**6.0 CASE STUDIES VIGNETTE OF EFFECTIVE COMPOSTING**

Introduction of unnecessary nutrients to the ground and shallow waters through chemical pollination, animal composts, sewage management units and development is one of the most substantial mutual topics that are at present the driving force for both, government ingenuities and the interest in composting by the Unites States and other nations (Sherman, 2006). Both the organic and financial practicality is under danger due to the existence of unnecessary nutrients. Nevertheless, a lot of case studies have shown composting to be an effective tool.

**6.1 CASE STUDY #1 - Olympia, Washington, United States**

Sherman (2006) indicated that the composting program was initiated by the Olympia’s Public Works Department in 1993. Discrete curb side gathering of yard trimmings, a drop-off location for yard fixings and a locality chipping program has been established by the municipality. The town of Olympia comprises of 37,000 inhabitants with an average household income of around $2,800. Out of this entire population, estimates of 60 % of the single-family homes have the routine of taking up organic source lessening either by means of vigorous composting or grass cycling. Over the period of three years, Olympia has been able to steadily augment the alteration of yard trimmings and food leftovers by the means of home composting (Sherman, 2006)

 **6.2 CASE STUDY #2 - Gironde, France**

The European Commission (2000), specifies in its article on the, "*Success stories on composting and separate collection*," that in France, a private company operates the composting centre and a scheme in the city of Gironde. This centralized scheme, Biodegradable kitchen and garden waste are gathered separately and composted and it covers around 20,000 households. This composting unit holds the capacity of 40,000 tons per year and produces around 2,000 and 3,000 tons of compost each month (European Commission, 2000). In this scheme, households waste can be taken to waste-collection centres and became successful because of quality of compost produced during this scheme.

**7.0 ROLE OF COMPOSTING IN SWM, MSW, ISWMPS**

An ISWM should run certain programs to reduce or reuse the waste products and materials from the outdated dumping facilities to recycling, composting, and burning processes Huang, G., Chi, G., & Li, Y. (n. d). However, the solid waste management (ISWM) systems has been created to implement waste diversion in current scenario and due to the shortage of land in metropolitan areas and due to the availability of impurities in groundwater and with the increasing opposition of public with respect to landfill disposal. Therefore, a landfill and garbage truck should be included in the disposal system and Traditional Municipal Solid Waste (MSW) collection system.

Rahman, M. H., & Al-Muyeed, A. A. (2010) indicates that an important role in the composting process is played by the Municipal Solid Waste or (MSW). Let’s take for instance, the presence of recyclable organic fraction in a very large proportion of solid waste is found in the town of Bangladesh and India. This organic fraction of solid waste can be created to diminish the volume of the solid waste and therefore, this compost can further be utilized as a soil conditioner as the composting turn away the organic fraction of solid waste from public collection services and final dumping sites (Rahman, M. H., & Al-Muyeed, A. A., 2010). Therefore, it helps in improving the waste management system through ecological sustainability and economic stability. On the other hand, we are gaining some environmental benefits by the use of compost as a soil utilizer as it diminishes the usage of chemical fertilizers.

When it comes to composting, Integrated Solid Waste Management (ISWM) is highly important. It was in Italy that over the course of 5 years two maize farm’s agricultural soils were treated with a top quality industrially made compost Guerini, G., Maffeis, P., Allievi, L., & Gigliotti, C., 2006). Regular mineral fertilizer was compared with cattle manure, with an analysis being performed on harvested materials, cultured soils, grain yield, manure and compost. It was observed that the organic fertilization led to an improvement in NPK, organic matter content, CEC and soil pH and for purely mineral-treated soil, and the N mineralization and soil respiration was higher (Guerini, G., Maffeis, P., Allievi, L., & Gigliotti, C., 2006). Improvements were also seen in the Plant K take-up, however, there was no effect on the grain yield. From this we can confirm that it is organic fertilization rather than the use of compost that led to improved soil fertility.

There are several aspects to municipal solid waste (MSW): grass clippings, clothing, furniture, package wrappings, bottles, newspapers, food scraps, appliances and consumer appliances and electronics (Shoou-Yuh, C., Wanchi, H., & Shu-Liang, L., 2010) .While many improvements have been made in the field of recycling and waste reduction, MSW management remains a major concern. We can see from generation trends that total tonnage is rising, particularly in developing nations. To answer economic, environmental and public health concerns, it is important to deal with the complicated problem that is management of municipal solid waste. Generally, MSW tends to be collected by the cities/countries before it is divided into three waste sections: organic wastes, recyclables and miscellaneous (Shoou-Yuh, C., Wanchi, H., & Shu-Liang, L., 2010) . In organic wastes, we have materials like yard waste which can easily be composted through the use of microorganisms. This leads to the production of a humus-like material that is used in landscaping and gardening. All recyclable materials are sorted into separate piles (glass, paper, aluminium etc.), which are then sold off to vendors or brokers after being sorted. Lastly, the remaining waste tends to either be sent to landfills or incinerators but solid waste management tends to differ from nation to nation Shoou-Yuh, C., Wanchi, H., & Shu-Liang, L., 2010)

Spencer, R. (2007) states that there is no doubt whatsoever that the composting of mixed municipal solid waste is a highly niche business. This MSW management option tends to be viable in highly specific circumstances and as a result, most of these plants tend to work as tourist destinations. They are often located in rural areas, making recycling hard and landfills far away. There are several instances where public agencies put down plants so that they could increase an existing landfill’s lifetime. It was clearly seen that in nearly all the cases where facilities were working well, they were dedicated towards making the entire endeavour a success.

**8.0 Future Trends in Composting and Growth of Industry Evaluation (Highlighting Regional Differences)**

According to EPA’s Report on the Environment Highlights of National Trends (2008), we can gain some interesting insight into any country’s efficiency if we were to look into the management, composition and amount of waste being produced. In addition to this, it can also provide vital information on how the waste is affecting the environmental and human health. In the United States, waste amount and types tend to vary, depending primarily on the company’s activities and size. There are manufacturing and commercial companies that are responsible for the production of hazardous waste, industrial waste and solid waste while the households tend to create municipal waste (e.g. yard trimmings, packaging, paper etc.) while discarding products having possibly hazardous ingredients and materials. Materials that could possibly be harmful to human health are classified as hazardous waste and they tend to be highly reactive, flammable, corrosive and/or toxic. There are activities like mining, resource extraction, construction and demolition, agriculture and other industrial processes which tend to create large amounts of miscellaneous waste.

EPA’s Report on the Environment Highlights of National Trends (2008) indicates that at present, the United States focuses on collecting information about hazardous and municipal solid waste only, which together are but a small part of the total waste created in the nation. After the waste has been created, it needs to be properly managed which means the proper collection, transportation, storage, reuse, recycling, processing/treatment or disposal of the waste. Due to the fact that waste tends to have in it many hazardous chemicals, their management and subsequent processing has the potential for contaminating water, air and/or land. Other harmful side effects include a compromise in their use and adverse effect on human health or the ecology. There are several waste types which upon decomposition turn into methane source. As a result, the industry has taken upon itself to bring down the amount of certain chemicals (which have been proven to contaminate land, air and water) that can be found in waste.

When it comes to the Southeast area, what can we expect to see in the future for composting? To answer this clearly, several aspects need to be considered: soil amendment demands, different residuals requiring alternative management such as biosolids, food residuals, mixed MSW and animal manure, tipping fees and disposal capacity, any bans on herbicides and traditional pesticides e.g. methyl bromide and the region’s soil state (Composting Trends in the Southeast., n.d.). There are five South-eastern states, namely Georgia, South Carolina, North Carolina, Virginia and Florida, which have gone beyond their set recycling objectives, as lay down by their own legislatures. This means that the true driving force here would be the requirement for alternative management techniques, a desire to remediate stem erosion and soils, demands from the consumers for soil amendments such as compost and an agricultural based demand for compost products which help build soil organic matter as well as provide disease operating composting facilities in the nation, followed closely by North Carolina, South Carolina, Florida and Virginia.

According to Zimms (2013), the future involves seven items: the meeting of loftier targets, a new connection being fostered between collection and generators and organics facilities, an education program being developed, expansion of business diversion program alternatives, feasibility and benchmarking, increasing public private partnerships and more private versus public facilities.

**8.1 EPA REGION I COMPOSTING TRENDS**

In the EPA Region 1, Education and outreach are most important concerns of a number of composting programs. In Connecticut, Maine, and Massachusetts, food scraps, a manure waste stream, are being studied in pilot programs and projects (EPA, January 27, 2013). In Maine and Massachusetts composting workshops are being sponsored. Meanwhile, Connecticut and New Hampshire provide school composting guides.

Re-consumer kitchen residuals (e.g. unbleached napkins, coffee grinds, egg shells, fruit/vegetable peelings) are taken to a local farm for composting At Bates College in Lewiston, Maine. Disposal costs and water usage (as less food waste is put through garbage disposals) are saved as a result of this program.

**In 1998, a** public/private partnership was created to compost food wastes from college and hospital. In the past the food waste was grounded and sent to the sewer, finishing up at the Hanover Waste Water Treatment Plant. The loading on the treatment plant has decreased by redirecting the food waste to the compost facility (EPA, January 27, 2013).

**8.2 EPA REGION II COMPOSTING TRENDS**

In EPA Region 2, states are composting to amplify solid waste reduction. In 1998, New York's organic waste recycling program recycled almost two million tons of organic waste. Yard waste is the main focal point in New Jersey’s program. New Jersey’s program has removed considerable quantity of material from the waste stream. Sewage sludge (biosolids) from publicly-owned treatment works (POTWs); food residuals recycling from food recovery programs; industrial organic waste from food processing facilities; used paper products; yard waste; or other organic materials are being covered in these states (EPA, January 15, 2013).

**8.3 EPA REGION III COMPOSTING TRENDS**

In the EPA Region 3, composting is made a main concern for reducing waste. In Virginia composting of leaves, grass, brush and other collected material, but not composting of land-clearing debris takes place with help of the vegetative waste management and yard waste composting regulations (EPA, March 13, 2013). In support of yard waste composting facilities in Pennsylvania, and Delaware and Maryland, several guidelines are being written.

**8.4 EPA REGION IV COMPOSTING TRENDS**

In EPA Region 4 and with respect to agriculture and horticulture, Georgia gives pollution prevention and waste reduction information particularly for the “green industry”. Fact sheets on how to compost, technical assistance publications, and rules and regulations are included in course of action (EPA, February 27, 2013). Municipal, home, and commercial composters are helped by instructions from Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee.

**8.5 EPA REGION V COMPOSTING TRENDS**

In Minnesota, Indiana, and Wisconsin, tree wastes and yards are prohibited from landfills. In EPA Region 5, the states provide information mostly for home composters and expect them to decrease household waste produced (EPA, March 14, 2013). Environmental beneficial results through grant opportunities, public recognition awards, broad-based educational programs and technical assistance are given confidence by The Indiana Recycling Grants Program. In Indiana, many municipalities and businesses are a part of the compost market.

**8.6 REGION VI COMPOSTING TRENDS**

Manufacturers and users can visit websites from states in Region 6 to learn more about compost and techniques used during this process. Also tips on how to begin composting, what resources can be composted, if the compost needs to be in a bin, suitable temperature for the compost, what is required to be done to the compost to let the organics to decompose, and how compost can be utilized with help of gradual guidance (EPA, March 01, 2013). Incentives for composting to reduce materials land-filled by 15 percent are provided by Texas legislation.

**8.7 EPA REGION VII COMPOSTING TRENDS**

Within EPA Region 7, States not only reduce waste, but they expand the market for recycled materials and improve soil conditions by diverting organic materials from landfills. Detailed instructions for composting, mulching and grass recycling for consumers in Missouri, Kansas and Iowa are provided. Applicable information, about resources that are capable of and not capable to be recycled through organics recycling is included in each State. In Iowa, the State suggests a repayment to any non-residential buyer of compost, which is purchasing compost for the first time by means of particular programs (EPA, March 12, 2013).

**8.8 EPA REGION VIII COMPOSTING TRENDS**

Efforts are being made to reduce the amount of waste that could be composted from entering landfills in Montana, North Dakota, South Dakota, and Wyoming. Backyard composting guidelines to homeowners and others fascinated by this attempt are provided by the State. Montana further added 3,000 composting systems through the “Backyard Gold” project and sidetracked almost 1,000 tons of matter from landfills, in addition to improving Montana soil (February 15, 2013).

**8.9 EPA REGION IX COMPOSTING TRENDS**

Homeowners, renters, commercial businesses and institutions are given confidence to diminish the amount of green waste they generate by composting, in States within EPA region 9.

In 2000, to offer the California Integrated Waste Management Board with information on the number of producers, feedstock sources, products, and markets for compost and mulch, a survey was performed. Regulatory oversight and marketing assistance to compost and mulch producers is given by the Waste Board.

Enormous area of land is dedicated to agriculture in California, Hawaii, Arizona and Nevada. Well-built markets for compost and other recovered organic materials are present in these states. The diversion of organic materials from landfills for different uses, such as the manufacture of compost is supported by EPA’s Resource Conservation Challenge. Within the Pacific-Southwest Region-9, the beneficial qualities of composting have captured increased interest among policy makers. As performing this circumvent the release of greenhouse gases when the material is land filled and it also creates a helpful soil modification. This soil modification can be useful to agriculture lands to supply the soil with nutrients vanished for the period of food production. A sustainable, closed-loop system is there as an outcome (EPA, March 06, 2013).

**8.10 EPA REGION X COMPOSTING TRENDS**

To protect human health and the environment, composting facilities in Oregon and Washington are regulated. In these States, all amenities are required to act in accordance with standards for odour minimization. In Oregon, there are huge facilities for managing non-green feed-stocks substances that in present or future pose danger to human health or the environment; substances that are high-in, and probable to sustain, human pathogens—must meet the terms with more human health and environmental security because of their larger risk (EPA, February 16, 2013).

**9.0. CONCLUSION**

According to Shoou-Yuh, C., Wanchi, H., & Shu-Liang, L. (2010) report, package wrappings, grass clippings, furniture, clothing, bottles, food scraps, newspapers, consumer electronics and appliances are included in Municipal solid waste (MSW). This waste remains a continuous concern because the generation tendency indicates that the on the whole tonnage persists to increase particularly for developing countries, in spite of developments in waste diminution and recycling. MSW is collected by cities and counties in most countries, including the United States. Nevertheless, reported cast studies and EPA regional trend differences show that there are considerable divergences in the production and management of SWM, MSW, and ISWMPS. MSW is gathered and then potentially divided into three waste streams. Recyclable material is classified as (paper, glass, aluminum, etc.) and subsequently sorted and sold to dealers or vendors. The left over waste stream is regularly placed in a landfill and in further cases propelled to incinerators. Microorganisms can also be used to produce a humus-like substance from organic wastes (compost) such as yard wastes. This substance can be utilized in gardening and landscaping applications. Municipal solid waste management is a complex dilemma that requires to be addressed to meet public health, environmental, and economical concerns (Shoou-Yuh, C., Wanchi, H., & Shu-Liang, L. , 2010) .