate those local gardens that might accept food waste from you for composting.

If you go and visit your grocery store, do not forget to carry reusable bags along with you. A lot of stores may even provide you credits for carrying your own bag. Even though the amount looks small, it can eventually add up over the course of one year.

Everyone contributes to the increase of waste in the environment, so everyone should help in its reduction. Even the smallest effort counts, so do not hesitate to make your effort be counted.

Chapter 2:

How Leachate from Landfill Can Causes Water Pollution

Leachate is the contaminated liquid that has permeated through forms of hazardous waste and seeped out to the environment. This form of liquid is indeed harmful to humans, especially when they reach the water sources. In this chapter, you will learn more about the dangers brought by Leachate and how it causes water pollution.

Leachate and Its Dangers

As mentioned earlier, leachate is a form of contaminated liquid that has percolated through harmful waste and has leaked into the environment. While this runoff comes with a range of toxic chemicals, this normally affects human health and the environment, particularly when it starts from the solid waste within landfills and drifts into streams, rivers, the groundwater, as well as the ocean.

Landfill Leachate

Landfills are the most extensively utilized things for solid waste disposal. If the water from the melting snow or rain seeps through the putrefying inorganic and organic waste of such landfills, it turns out to be polluted. The entire landfills produce this kind of pollution, even the ones that have been abandoned and closed for decades. Normally, a single ton of landfill waste produces around 53 gallons of extremely contaminated wastewater leachate.

Components of Leachate

Landfills are not like the other sources of groundwater pollution because once the wastes have been buried, a cycle of biological, physical and chemical reactions occur that will intensify the toxic waste concentration, which runs off in the form of leachate.

In rare conditions, completely new compounds are being formed. The typical landfill leachate contains high ammoniacal nitrogen concentrations and fairly high concentration of recalcitrant compounds that include halogenated hydrocarbons like methylene chloride and tetrachloride, along with complex polymers that contain heavy metals that are not easily degradable.

Among those toxic pollutants, the organic nitrogen's decomposition into ammoniacal nitrogen is not just a long-lasting pollutant, yet it is also highly toxic to most aquatic species. Over the previous one hundred years, arsenic is the substance that has played a significant industrial role within the production of metal alloys, lead batteries, wood preservatives, glass and semiconductors, along with herbicides, pesticides and animal feed. All of these materials eventually find their way into the landfills.

Groundwater Pollution

Leachate contaminants that leaked from the landfills can be a serious risk to the core groundwater, which is the major source of drinking water in the most parts of the world. This threat has become a crucial problem in many developing countries in which the majority of landfills are established without any preventative environmental engineering like leachate collection systems or liners. When the leachate seeps into the groundwater, it may be expensive and hard to have it cleaned up and have the source of drinking water restored into its usable state.

Methane Pollution

Harmful leachate that leaks into sewers has become a typical problem. Generally, treatment plants for public wastewater do not accept leachate because of its toxic concentration. For treatment plants that accept untreated, both health and physical threats exist. The existence of dissolved methane could offer some physical risks. In inappropriately ventilated sewer systems, such methane could lead to violent explosions. The intense concentrations of ammoniacal nitrogen within leachate may also pose some health risks to the workers of sewer maintenance.

Chapter 3:

Better Waste Management Creates a Better Environment

The environmental condition highly depends on the way you manage it and the way you deal with your waste. Waste management is the prevention, generation, monitoring, handling, treatment, residual disposition, the characterization and reuse of solid wastes. To know more about better waste management and creating a better environment read on this chapter.

Best Methods of Waste Management

There are different forms of solid waste and these include agricultural, municipal (commercial, residential, institutional), and special (sewage sludge, health care, household hazardous wastes). Usually, the term relates to those materials that are produced by human activity. Furthermore, the process is normally undertaken in order to decrease their effect on the environment, aesthetics or health.

It is crucial to know the best ways to conduct waste disposal. In the world of today in which population is on the rise and so is quick industrialization, waste material creation is a popular trend. These wastes can be dangerous to the environment while the way you have them disposed off varies on the way they affect the environment. Proper disposing of waste materials aids in keeping the environment free of pathogens that cause diseases and maintains it green.

The following are 4 techniques of suitable waste management that will help you in keeping your environment clean.

- ✓ *Recycling*

One of the most common methods of waste management, recycling is not costly and it could easily be conducted by you. Once you perform recycling, you will be able to save lots of resources, energy and so, it helps reduce pollution. Also, you may save money when you recycle. Different materials that can be recycled include aluminum, plastics, glass and papers. If you like to decrease the waste material's volume, one of the best ways you can do is to recycle. When you choose recycling, you could get rid of tires, asphalt and batteries from the waste material and it stops them from being into the incinerator and landfills. The municipality of just about every city motivates their citizens from taking

up recycling. So, be one of these responsible citizens and decrease your waste through recycling.

- ✓ *Composting*

This is the natural process which is totally free of any risky by-products. The process includes the break down process of materials into some organic compounds that may be utilized as manure. You may perform composting within your very own backyard. When composting, you may use grass, twigs, leaves, and add fruit and vegetable skins and peels. After a couple of days, you should observe that the materials have decomposed. You may utilize this compost that is rich in nutrients in order to enhance the soil within your garden.

- ✓ *Landfills*

Waste management by the utilization of landfills includes the utilization of a wide area. The place is excavated and will be filled with the waste. After that, the area will be covered up using soil. Landfills are unsafe since they release gases such as methane that are extremely perilous. You must not execute waste management with landfills when you can't guarantee safety means. Landfills must be lined properly while the waste must not get in touch with the neighboring areas.

- ✓ *Burning Of Waste Material*

If you can't recycle or when there are no ideal places for having landfills set up, you may burn the waste materials produced within your household. Controlled waste burning at extreme temperatures to generate steam and ash is an ideal waste disposal method. Combustion significantly decreases the waste volume to be disposed. Furthermore, solid waste may offer for the alternative and continuously available

source for producing energy with combustion. Such energy may be channeled into functional purposes.

These are few of the waste management methods you can perform within the individual level. Also, these are inexpensive and safe. In such way, you will be able to work for the development of the whole environment.

Chapter 4:

Start Composting For a Better Earth

Disposal of waste can become a problem if not dealt with properly and effectively. This will greatly affect the condition of the environment. Composting is one way you can do when it comes to proper waste disposal. Learn more about composting and know just how you can start to make a better earth.

Ways to Start Composting

What you're adding into your compost also has something to do with composting. The following steps help you start with composting and know what materials you should and must not include in the process.

1. Build a bin for the compost. Though you can still successfully compost within a pile on the ground, using a bin will keep the whole process neater and it helps in putting off animals when you are including food scraps in your composting process. Based on the bin's construction, it may also aid to regulate the temperature and moisture. A fine minimum pile size is at least one cubic meter or one cubic yard, but the pile may go bigger than this, while smaller-scale composting could be allowed to work.
2. Fill the bin with balanced mixture (for finest results).You may include the following into your mixture:

- ✓ Green Stuff (nitrogen) for activating the heat process within your compost.
- ✓ Brown Stuff (carbon) to act as the "fiber" for the compost.
- ✓ Other items that could be composed that you might not have considered before, such as paper bags, paper towels, egg shells, cotton clothing, hair (human, animals). Utilize all the items moderately.
- ✓ Air. This helps deal with the smell produced by different bacteria. Anaerobic compost can attract files that you do not want in your yard.

- ✓ Water. The pile must be around as damp as sponge that has been squeezed out.
- ✓ Temperature. The compost pile's temperature is extremely important and is a sign of the microbial activity of the process of decomposition.
- ✓ Starter or Soil Compost. It is not firmly necessary, yet recently completed compost between layers could aid to introduce the right bacteria to begin the compost process a bit more quickly. When you are getting weeds, the soil that is left on the roots might be sufficient to serve the purpose.

3. Mix of layer various materials within the bin so that they could come in contact with each other. Also, with this, you will be able to prevent any big clumps. Particularly avoid compacting together large volume of green materials, as they may quickly become anaerobic.
4. Turn the pile regularly, at least once each week or two.
5. Decide whether you will add slow rotting materials such as twigs, hedge clippings and tough branches, wood shavings, wood pruning and wood ash.
6. Know the things you should not compost.
7. Harvest the compost. When all goes well, you'll eventually find that you've a layer of fine compost at the bin's bottom. Take this out and have it spread out on or dug into the garden beds.

Start composting today and make a better earth by starting in your own home.

Chapter 5:

Categorizing Waste for Recycling

Another method of waste management that you may want to perform is recycling. This is the process of categorizing waste separating the ones that can still be reused from those that are not. In this chapter, you will know how to categorize waste for recycling.

Waste Categories for Recycling

The following are the common categories of waste that can be recycled.

- Reusable goods, such as repairable or intact industrial or home appliances. Household goods may include clothing; building materials like windows, sinks, doors, and cabinets; intact materials within demolition debris like lumber; business equipment and supplies; lighting fixtures, and other manufactured object item that could be used again as is or repaired.
- Paper such as newsprint, computer paper, ledger paper, mixed paper; and corrugated cardboard
- Metals both nonferrous and ferrous, such as cans, parts of abandoned cars; fences; plumbing; metal screens and doors; machinery; tools; and some other unused metal pieces
- Glass, such as window glass and glass containers
- Textiles, such as non-reusable clothing, fabric pieces; and upholstery
- Plastics, such as beverage containers; plastic cases of goods including electronic equipment or telephone; plastic packaging; tires and films
- Plant debris, such as cuttings and leaves, trimmings from grass, trees, and shrubs; sawdust and whole plants
- Putrescibles, such as vegetable, animal, and fruit debris; manure; sewage sludge; and offal;
- Wood, such as un-reusable lumber; pallets; and tree rounds.

- Ceramics, such rock; china; tile; concrete; asphalt; brick; and plaster
- Soils, such as excavation soils from developed land or barren; and excess soils coming from the yards of people.
- Chemicals, such as acids; solvents; bases; lubricating oils; medicines; and fuels

These materials are only some of the many wastes people can include in the recycling process. So, if you are one of those people who are looking to participate in this kind of activity, make sure to consider these categories given above.

Chapter 6:

Understanding Biodegradable and Non-Biodegradable Materials

The primary difference between biodegradable and non-biodegradable materials is with biodegradable, items break down or decompose naturally, and non-biodegradable they do not. This specific difference is most crucial when talking about waste disposal and landfills. Understand more about these types of materials in this chapter.

Biodegradable and Non-Biodegradable

Everything around you can be determined as biodegradable or non-biodegradable. You can find banana peels, leaves and chicken bones as examples of biodegradable. Cans, candy wrappers and Styrofoam are non-biodegradable. In one way or another, things might confuse you on whether these materials are biodegradable or not. That is a threat to take and the whole environment could be at threat. Hence, determining what biodegradable and non-biodegradable are could aid in preventing water and air pollution. Proper separating of wastes could surely offer solution against those environmental problems.

Non-Biodegradable

Non-biodegradable things can't dissolve or break down for several years. Rather, they can become useful once again so they are called recyclable. Therefore, any waste that is thrown inside the garbage could be dumped within a recycling center or factory that could make them functional for other things. Get thin boards and papers as your examples. These materials don't normally dissolve and disappear though they shrink. However, they may stay as debris on water, holes and more that might eventually bring damage to the environment. Hence, they are gathered to be cut into pieces until they form once again as new pieces of paper.

Non-biodegradable items just can't be affected by the natural process. They don't dissolve and react easily on the soil. Few of those items that are really common to utilize again at homes include glasses, aluminum cans, plastic products, grocery bags, bottles, other plastic bags or metal scraps and even polystyrene or commonly known as Styrofoam. Along with other non-biodegradable items, these need to be properly stored after utilization for recycling.

Biodegradable

Conversely, biodegradable materials are items that may easily dissolve, break and fade away over time. Similar to solid and bacteria or other micro-organism, they go through natural process within a slow or quick yet definitely not a risk to the environment. Few of the wastes that putrefy into the soil are egg shells, kitchen food scraps and garden wastes. They are dissembled and destroyed by biological or natural elements that may include oxygen or air, UV light from the sun, as well as the nitric acid coming from the rain. Some other elements may also include critters or microscopic elements and soil.

Normally, the disparity between biodegradable and non-biodegradable materials is based their impacts to both environment and health. However, you could aid your own government and other organizations when it comes to saving the environment against water and air pollutions. Primarily, you can reuse and recycle items that are non-biodegradable. Secondly, you can separate biodegradable items from the non-biodegradable ones.

Chapter 7:

The Negative Impact Of Landfill Gas (LFG) To The Environment

Landfill Gas is not similar as “methane” or “natural gas”. These are 3 separate terms that mean various things so they must not be utilized interchangeably. To understand more about Landfill Gas (LFG), read on the following chapter.

In Depth Understanding of Landfill Gas and Its Effects

Landfill Gas is the complex blend of various gases produced by the action of microorganisms in a landfill.

Production of landfill gas leads from microbes and chemical reactions that act on the waste as putrescible materials start to decompose within the landfill. The production rate is normally affected by landfill geometry and waste composition that in turn persuade the microbial populations in it, physical conditions' thermal range, chemical waste composition, and the natural ecosystems that co-exist simultaneously in most sites. Together with the normally vague nature of contents, this heterogeneity makes the production of landfill gas harder for control and prediction than those typical industrial bioreactors that are used for sewage treatment.

Because of the continuous landfill gas production, the boost of pressure in the landfill (along with disparity diffusion) leads the gases to be released into the atmosphere. These emissions may result to crucial security, hygiene and environmental problems within the landfill. A number of accidents have taken place, for instance in 1986 at Loscoe, England in which migrating landfill gas that was enabled to accumulate partly destroyed the property.

Another accident caused 2 deaths because of the explosion inside the house near the Skellingsted landfill within Denmark that happened in 1991. Because of the threat displayed by landfill gas, the need for monitoring the gas being produced by landfills is clear. Aside from the threat of explosion and fire, gas migration within the subsurface could lead to letting landfill gas get in contact with groundwater. In turn, this

may lead to groundwater contamination by organic compounds existent in almost all landfill gas.

Landfill gas is about 40 to 60% methane, with the rest being mainly carbon dioxide. Also, it contains different amounts of oxygen and nitrogen gas, hydrogen sulphide, water vapor, and some other contaminants. The majority of these contaminants are recognized as “non-methane organic compounds” (NMOCs). In addition, some inorganic contaminants like mercury are existent in some landfill gases. Sometimes, there are also some radioactive contaminants, like tritium, found within the landfill gas. Usually, the non-methane organic compounds compose less than 1% of landfill gas. In 1991, the United States EPA determined 94 non-methane organic compounds that include toxic chemicals such as touene, benzene, carbon tetrachloride, chloroform, and vinyl chloride. No less than 41 of the total non-methane organic compounds are considered as halogenated compounds or the chemicals that contains halogens like bromine, chlorine or fluorine.

Common options for landfill gas include boiler, flaring, gas turbine, internal combustion engine, converting methane to methyl alcohol, sufficient cleaning to pipe into lines of natural gas or to some other industries.

The Environmental Protection Agency has estimated that those are about 6,000 landfills within the US. Most of those landfills have been composed of municipal waste and so generate methane. Those landfills are considered to be the biggest sources of anthropogenic methane emissions within the US. These landfills will add the estimated 450 to 650 billion cubic ft of methane each year during 2000.

Landfill gases display some effects on climate change. Two of the primary components include methane and CO_2. Both of these are greenhouse gases. Methane has been considered to be twenty times more damaging to the environment as compared to Carbon Dioxide.

Chapter 8:

New Ways Our Waste Could Fuel the Future

Some people might think of their wastes as useless materials, but these should not be seen in this way. Aside from the opportunities offered by waste management techniques mentioned in earlier chapters, there are some other ways that you could do in order to make these wastes useful. Know some of these ways in this chapter.

Converting Waste into Useful Energy

As latest energy solutions are being identified, refined and delivered further and further to the public light, one thing that doesn't acquire lots of headlines is the conversion possibility of waste to energy. This technique has become a very efficient one for some countries, particularly Japan, as it dramatically alleviates its waste disposal problems, while making the most of the energy produced on other essential industries.

Waste-to-Energy or Energy-From-Waste is a process of producing energy in the form of heat and/or electricity from waste incineration. WtE is a kind of energy recovery. The majority of WtE processes generates heat and/or electricity directly through combustion, or generates a combustible fuel commodity, including synthetic fuels, ethanol or methanol.

The combustion of the natural materials such as waste using energy recovery or simply incineration is known as the most popular WtE implementation. All advanced WtE plants within OECD countries incinerating waste (commercial, RDF, residual MSW or industrial) should meet the exact emission standards and these include the ones on sulfur dioxide, nitrogen oxides, dioxins and heavy metals. Therefore, advanced incineration plants are significantly different from the old forms. Some of them neither recovered materials nor energy. Advanced incinerators decrease the original waste's volume by 95% to 96%, based on degree and composition of materials recovery including the metals from ash for the recycling.

Aside from incineration, there are several other emerging and new technologies that have the capability to generate energy from waste as

well as other fuels with no direct combustion. Mainly, this is because of the corrosive components' separation from the fuel converted, thus, allowing in higher temperatures of combustion, such as gas turbines, fuel cells, boilers, and internal combustion engines. Some of them have the capacity to effectively convert energy into gaseous or liquid fuels:

Thermal Technologies

- Gasification (generates hydrogen, combustible gas, synthetic fuels)
- Pyrolysis (generates combustible chars and biooil/tar) Waste Conversion Pyrolysis
- Thermal depolymerization (generates synthetic crude oil that could be refined further)
- Plasma Gasification Process (PGP) or plasma arc gasification

Non-Thermal Technologies

- Anaerobic digestion (methane-rich biogas)
- Fermentation production (such as lactic acid, ethanol, hydrogen)
- Mechanical Biological Treatment (MBT)

These are some of the advanced ways to converting waste into useful energy. With these methods, there has been a high possibility for your waste to fuel the future.

Chapter 9:

Taxes and Expensive Cost in Maintaining Landfill

Operating and maintaining a landfill is never free, as it always comes with some costs. There is the so called landfill tax or levy, which is the kind of tax being used in other countries to increasing the cost of a landfill. This chapter explains more about landfill tax as well as the cost that goes along with landfill maintenance.

Landfill Tax

As mentioned earlier, landfill tax is the form of tax utilized in some countries to increase the landfill cost. Normally, the tax is being levied within currency units for every unit of volume or weight (£/t, E/t, $/yard^3). This tax is complementary to the total landfill cost and forms a part of the gate fee, which is the levied charge on a particular volume of waste delivered to a certain waste processing facility.

A fee or tax might be obligatory on landfills or some other disposal facilities as a way to increase general revenues to produce fund for assessment programs or long term alleviation of environmental effects relevant to disposal. Or, it can be as a way to inhibit disposal through increasing the cost as compared with the ideal alternatives in similar approach as a sin tax or excise.

Landfilling is being discouraged because of several primary reasons. Some of them are:

- Climate change because of landfill gas coming from biodegradable waste
- Losing of resources
    - Constraints on places right for landfill areas
    - Loss of waste landfilled recyclable components
- Nimby objections that cause some political concerns

In the majority of cases, establishing landfills is the local government's responsibility. When the study on environmental impact has been completed, permits should be acquired from the federal, local and state

governments. Landfill construction's cost differs based on application fees, engineering cost and location.

For instance, a landfill within Kentucky would operate about $500,000 up to $1M for the design and application engineer cost, yet the fee does not include the landfill liner's construction. That would cost around $75,000 for each acre. Normally, the money is increased from municipal bonds or taxes. Hence, it is likely that landfill funding could come from the pockets of taxpayers. The maintenance cost will greatly depend on the maintenance approach used by the operator.

Chapter 10:

How Landfill Sites Can Cause Harm To Our Health

Even though landfills are intended to help on the proper management of waste, they can still draw some harm to the health of people. The information given in this chapter uncovers the potential risks drawn by the landfill sites.

The Landfill Sites and those Potential Threats

Landfills draw possible risks to both human health and environment. Even though landfills are built to bring protection to the surrounding environment, failure to properly operate may still take place.

Based on a certain survey conducted by Geological Survey, while gasses and chemicals move across its plastic tubes and the liner, they swell and they become brittle then they breakdown. Consequently, leakage is not the only thing possible to happen, it is almost inevitable.

Those people living or working near a landfill that contains leakage might face some health threats, including the increased possibility of cancer as well as birth defects because of dangerous airborne releases coming from chemicals within both inactive and active landfills. This is according to a professional environmental consulting company.

Leakage is not the only concern that many landfills face. While they are being covered with high density of HDPE (High Density Polyethylene) plastic, waste may decompose at a slower pace.

The process of waste decomposition within landfills may extend for several years. This eventually results to the evaporation of existing space.

Living or working around landfills can be very harmful for an individual, so it is important that everyone should know how to avoid stay away from these risks through proper methods used.