



OPEN BURNING OF SOLID WASTE IN THE PHILIPPINES: REGULATIONS, COMPLIANCE AND INITIATIVES

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ABSTRACT – Open burning of solid waste has many documented negative effects on human health and the environment. Despite this information, the practice is still widespread, especially in developing nations such as the Philippines. An internet-based assessment of national and local laws and ordinances prohibiting open burning of solid waste was conducted to determine the regulations and ordinances concerned with open burning. Informal discussions were also held with barangay officials, law enforcers and ordinary citizens concerning open burning. The assessment showed that the Philippines is a signatory to an international treaty advocating the reduction of open burning, has a national law on solid waste management, and has numerous local government units with ordinances addressing the problem of open burning. However, information from informal discussions done in Los Baños, Laguna, Philippines showed that many residents and local officials are not sufficiently aware of the negative effects of the practice, are not well-versed in the implementation of laws and ordinances, and consider compliance as merely optional. However, the web search also revealed initiatives and alternatives to open burning that have been well-received by the general population of Alaminos City in Pangasinan, Philippines, and have been well implemented by the authorities concerned.

Key words:

Introduction

Open burning of solid waste material (SWM) affects human health with effects ranging from headaches, respiratory problems to a variety of cancers i.e. breast cancer (Breast Cancer Fund, undated; Panaligan, 2007), lung cancer (Estrellan and Iino, 2010). Solid waste is defined by the Republic Act (RA) of the Philippines No. 9003 – Ecological Solid Waste Management Act of 2000 (RA 9003 Article 2, Section 3 Definition of Terms, p 5) as follows:

“Solid waste shall refer to all discarded household, commercial waste, non-hazardous institutional and industrial waste, street sweepings, construction debris, agriculture waste, and other non-hazardous/non-toxic solid waste.”

Republic Act 9003 is “an act providing for an ecological solid waste management program, creating the necessary institutional mechanisms and incentives, declaring certain acts prohibited and providing penalties, appropriating funds therefore, and for other purpose”. In Chapter VI, Section 48, item 3, it states that one of the prohibited acts is the open burning of solid waste (Environment Management Bureau, 2013).

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The **Stockholm Convention** on Persistent Organic Pollutants is a global treaty (ratified by the Philippines on 27 February 2007) which aims “to protect human health and the environment from persistent organic pollutants (POPs)” (UNIDO, undated). The Philippines is one of more than 150 countries that signed the treaty (Stockholm Convention, undated).

Intentional open burning of wastes is strictly controlled in developed countries. These countries impose stringent restrictions against open burning because numerous studies have revealed that hazardous emissions result from these activities (Estrellan and Iino, 2010). In comparison, the situation in developing countries is very different.

Despite the ratification of the Stockholm Convention, open burning of solid waste material is still a common practice in many developing countries, including the Philippines, since it is cheap and easy to perform (UNIDO, 2008). Although there is some awareness of the health risks and negative environmental impact, people in the Philippines continue to practice open burning for various reasons. This is especially true in communities where inhabitants have developed and applied their own approaches to solid waste management (Estrellan and Iino 2010) with minimal, if any, guidance from recognized agencies or institutions.

Mayor Caesar P. Perez (2013 to present and former 3-term Mayor) stated the following problems in solid waste management in Los Baños:

1. “Lack of a well-prepared Solid Waste Management Program with doable action plans and strategies done such as reduction, segregation, recycling and composting.
2. Non-enforcement of ordinances, rules and regulations.
3. Lack of political will and competent leadership.
4. Lack of community-wide participation and acceptance of responsibility.
5. Lack of discipline among the constituents.
6. Citizens solely dependent on government for garbage management.
7. Limited resources.” (Perez, C.P. undated)

In addition to lack of resources, the problem surrounding Republic Act 9003 is the absence of political determination in implementing and enforcing the Solid Waste Management Act. The general public’s lack of concern and sense of urgency towards solid waste management makes this complex problem even more difficult to address. In several cases, there is a lack of programs and strategies on waste segregation and recycling. For areas that do have programs and strategies, it is not widely publicized and not fully implemented. Uncontrolled waste disposal in the Payatas dumpsite of Manila City resulted in a large and unstable mass of garbage that collapsed in July 2000 during a period of heavy rain. More than two thousand lives were lost in this incident. The National Capital Region (NCR) of Metro Manila, Philippines is composed of fourteen cities in an area of 636 square kilometres. Unchecked waste disposal in this densely populated and industrialized area has also resulted in heavy pollution of major rivers passing through several cities such as the San Juan, Pasig and Tullahan Rivers, as well as the Estero de Paco and Estero de Pandacan creeks (Magnate, 2013).

Based on a survey conducted by Bernardo (2008) in Metro Manila, majority of respondents consider the collection and disposal of garbage as a government duty. This is detailed in several sections of RA 9003 which specifies the functions and responsibilities of local governments with respect to solid waste management. However, the outcome of the survey showed that implementation of RA 9003 is incomplete in Metro Manila.

According to the Department of Environment and Natural Resources (DENR), the Philippines generates about 35,000 tons of solid waste material daily. About 8,400 to 8,600 tons (25% of the solid waste generation daily) of this comes from Metro Manila (Alave, 2011). Furthermore, the volume of waste is projected to increase by 70% by 2025 (World Bank, 2013). Based on the 2009 National Emission Inventory of the DENR, 18% of air pollution emanates from area sources (i.e. **waste burning**, agricultural biomass after harvest), 19% is from stationary sources (i.e. electricity generating plants, manufacturing plants), while the largest contributor at 65% is from vehicles (Cuna, undated). Area sources, which include waste burning, increased from 14% in 2006 (Environment Management Bureau, 2009) to 18% in 2009.

Dr. Enrique T. Ona (Secretary of the Philippine Department of Health) said that 3 out of the top 10 leading causes of mortality are non-communicable diseases (NCD) associated with air pollution. Annually, 200,000 Filipinos die of NCDs, like pneumonia, chronic lower respiratory diseases and heart disease. Furthermore, Sec. Ona said that based on a study, reduced work days of employees with acute lower respiratory infection/pneumonia, and chronic obstructive pulmonary disease (COPD) resulted in Php52 million in economic losses. In addition, the study showed that Php910 million was spent for the treatment of non-communicable diseases. Sec. Ona observed that the problem is probably worse today (Andrade, 2012). These negative effects on health, on the environment and on economics underscore the importance of determining the reasons why people continue to resort to open burning of solid waste.

The Stockholm Convention identified 12 of the worst persistent organic pollutants (POPs), namely, Aldrin, Chlordane, DDT, Dieldrin, Dioxins, Endrin, Furans, Hexachlorobenzene, Heptachlor, Mirex, PCBs and Toxaphene (Stockholm Convention, undated). Open burning of waste (burning of landfill sites included) and residential combustion may result in the unintentional formation and release of Polychlorinated dibenzo-p-dioxins and dibenzofurans, hexachlorobenzene and polychlorinated biphenyls (Stockholm Convention on Persistent Organic Pollutants, undated). The common practice of open burning of crop residues (i.e. rice straw) also contribute to the release of polycyclic aromatic hydrocarbons (PAHs), polychlorinated dibenzo-p-dioxins (PCDDs), and polychlorinated dibenzofurans (PCDFs) (Gadde, et al. 2009). Dioxins are not only airborne, they can also enter the food chain; these compounds can accumulate in the fatty tissues of animals (WHO, 2014). These food-borne dioxins pass into humans once these products are consumed. Dioxins and furans can damage the immune system, and hamper the development of the nervous and reproductive systems, as well as the reproductive functions (WHO, 2011). Furthermore, dioxins (which are highly toxic) may interfere with hormones and cause cancer (WHO, 2014). Accidental high exposure to dibenzofurans, hexachlorobenzene and polychlorinated biphenyls (PCBs) can result in bone disorders (WHO/UNEP, 2012).

Open burning is rampant in developing countries where there is less investment in disposal facilities such as landfill sites and incineration plants. Countries such as China, United States, India, Japan, Brazil and Germany with various levels of industrial development produce the most waste. However, developing countries (China, India, Brazil, Mexico, Pakistan and Turkey) have the greatest emissions from open burning of waste. In the opinion of a lead researcher from the University Corporation on Atmospheric Research (UCAR), air pollution is widely underestimated since there is no organized monitoring of open burning of garbage. As a widespread phenomenon, uncontrolled burning was considered a significant producer of pollution and should be given more attention (UCAR, 2014). In a study in 30 urban areas in 22 developing countries (the Philippines included) from 4 continents (Africa, Asia, Central and South America); 22 cities practiced open burning of waste at the household level (Guerrero, et. al. 2012).

Open incineration is one of the measures used to dispose of the large volumes of garbage being generated. However, incineration produces by-products that can cause respiratory problems, as well as nitrous oxides (NO_x) and sulphur dioxide (SO₂). These gaseous compounds mix with water droplets in the atmosphere to produce acid rain, sleet or snow. When this acidic precipitation falls to the earth, it can have many negative effects on terrestrial and aquatic ecosystems. Furthermore, when incomplete combustion occurs during open burning, carbon monoxide (CO) is formed as a by-product. Although CO is considered as a weak greenhouse gas (GHG), CO is able to affect the atmospheric lifetimes of stronger GHGs such as methane (CH₄). GHGs are thought to trap heat from the sun and are significant contributors to global warming (Magante 2013; EPA 2014; IPCC 2001).

Despite the well-documented effects of these pollutants on human health and the environment, improper disposal of solid waste continues to this day. The reasons for this are varied and complex. Inadequate financial resources, lack of institutional set-up for solid waste management, and lack of political determination are some of the barriers to the implementation of RA 9003. In addition, based on a study in Bacolod City, Negros Occidental, Philippines and the National Capital Region, Philippines, there is a lack of support from the public (i.e. open incineration, absence of the practice of waste segregation and recycling) in complying with RA 9003 (Ballados, 2010; Magnate, 2013). The public also lacks sufficient information on the provisions of RA 9003, as well as education on sustaining the ecological environment (Magnate, 2013). The citizen's response to RA 9003 is dependent on the governance and leadership of the governing body in their respective areas of residence. The lack of drive in the leadership resulted in slow progress in the implementation of RA 9003 in 2 barangays in Davao City, Philippines (Rico-Blones, undated).

A case study conducted in Cebu City, Philippines by Premakumara et. al. (2013) found that for a successful implementation of RA 9003, the following factors had to be present: (a) political will at the level of the local government; (b) a legal framework at the local level; (c) provision of sufficient financing, human resources, and appropriate technology; and (d) the active participation of the community. The keyword from these findings is "local"; the implementation of RA 9003 cannot be imposed on a community and will not be effective unless (a) the program is understood and (b) support is given by that community.

The objectives of this study are:

1. To conduct an assessment of the legal environment prohibiting the open burning of solid waste;
2. To conduct an assessment of the social barriers to compliance with open burning prohibitions;
3. To determine initiatives in prohibiting the open burning of various solid waste materials.

This study was conducted under a limited time frame (22 September – 19 October 2014 and 10-20 December 2014). Sources of data are from personal experiences and observations; interviews of other people's experiences (in Los Baños, Laguna, Philippines) and from social media.

I. Methodology

Assessment of the legal environment prohibiting the open burning of solid waste

An internet search was carried out to determine the existence of any international, national, and local treaties, laws, regulations, ordinances or administrative orders that govern the management of solid

waste. The relevant sections on open burning of solid waste were identified to generate a matrix of existing legal instruments that could be used as a guide to proper disposal of solid waste and to penalize violators of the law.

Assessment of the social barriers to compliance with open burning prohibitions

Informal discussions with residents, barangay captains, and law enforcers of Los Baños, Laguna were conducted to obtain their personal experiences, awareness and opinions on the issue of open burning. An internet search was also carried out to look for experiences of other people affected by the open burning of solid waste material; and to look for organizations that campaign against open burning of solid waste material. The barangays included in this study were the ones that were either mentioned in the posts in Facebook or people who shared their personal experiences with incidents of open burning in their barangays.

Determine initiatives to prohibit the open burning of various solid waste materials

An internet search and interviews were performed to gather successful initiatives to eliminate open burning of solid waste material.

II. Results and Discussion

A. Laws

There are existing laws in the Philippines against open burning of solid waste materials, ranging from a global treaty to a Republic Act, Municipal and Barangay ordinances in some areas (Table 1).

Table 1: Legal Environment Against Open Burning of Solid Waste Material in the Philippines

Level	Title of Document	Relevant Sections	Year of Implementation
International	Stockholm Convention	Prevention/reduction of persistent organic pollutants (POPs), one of the sources of these emissions is the open burning of waste including landfills and residential combustion (Annex C, Part III & V of the Stockholm Convention)	2004
National	Republic Act No. 9003	Prohibits the open burning of solid waste (Chapter VI Penal Provisions, Section 48)	2001
Local	Municipal Ordinance No. 06-31 (Cardona, Rizal)	Prohibits the open burning of solid waste (Article VIII Section 1.1 and Article 10 Section 1.3)	17 Aug 2006

	Municipal Ordinance Resolution No. 2009-035 (Kabacan, Cotabato)	Prohibits the open burning of solid waste (Article 16, Section 47, Item 8)	29 January 2009
	Municipal Ordinance 2007-002 (Bagabag, Nueva Vizcaya)	Prohibits the open burning of solid waste (Article XII, Section 1)	27 Feb 2007
	Municipal Ordinance 2011-002 (Ligao City, Albay)	Prohibits the open burning of solid waste (Chapter IX, Section 45)	07 Feb 2011
Local	Barangay Ordinance template based on Loakan Proper, Baguio City Barangay Ordinance	Prohibits “open and indiscriminate burning of residual and special wastes” (Article VII, Section 13, Item 2)	2008

1. Stockholm Convention on Persistent Organic Pollutants

The Philippines (together with more than 150 other countries) is a signatory of the Stockholm Convention and officially declared its commitment to the global treaty in 2004 (DENR, undated). The Stockholm Convention aims “to protect human health and the environment from persistent organic pollutants (POPs)” (UNIDO, undated). Specifically, the treaty’s goals are:

- “Eliminate dangerous POPs, starting with the 12 worst pollutants
- Support the transition to safer alternatives
- Target additional POPs for action
- Clean-up old stockpiles and equipment containing POPs
- Work together for a “POPs-free future” (UNIDO, undated)

2. Republic Act (RA) of the Philippines No. 9003 - Ecological Solid Waste Management Act of 2000

Open burning of solid waste is one of the prohibited acts in RA 9003 (Chapter VI, Section 48). The Environment Management Bureau of the Department of Environment and Natural Resources is mandated to implement RA 9003 (DENR/EMB, 2014). The Local Government Units (LGUs) are mainly responsible for implementing and enforcing the provisions of RA 9003 (Chapter II, Section 10). Fines and penalties for violating the prohibition on open burning of solid waste management are as follows:

“Section 49. Fines and Penalties

(b) Any person who violates Sec. 48, pars. (2) and (3), shall, upon conviction, be punished with a fine of not less than Three hundred pesos (P300.00) but not more than One thousand pesos (P1,000.00) or imprisonment of not less than one (1) day to not more than fifteen (15) days, or both;

The fines herein prescribed shall be increased by at least 10% every three (3) years to compensate for inflation and to maintain the deterrent function of such fines” (Environmental Management Bureau, 2013).

3. Municipal and Barangay Ordinances

Not all municipalities/barangays have existing ordinancesⁱ related to RA 9003. Some of the municipalities and a barangay that have ordinances (accessible through the internet) are stated in Table 1. Based on some interviews in Los Baños, Laguna, penalties (fine or community service or imprisonment) as stated in RA 9003 are not implemented due to various reasons, i.e. absence of a barangay ordinance which would allow for the implementation of the penalties; *padrino* culture where the offender approaches officials that are either relatives or friends, who will ask the implementing official to let this offender go; *pakikisama* culture where the implementing official will avoid upsetting or embarrassing the offender since he is concerned that s/he will lose the vote of the offender and whoever hears of the implementation of the penalty.

B. Practice of Burning Waste Materials

Open burning of waste is rampant in the Philippine environment. There are several organizations (both local and international)/movements that campaign against open burning of waste. Below are some of them:

- GAIA (Global Alliance for Incinerator Alternatives/Global Anti-Incinerator Alliance) – “is a worldwide alliance of more than 800 grassroots groups, non-governmental organizations, and individuals in over 90 countries whose ultimate vision is a just, toxic-free world without incineration.” <http://www.no-burn.org/>
- EcoWaste Coalition – “is a national network of more than 150 public interest groups pursuing sustainable and just solutions to waste, climate change and chemical issues towards the envisioned Zero Waste 2020 goal”. <https://www.facebook.com/pages/Ecowaste-Coalition/232738115250>
- Ban Garbage Burning in the Philippines – is a Facebook page “dedicated to ending the barbaric act of open-waste burning in the Philippines”. <https://www.facebook.com/BanBurningPhilippines/info>

Interviews, Personal Observations, Social Media

Barangay Batong Malake, Los Baños, Laguna – We reside inside the College of Forestry (CF), U.P. Los Baños (UPLB). When there are incidents of open burning in our area, the instructions are to take a photo and report it to the University Police Force (UPF). The UPF calls the attention of reported violators, however some violators continue to practice open burning in the succeeding days. There are instances when the area (including the Makiling Forest Reserve) where open burning is being done is under the jurisdiction of the UPLB Makiling Center for Mountain Ecosystems. As of this writing we have not had the chance to visit their office to report the various incidents of open burning in their jurisdiction which affects the residents of CF-UPLB.

Barangay San Antonio, Los Baños, Laguna (September 2014) – The respondent shared 2 open burning incidents with me. Respondent called San Antonio Barangay Office to report an on-going open burning near their residence. The person who answered the telephone call said they will send someone to check the incident. No one came. The second time the respondent called to report an on-

going open burning incident near their area of residence, the person from the San Antonio Barangay office replied with "Naku Ma'am, eh nag sisiga nga po ako ngayon, pag maliit lang naman, okay lang po yan, pag malaki, yun ang delikado, kasi baka magka sunog" (Ma'am, I am currently burning some waste materials myself, if it's just a small "bonfire", it's okay, what is dangerous are the big "bonfires" since it may start a fire in the area). The resident was dumbfounded and furious at the same time.

Barangay Timugan, Los Baños, Laguna (through posts in "Taga UPLB ka kung . . ." group in Facebook)

- August 7, 2014, a member ("respondent") posted a photo of an on-going open burning of waste at Los Baños High School along Jamboree road. "The respondent appealed to Mayor Perez or to whoever would make time to call the attention of the school that open burning is prohibited. According to the "respondent" the school performed the open burning at night, when the City Environment and Natural Resources Office (CENRO, DENR) was already closed. The *barangay tanod* called their attention repeatedly, but such calls were ignored. Another member responded saying that the incident will be reported to the Municipal Environment and Natural Resources Office (MENRO) the next day. I posted a comment sharing that the same practice of open burning at night was done in the College of Forestry, UPLB area and at the time of my post, I could smell smoke from open burning in the Faculty Village, UPLB area. As of August 10, 2014, the respondent gave feedback that the school has not performed any open burning activities; however the houses in their neighborhood performed open burning activities. Discussion on this post continued until September 7, 2014. There was a regular smell of smoke daily around 5-6:30am in Faculty Village as of August 12 post. Photos of on-going open burning in the College of Forestry, UPLB area, Jamboree area and in Barangay Tungtugin-Putho were posted. Another member shared that the same practice of regular open burning of waste was rampant in Bernardo Village, Los Baños. Several members posted comments wondering who is responsible for implementing the law against open burning. Another member identified the law as Republic Act 9003. Some members expressed their lack of faith in the barangay officials concerned, in terms of their awareness and ability to implement the law.

- September 20, 2014, 9:14am, the same member ("respondent") posted a photo of an on-going open burning of waste at Los Baños High School (again). The exchange of comments revealed that CENRO, DENR has called the attention of Los Baños High School. The high school discontinues the practice of open burning when their attention is called, but then they resume the practice of open burning again. The school prefers to burn their dried leaves and wood instead of putting them in sacks for pick-up by the garbage collector (who does regular pick-up). The comments also revealed that not everyone is clear that open burning is prohibited; one member thinks that it is okay to burn dried leaves and wood, and that burning plastic is what is harmful. Other members of the group posted comments to clarify that open burning of any material is prohibited, including dried leaves and wood. Prior to posting the photo, the "respondent" posted (at 9:09 a.m.) a message addressed to someone who seems to be working for the Los Baños Municipal Hall. A response to this message was posted at 9:31 a.m. with the telephone number of the Municipal Action Center. The spouse of the "respondent" posted a comment at 9:54 a.m. saying thank you for the quick response from the Municipal Action Center. It spared them from an asthma attack from the smoke and their laundry would not end up smelling like smoke.

A Barangay Captain (one of the 14 Barangay Captains in Los Baños, Laguna) – started announcing around the second week of October, 2014, by megaphone that burning of waste materials is prohibited. Some reactions were "*bakit daw bawal?*" (Why is it prohibited?), "*anung gagawin namin sa tuyong dahon?*" (What do we do with the dried leaves in our surroundings?).

A Police Officer from the University of the Philippines at Los Baños (UPLB), University Police Force (UPF) shared that when they call the attention of people performing charcoal-making, the people start running the moment they see the UPF. The UPF run after them, but sometimes are not able to catch them. Most of the time they can only give warnings to these offenders instead of imposing the fine, since the violators have no money to pay the fine.

Posts on inquirer.net below the October 7, 2012 article “DENR bans backyard burning of garbage” by DJ Yap

- Residents from Baguio, Las Piñas and Makati shared their observations on the violation of open burning in their respective areas.

- An observation from another citizen was that garbage from Metro Manila is dumped in Cavite, Payatas, Montalban and San Mateo. It was also expressed in the post that segregation and recycling be adapted as practised in Japan.

- There were some posts expressing lack of faith in the government towards the implementation of this law. Some said that the implementation of this law is a waste of resources and that there were more important matters to attend to.

Several posts show that there is great need to educate the public on the gravity of addressing solid waste management and to communicate the seriousness of the health hazards caused by certain practices like open burning of waste.

C. Initiatives to implement prohibition of open burning of various solid waste materials

The following initiatives are lifted from the actual implementation of RA 9003 in Alaminos, Pangasinan by the city government in partnership with GAIA (Global Alliance for Incinerator Alternatives/Global Anti-Incinerator Alliance):

1. Establishment of composting facilities (including backyard and village-level composting)
2. Practice of segregation of waste at source (implement a “No segregation, No collection policy”)
3. Enforce the strictly no littering ordinance
4. Practice of Vermicomposting with the support of the city government
5. Barangays provided eco-sheds (small scale sorting facilities) for temporary storage for residential and hazardous waste and for recyclable waste. The city collects these wastes and brings them to the city materials recovery facility for processing.

Implementation of these strategies resulted in close to zero open burning and dumping of solid waste material. Informal sector recyclers are able to collect under better conditions, recover more materials and are able to sell at a better price (compared to pre-implementation of the above strategies) (Larracas, 2012).

V. Conclusions

There is a legal environment in the Philippines prohibiting the open burning of solid waste. The government is well aware of health hazards of open burning, being one of the signatories in the Stockholm Convention. There are efforts on the level of the Department of Environment and Natural Resources (DENR) to prohibit open burning as seen in the creation of the Environment Management Bureau and the newspaper articles on "DENR bans backyard burning of garbage" (Yap, 2012) and "DENR seeks more alternatives to open burning of waste" (Philippine News Agency, 2012). However, there are deterrents to the implementation of the laws, beginning with the fact that not all barangays have ordinances in connection with RA 9003. There is also the lack of knowledge and understanding on the part of the citizens regarding the health hazards of open burning of solid waste material. This is compounded by a general attitude towards laws, regulations and ordinances where compliance seems to be considered "optional". There are successful initiatives that can be adopted in the implementation of the prohibition of open burning of solid waste management. These are centered on the three R's of solid waste management: **Reduce, Reuse** and **Recycle**. However, technical personnel, facilities and infrastructure should be provided and should be in place prior to implementation to ensure the program is sustained in the long term.

VI. Recommendations

To improve the implementation of the prohibition of open burning (together with the rest of RA 9003) in Los Baños, Laguna, it is recommended that the method used in the implementation of "Alaminos, Philippines, Zero Waste, From Dream to Reality", and of Los Baños Ordinance No. 2008-752 serve as a guide. The town of Los Baños can also explore asking for the support of the Global Environment Facility (GEF), "an independent financial organization", that "provides grants to developing countries for projects that benefit the global environment and promote sustainable livelihoods in local communities. For UNIDO's POPs related efforts, the GEF is serving as the prime source of budget and as a proven success story." (UNIDO, undated)

Alaminos, Philippines, Zero Waste, From Dream to Reality

GAIA proposed a partnership (in August 2009) with the city government of Alaminos, Pangasinan to provide education and training to barangay leaders on waste management. GAIA provided technical assistance, support for strategic planning for the barangays as well as "financial support (for printing educational materials, buying shredders for organics and plastics, awarding mini-grants for barangays to build eco-sheds or purchase vehicles, etc.)". A comprehensive survey was also conducted to assess and record current waste management practices. Workshops with barangay leaders in 39 barangays were also held over a 14-month period. Brochures discussing the dangers of open burning and other prohibited practices were also distributed to residents; each recipient was required to sign a logbook as proof of receipt of the brochure (Larracas 2012).

Bring-Your-Own-Bag Campaign (which led to Los Baños Ordinance No. 2008-752)

In 2007, a class project in a graduate level course in Development Communication (in UPLB) advocated for the use of reusable shopping bags. The project was entitled "Bring Your Own Bag" (<http://pssnblog.wordpress.com/>), eventually becoming known as BYOB. The mayor of Los Baños, Laguna at that time was Mr. Caesar P. Perez who initiated an ordinance on 02 June 2008 banning the use of plastic bags for dry goods (<http://pssnblog.wordpress.com/>), becoming one of the first local government units in the Philippines to have an eco-friendly waste management program (Lamentillo,

2012). To ensure acceptance of the program, a 3-month orientation was conducted until residents understood the value of this initiative. Following the success of Los Baños in banning plastics, the nearby city of Calamba, Laguna approved a city ordinance banning the use of plastics for packaging on 16 Aug 2010 (Blog Watch Citizen Media, 2011). The House of Representatives approved House Bill 4840 on 03 Aug 2011, also known as the Plastic Regulation Act of 2011. "This legislation would require the phase out of non-biodegradable plastic bags within three years and the placement of a plastic bag recovery bin at each store or cluster of stores." From these early milestones, the ban on plastic bags has expanded nationwide, with ordinances passed in more than 59 towns and municipalities which are in various stages of implementation (Lamentillo, 2012).

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