

Hotel Food Scraps Go to the Animals-Reduces Disposal Cost and Saves Environment

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Abstract The waste generated in the hotel industries both in kitchen and eateries on the daily basis is big challenge. In addition to the man power, cost of waste disposal and environmental pollution, the waste also needs space to store and dispose of safely. The waste from hotel industries were collected from the hotels and dumped for composting. This normally generates biogas which sometimes is collected and utilized and most of the times let-off in atmosphere for further pollution. Some of the bid hotels have even installed bio-methanation plant to generate biogas for their kitchen to save in fuel. Recently some private industries have come up which collect the waste food scrapes directly from hotels and take it their farm, do basic process like sort out the animal waste, grind and process further to feed to their pigs and or animals as feed supplement to save on animal food. Certain health regulations for the animals being fed and the personals handling the waste have strictly to be followed and regularly monitored. This has benefitted the both hotel industries and farm owners. The case studies from within country in Bangalore and a few from abroad have been presented. This mode of food scrapes going to animals trend is getting popular, economical and environment friendly and is expected to grow further and further.

Keywords: hotel food scrapes, saves environment, reduces disposal cost

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1. Introduction

For the hospitality industry, the waste created by daily operations is an ongoing challenge. In addition to incurring the costs of waste disposal, hotels need to also allocate valuable back-of-the house space for waste to be stored and sorted. There are other concerns as well, namely the health and safety of those coming into contact with the waste, and the noise created by waste compaction and collection. Much of the waste created in hotels is generated from within the kitchen (organic food waste, packaging, aluminum cans, glass bottles, corks and cooking oils), or from the housekeeping department (cleaning materials and plastic packaging). Waste is not only created in guest rooms but also in public areas, hotel gardens (engine oils, pesticides, paints and preservatives to grass and hedge trimmings) and offices (toner cartridges, paper and cardboard waste). And refurbishment and renovation projects undertaken at the hotel contribute further to the waste generated by the property. The waste management system in India is fairly unorganized. The waste management system in India starting with residential waste collection, industrial waste collection and commercial waste collection.

Residential waste collection is mostly done by the unorganized sector, using manual rickshaws. On an average one individual collects waste from about 300

houses and then loads this waste onto his rickshaw. The waste from households comprises of the following materials:

1. REUSEABLE: Plastic, Paper, Cardboard, Iron scrap, Used copper wiring, Batteries, Mineral Water bottles, Poly bags.
2. ORGANIC WASTE: Food scrap, Mud
3. INERT WASTE: Clay pots, Cigarette buds, Complex plastics

All this waste is collected in a mixed form from the households. The waste collector then takes this waste to a segregation site, or an open ground where he proceeds to remove the recyclables from the waste. After sorting through the waste, the collector packs them in different sacks and reloads them onto his rickshaw. The organic waste and the inert waste are left behind as the waste collector has no use of this, and does not get any monetary benefit from it. After the collection and segregation process is complete, the collector paddles his rickshaw to his godown, where he proceeds to sell the waste to the go down owner or scrap dealer.

2. Present System of Hotel Waste Disposal

At present Hotel waste generated by small restaurants is disposed off directly by the hotels at nearby collection spots. The substantial quantity of food waste dumped at these collection spots gets mixed with all the other kinds

of dry and wet waste and gives an ugly look to the collection spots with lot of dirt and stink.



In case of large 4 and 5 star hotels; the hotel waste is disposed off directly by the hotels through corporation or through private contractors to the dumping ground. Corporation provides a service of directly lifting hotel waste from the small hotels in some wards. Corporation Trade Refuse Charge (TRC) to the hotels for the waste generated by the hotels. The TRC is charged in multiples of license fees, which are directly based on the area of the hotel and the grade. The grade one hotels are generally bars and permit rooms, which do peak business during evening hours. The food restaurants much less as compared to that generate the waste generated by the restaurants with bars and permit rooms. However the TRC charged for the bars and restaurants is much higher than that charged for the ordinary restaurants, which generate much, more quantity of waste.

As per the observations of the hotel waste generated by hotels, around 70 to 75 % of the hotel waste is biodegradable and gets mixed with all the other type of waste when dumped at the collection spots. Also the corporation or private contractors directly mix the waste, which is collected, with all the other type of non-biodegradable waste at the dumping ground.

3. Suggestions

Any waste management strategy will take into account the hierarchy of waste management with a number of things that can be done before recycling. Also an occupational health study of waste workers would increase knowledge about the impact on health of working with biodegradable and non-biodegradable waste streams. The study could include identifying and assessing health concerns and causes of health effects, evaluating the adequacy of protective equipment, and comparing occupational risks from various professions [1].

1. Management of waste generated by all the 3,4 and 5 star hotels and restaurants generating over one ton of waste by themselves: These hotels can look at options of in-situ composting, installation of small bio-methanation plants in the premises.

2. Direct collection of waste generated by hotels by corporation and its localized disposal: Corporation should look at direct collection of hotel waste and set up zone wise processing facilities (either composting or bio-methanation). This will substantially reduce the transport cost as well as the load on the dumping grounds. The

public collection spots will also get less amount of garbage.

3. Bio Sanitizer: This machine can crush the food waste to 1/3rd of the original volume and odorless compost produced can be used as manure after curing.

4. Bio-methanation: Bio-methanation Plants of capacities 100 -500 kg per day can be installed in the premises of hotels if adequate space is available. Gas generated can be used for cooking

5. Composting/Vermicomposting: Options of composting/vermicomposting could be explored.

6. Recycling: Recycling is good for the environment because it significantly lowers the amount of waste going to landfill, and can reduce waste costs if fewer collections are needed for general waste. Recycling of glass, metal tins and aluminum cans.

3.1. Meet the Green Managers of Garbage

BANGALORE: Civic authorities have cracked the whip on the hotel industry, considered as the biggest contributor to the city's burgeoning burden of garbage. A whopping 1,500 tons of the 5,000 tons of waste generated daily by Bangalore comes from hotels.

But waste management is not a burden in itself as can be witnessed in some of the best practices adopted by big players in the city. TOI details these model practices adopted by top notch hotels, IT companies and residential blocks in an effort to underscore the point that waste management is all about managing the basics.

3.2. Hotel Lalit Ashok, Kumara Krupa Road

This five-star hotel in the city is the harbinger of many a green initiative. It complies with all prescribed norms in waste management, water treatment and energy management. Every day, the hotel segregates the waste into biodegradable and non-biodegradable. The wet waste is composted in a vermicompost unit within the premises with only the dregs landing into BBMP trucks. The dry waste is segregated and recyclables are stored separately and sold as scrap. Half burnt candles are sent back to the supplier while remaining cooking oil is sold for reuse in machinery. The hotel uses biodegradable material everywhere possible, including for its floor mats.

3.3. ITC Gardenia, Vittal Mallya Road

This is a zero solid waste hotel, having adopted efficient solid waste management practices since its inception in 2009. The hotel has its own primary waste segregation unit where dry and wet wastes are separated. An organic waste convertor generates manure from kitchen waste. The manure is used as fertilizer in the hotel garden. The hotel has its own contractual agreement with a dedicated team of experts who guide its waste management efforts.

3.4. Hotel Leela Palace, Old Airport Road

The hotel segregates waste every day, yielding nearly two tons of wet waste every day and 3.5 tons of dry waste every week. The wet waste comprises leftover food and kitchen waste. It is transported to a poultry farm in Marathahalli for feed. The dry waste is sold to a local waste recycling merchant, thrice a week. The papers are

recycled for printing in-house reports. The hotel's skillful disposal of waste and use of recyclables are a lesson to all Intel, IT giant, Outer Ring Road. Spread over 22 acres, this company campus is a plastic-free zone. No plastic is used even in its cafeteria. Employees use cups, which can be reused. The IT giant has a wet waste convertor and shredder to compost the 250 kg of organic waste generated every week. The mixture is then fed into a blending unit along with previously generated compost to provide adequate microbial density in the mix. The produce further undergoes ventilation for 15 days before being used as manure in the company garden. Excess manure is given to NGOs.

Prestige Constructions: All residential enclaves of this builder, including apartment complexes and gated communities, follow practices that ensure at least 70% of the waste generated does not go to the landfills. Apart from sewage treatment plants, every residential block or gated layout has its own solid waste management unit where wet waste is segregated and composted for producing manure. The enclaves even sell excess manure to agencies and NGOs. Recyclables are also sold to NGOs land in BBMP trucks. But at its properties where they are disposed, no contractors come pick up garbage, recyclables are sold to NGOs.

3.5. Mantri Tranquil

N Ramchandran, a resident of Mantri Tranquil on Kanakapura Road, initiated an elaborate waste management system in the lush 800-unit strong-gated community. Ramchandran shifted to Bangalore from Germany and brought with him his deep commitment to managing waste. There is a separate solid waste management building within the campus. This houses a shredder, a composting unit, a bone crusher and a sewage treatment plant. Each of the 11 towers has five separate bins on the ground floor where residents segregate and dump glass, plastics and cartons, e-waste, tetra packs and medical and other hazardous waste. The waste is segregated again at the SWM center and the wet waste is composted to produce manure.

4. Case Studies from Abroad

4.1. Food Scraps go to the Animals Barthold Recycling and Roll-off Services

Don't throw away your food waste! Barthold Recycling and Roll-Off Services picks up food scraps from commercial businesses and feeds the scraps to pigs and cattle.

4.2. How It Works

Since 1988, Barthold Recycling & Roll-off Services has collected food from restaurants, hotels, schools, nursing homes, grocery stores and even large food processors to feed 3,800 pigs and 250 head of cattle on its 290-acre facility. Today, Barthold collects food scraps from about 400 commercial customers in the St. Francis, Minnesota area each month.

In 1951, the Federal government and the State of Minnesota Department of Animal Health required haulers

and farmers to process or cook food before feeding it to animals to kill harmful bacteria. In order to comply, Barthold pioneered a method of cooking the food scraps in the trucks after collection. Steam pipes are hooked to the truck for 20 minutes, increasing the temperature enough to kill potentially harmful bacteria. Once cooked, the food waste is fed to the pigs and cows. Barthold operates a full circle practice by also composting the manure from the animals for fertilizer used both onsite and offsite.

4.3. What Makes Barthold Recycling and Roll-off Successful

One word sums it up: collection. Barthold Farms established industry food collection service standards to ensure consistency and good performance and ensures that all farms listed on their Web site adhere to these standards. For example, Barthold uses special containers with lids that seal with a rubber gasket to reduce odor and leakage. In addition, thanks to Barthold's long relationship with many of its customers, along with education and training, its final product is 99.75% pure. Experienced customers know how to properly sort the food waste so that contamination is minimal, and Barthold trains new customers to do the same [6].

4.4. Everyone Benefits

Types of Recovery: Feed Animal
Company: Barthold Recycling & Roll-off Services
 Family owned business in the St. Francis MN area.
Cool Facts:
 Barthold feeds 3800 pigs and 250 cattle on its 290 acre facility. They process around 1000 tons of food scraps per month.
Website: www.foodrecyclers.com

Customers save money by paying Barthold to haul their food waste and feed it to pigs and cattle because it reduces taxes, disposal costs, and fees at landfills. Customers pay 30% less to recycle their food waste instead of throwing it away. In April 2003, Ramsey and Washington Counties, Minnesota, established a County Environmental Charge to encourage commercial waste generators to reduce their organic waste, avoiding additional charges on their waste bill. For example, two innovative customers, the Prairie School District and J&J Distributing (wholesale produce distributor) used Barthold Recycling & Roll-off Services and estimate that they save 50 % and 67 %, respectively, in trash hauling and disposal fees. J & J Distributing estimates that by using Barthold they divert an average of 35 tons of fruit and vegetable waste or 65% of its total waste stream per month. Customers report other benefits such as increased cleanliness and reduced labor costs. Also, since Barthold uses the compost produced from its animal waste both onsite and offsite, they reduce costs and create another source of revenue.

As you can see, feeding animals provides an excellent opportunity economically and environmentally for your business. If you generate large quantities of food scraps, look at your waste handling and consider the benefits of recycling that waste. [3].

4.5. Waste Reduction Tips for Hotels and Casinos in Indian Country

The United States Environmental Protection Agency in its report vide EPA 530-F00-007 dated April in 2000 has stated that tribally owned hotels, motels, resorts, casinos, and bingo halls have numerous opportunities to prevent waste when purchasing supplies and food, serving customers, or cleaning guest rooms. There are approximately 400 hotels, motels, and resorts, and 200 casinos and bingo halls located in Indian Country [2]. These facilities generate a tremendous amount of solid waste, including food waste, glass containers, metal cans, plastics, paper and cardboard. Hotel and casino operators have found that waste prevention reduces purchasing costs and disposal fees. So, waste prevention not only can help protect the environment and conserve natural resources, it makes economic sense.

4.6. Surplus food can be beneficially used in a variety of ways. The food recovery hierarchy prioritizes methods of reducing food waste. Source Reduction-Reduce the volume of food.

New Jersey's Rutgers University has been a leader in food scraps diversion for so long that Jim Vernere, Facilities Supervisor, can't recall the start date of the program. "Steve's grandfather used to come here in a horse and buggy," jokes Vernere, referring to Steve Pinter, owner of Pinter Farms, who collects food scraps from Rutgers' four main dining halls and feeds it to his hogs and cattle [4].

4.7. A Lesson in Successful Partnerships

The San Francisco Recycling Program (SFRP) used stakeholder involvement to create a successful composting program at local schools. SFRP and Sunset Scavenger, a division of Norcal Waste Systems, met with interested teachers, principals, subcontractors, and custodial staff to discuss roles and responsibilities during the different steps in the composting process. Stakeholder meetings allowed SFRP to identify and solve potential problems and foster a sense of responsibility needed to sustain its programs. SFRP's stakeholder involvement also led to student and parent interest in food waste recovery.

In 2000, the four public elementary schools and one private high school participating in the program diverted nearly 200 pounds of food scraps daily. The City of San Francisco uses its successful partnership approach to expand its food diversion program to haulers, composting facilities, dairy farmers, local colleges, and other organizations.

4.8. Shopping for Change

The Massachusetts Department of Environmental Protection and the Massachusetts Food Association partnered to increase organics recycling at supermarkets in their state. These two organizations established a voluntary supermarket recycling certification program to promote recycling and reusing food waste and other materials. Participating supermarkets save money and receive both positive recognition and waste load inspection regulatory relief. In August 2005, 62 supermarkets, nine haulers, and six composting facilities achieved a 60 to 75 percent recycling rate of food scraps and other organics. The supermarkets reportedly saved

\$3,000 to \$20,000 annually per store by simply diverting organics [5]. Surplus food can be beneficially used in a variety of ways. The food recovery hierarchy prioritizes methods of reducing food waste.

1. Source Reduction- Reduce the volume of waste food generated.
2. Feed Hungry People- Donate extra food to banks soup kitchens and shelters
3. Feed Animals-Divert food scraps to animal feed.

4.9. Food for Thought

Coca-Cola sends leftover food from its cafeteria and banquets to Atlanta's Table, a local branch of Food chain (a network of prepared and perishable food rescue programs). Stony Field Farm Yogurt donates leftover yogurt to local hog farms. The University of Vermont composts 115 tons of its dining hall food waste per year for an annual savings of nearly \$11,000 in avoided landfill tipping fees.

4.10. Hungry for the Basic Facts

Almost half the food in the United States goes to waste. Food is now the #1 material sent to landfills and incinerators each year. Food waste makes up almost 14 percent of all the municipal solid waste generated in the United States. Less than 3 percent of food waste is recovered. Food waste losses account for up to \$100 billion per year; \$30-40 billion occurring within the commercial or retail sector (e.g., restaurants, convenience stores) and \$20 billion from farming and food processing. To learn more about food waste, visit www.epa.gov/foodrecovery

4.11. Food Waste for Animal Feed

Almost energy and nutritional value are important qualities for stock feed. Whilst some past consumer food waste, such as fruit, vegetable materials can be used as supplementary animal feed, the nutrient value is highly variable and putrefied food is undesirable as feed.



Critically, food waste may only be fed to animals under prescribed conditions. For most applications food must be **guaranteed** not to contain or to have come into contact with meat or other animal by products. Livestock bio-security laws and regulations restrict the use of food waste for animal feed. Bio-security is the management of risks of pests and diseases to the economy, the environment, and the community.

4.12. Food Waste and Pigs

Feeding swill to pigs is considered the most likely way a foot-and-mouth (FMD) outbreak could occur, and the

practice is illegal in all States and Territories of Australia and New Zealand.

The 2001 UK outbreak of FMD originated on a “food-waste-feeding” swine farm.

Recycling Food Waste into Animal Feed within the UK’s Legislative Framework 6 August 2013. By Ben Messenger, Managing Editor, Waste Management World [6]. The similar trends will follow soon in India and time is not far when such legislation will also be passed and implemented by Govt. of India.

The definition of swill includes meat or animal by products (material from placental mammals), **or anything that has been in contact with meat or meat products**. Swill may include food scraps, bakery waste and waste from restaurants. The responsibilities for legal compliance, and therefore potential risk and liability extend to feed suppliers.

Food waste containing meat or animal material that is sterilized via a proven process to destroy potential disease organisms may be acceptable for feeding to pigs.

The University of Florida has developed the following guidelines for feeding wet food waste to pigs:

1. Conduct regular nutrient analysis. Although diets will not be balanced in the traditional sense, this will help in determining deficiencies and implementing supplementation strategies.

2. Supplement wet food waste with a [higher protein] dry feed such as ground corn to improve animal performance. Consider including a commercial vitamin/mineral premix with the corn.

3. Many pigs on food waste farms come in as feeder pigs. Starting them directly on food waste could be disastrous. They should be slowly adapted to food waste in the diet. Use a medicated complete starter feed when starting pigs on feed.

4. Avoid food waste containing physical contamination such as might come from a restaurant. Collect where effective source separation is practiced.

5. Avoid feeds that are too wet. Low dry matter will result in slower growth.

6. Follow regulations and sterilize material where there is any risk that food waste contains, or may have come into contact with meat or animal by products.

4.13. Food Waste and Ruminants



Australia and New Zealand have adopted uniform national laws that ban the feeding of restricted animal

material (RAM) to ruminants (animals that chew the cud, including cattle, sheep, goats, deer, alpacas. etc.).

The only significant method of spreading BSE (mad cow disease) is through dietary exposure to feed that contains infected material. The ban acts as a fail-safe control measure to rule out the possibility that feeding will amplify or spread the disease from any source.

Restricted Animal Material (RAM) includes any material, tissue or blood taken from an animal, including fish and birds, and includes meal obtained from rendering tissues or blood from animals such as blood meal, meat meal, meat and bone meal, fish meal, poultry meal and feather meal, and compounded feeds made from these products.

Only feed that is **guaranteed** not to contain or to have come into contact with RAM is permitted. The responsibility for legal compliance extends to feed suppliers. A disposal system is inadequate; management of such risks would require a secure and independently certified HACCP based food quality system. Commercial rendering of the materials (as for pigs) is not an acceptable treatment method.

4.14. Health Impacts of Solid Waste

Modernization and progress has had its share of disadvantages and one of the main aspects of concern is the pollution it is causing to the earth – be it land, air, and water. With increase in the global population and the rising demand for food and other essentials, there has been a rise in the amount of waste being generated daily by each household. This waste is ultimately thrown into municipal waste collection centers from where it is collected by the area municipalities to be further thrown into the landfills and dumps. However, either due to resource crunch or inefficient infrastructure, not all of this waste gets collected and transported to the final dumpsites. If at this stage the management and disposal is improperly done, it can cause serious impacts on health and problems to the surrounding environment. Waste that is not properly managed, especially excreta and other liquid and solid waste from households and the community, are a serious health hazard and lead to the spread of infectious diseases. Unattended waste lying around attracts flies, rats, and other creatures that in turn spread disease. Normally it is the wet waste that decomposes and releases a bad odour. This leads to unhygienic conditions and thereby to a rise in the health problems. The plague outbreak in Surat is a good example of a city suffering due to the callous attitude of the local body in maintaining cleanliness in the city. Plastic Waste is another cause for ill health. Thus excessive solid waste that is generated should be controlled by taking certain preventive measures.

4.15. Impacts of Solid Waste on Health

The group at risk from the unscientific disposal of solid waste include – the population in areas where there is no proper waste disposal method, especially the pre-school children; waste workers; and workers in facilities producing toxic and infectious material. Other high-risk group includes population living close to a waste dump and those, whose water supply has become contaminated either due to waste dumping or leakage from landfill sites.

Uncollected solid waste also increases risk of injury, and infection.

In particular, *organic domestic waste* poses a serious threat, since they ferment, creating conditions favorable to the survival and growth of microbial pathogens. Direct handling of solid waste can result in various types of infectious and chronic diseases with the waste workers and the rag pickers being the most vulnerable.

Exposure to hazardous waste can affect human health, children being more vulnerable to these pollutants. In fact, direct exposure can lead to diseases through chemical exposure as the release of chemical waste into the environment leads to chemical poisoning. Many studies have been carried out in various parts of the world to establish a connection between health and hazardous waste.

Waste from agriculture and industries can also cause serious health risks. Other than this, co-disposal of industrial hazardous waste with municipal waste can expose people to chemical and radioactive hazards. Uncollected solid waste can also obstruct storm water runoff, resulting in the forming of stagnant water bodies that become the breeding ground of disease. Waste dumped near a water source also causes contamination of the water body or the ground water source. Direct dumping of untreated waste in rivers, seas, and lakes results in the accumulation of toxic substances in the food chain through the plants and animals that feed on it.

Disposal of hospital and other medical waste requires special attention since this can create major health hazards. This waste generated from the hospitals, health care centers, medical laboratories, and research centres such as discarded syringe needles, bandages, swabs, plasters, and other types of infectious waste are often disposed with the regular non-infectious waste.

Waste treatment and disposal sites can also create health hazards for the neighborhood. Improperly operated incineration plants cause air pollution and improperly managed and designed landfills attract all types of insects and rodents that spread disease. Ideally these sites should be located at a safe distance from all human settlement. Landfill sites should be well lined and walled to ensure that there is no leakage into the nearby ground water sources.

Recycling too carries health risks if proper precautions are not taken. Workers working with waste containing chemical and metals may experience toxic exposure. Disposal of health-care wastes require special attention since it can create major health hazards, such as Hepatitis B and C, through wounds caused by discarded syringes. Rag pickers and others, who are involved in scavenging in the waste dumps for items that can be recycled, may sustain injuries and come into direct contact with these infectious items.

5. Diseases

Certain chemicals if released untreated, e.g. cyanides, mercury, and polychlorinated biphenyls are highly toxic and exposure can lead to disease or death. Some studies have detected excesses of cancer in residents exposed to hazardous waste. Many studies have been carried out in various parts of the world to establish a connection between health and hazardous waste.

5.1. The Role of Plastics

The unhygienic use and disposal of plastics and its effects on human health has become a matter of concern. Coloured plastics are harmful as their pigment contains heavy metals that are highly toxic. Some of the harmful metals found in plastics are copper, lead, chromium, cobalt, selenium, and cadmium. In most industrialized countries, colour plastics have been legally banned. In India, the Government of Himachal Pradesh has banned the use of plastics and so has Ladakh district. Other states should emulate their example.

5.2. Preventive Measures

Proper methods of waste disposal have to be undertaken to ensure that it does not affect the environment around the area or cause health hazards to the people living there. At the household-level proper segregation of waste has to be done and it should be ensured that all organic matter is kept aside for composting, which is undoubtedly the best method for the correct disposal of this segment of the waste. In fact, the organic part of the waste that is generated decomposes more easily, attracts insects and causes disease. Organic waste can be composted and then used as a fertilizer.

5.3. Green and Food Waste Collection - Health Issues

When green waste is left, microbes grow quickly in the warm, moist environment. Collecting and handling green waste creates bio-aerosols (microbes suspended with dust in the air) and these are breathed in when working. Research suggests that the health risks of breathing in these microbes from handling green waste are no greater than those from handling any other mixed household waste.

Good practice to reduce green waste dust by operating a system of controls that help minimize dust clouds is set out in the following guidance written in consultation with the Waste Industry Safety and Health Forum (WISH).

Occupational hazards associated with waste handling

Infections

- Skin and blood infections resulting from direct contact with waste, and from infected wounds.
- Eye and respiratory infections resulting from exposure to infected dust, especially during landfill operations.
- Different diseases that result from the bites of animals feeding on the waste.
- Intestinal infections that are transmitted by flies feeding on the waste.

Chronic diseases

- Incineration operators are at risk of chronic respiratory diseases, including cancers resulting from exposure to dust and hazardous compounds.

Accidents

- Bone and muscle disorders resulting from the handling of heavy containers.
- Infecting wounds resulting from contact with sharp objects.
- Poisoning and chemical burns resulting from contact with small amounts of hazardous chemical waste mixed with general waste.
- Burns and other injuries resulting from occupational accidents at waste disposal sites or from methane gas explosion at landfill sites.

Source - Adapted from UNEP report, 1996

6. Conclusions

Many local authorities in England are moving towards food waste collections, but it is still important to have a balance. A change in consumer behaviour and emphasis on the house holder's responsibility regarding their waste is important in changing attitudes to food waste, which in turn should have knock on effects on other types of waste and encourage waste prevention. According to "The food we waste" report (WRAP, 2008): food waste prevention also appears to be an area of waste prevention where there is little public resistance, at least in principle, with 9 in 10 people not opposed to the idea of reducing their food waste.

Waste prevention is a key tool for the management of food waste, particularly in conjunction with other methods such as a collection service which is favored by all the top performing councils in England. However it should be noted that education and home composting can only reduce a fraction of the food waste produced and products such as the food digesters are unlikely to be suitable for everyone as the trials of Green Cone in Sussex and Charnwood demonstrated. There are not many examples of innovative ideas in the UK or France to reduce waste with most councils following the LFHW examples and promoting compost bins. For many local authorities,

implementing a food waste collection provides a realistic solution for meeting legislative targets for diverting biodegradable waste from landfill and increasing recycling and composting rates.

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