

Conservation Culture In Suburban Thailand

(With Suggestion and
Implementation of an
Improvement Plan)

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Abstract

In a suburban district of central Thailand an assessment of individual material use habits was performed. The assessment was carried out with the goal of identifying trends of consumption. If unsustainable practices were identified, then further analysis determined how to encourage improvement through education. After extensive empirical observation, it was determined that plastic consumption was excessive and unsustainable.

Plastic consumption was examined from a background research standpoint, but an observation and survey component was included to add an element of cultural consideration. A process was developed, wherein consideration of the observed choices involving plastic consumption, and their subsequent impacts, lead to an action plan to deter overconsumption and improper disposal. The action plan selected was an online accessible collection of multimedia presentations that focused on conservation education. Videos within the collection addressed specifically observed issues, explained their impact, and gave suggestions on individual choices that could be made to improve consumption and disposal habits of plastic goods.

Shabbir H. Gheewala 7/19/14 5:23 PM

Comment [1]: Is this a general a statement about plastics or are you referring specifically to your study? If it is the former, as your sentence seems to indicate, it should not be in the abstract; if the latter, please rephrase for better understanding.

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1.0 Introduction

1.1 Background

The First Industrial Revolution in the United States began around 1780, the foundational changes it brought continued into the Second Industrial Revolution beginning in the 1840s (Deane 1965). During this time amid rapid growth and fresh technology the country entered a period self-reflection and intellectual dialogue known as the Progressive Era (Theoe 2005). This period saw expanded rights for women and workers, increased safety precautions in factories, and further regulation of the food and drug industry—in an effort to ameliorate the flaws that a rapidly expanding society had generated. Also gaining momentum during this period were the ideas of environmental protection and resource conservation. These ideas became increasingly important as the U.S. continued to grow and impact the natural world. Although many of the movement's leaders found their inspiration in the raw beauty of America's natural landscape, much of their argument was that preserving wild areas and resources was essential for the future of the American economy. Activists like John Muir, Gifford Pinchot, and Henry David Thoreau heavily weighted their writing towards the description of natural beauty, but it was their arguments of conservation's importance to business practice that got the attention of lawmakers (Theoe 2005). This movement, in fact, was the start of legislation that would create national parks, national forests, and laws protecting wildlife. It was a legacy that would give precedent for modern policies like the Clean Air Act and Clean Water Act.

The EPA has conducted studies that show the economic benefits of the Clean Air Act are astronomical in terms of savings in health costs and in improvements of crop yields (U.S. EPA...2011). National parks generate millions of tourist dollars each year and the energy saved through recycling practices is substantial even by conservative estimates (605 trillion BTUs in 2005 according to the EPA¹). These effects all stem from an understanding that conservation practices can be of great benefit to society. An understanding developed through the ideals of conservation being ingrained into American culture from earlier years unto the present.

The United States is far from perfect in its conservation effort, far from adequate even. An abundance of viewpoints exist on the issue of conservation. However, the history examined above suggests the idea that conservation is important and inherently good resonates through American society—a result of the writings and teachings that are an integral part of American history. The positive impact of this consciousness is measurable, and can be seen in the statistics above.

1.2 Focus

In the Southeast Asian country of Thailand, the history is dissimilar. The dynamics that shaped the growth of modern Thai society resulted in cultural perspectives unique to the country. It is the goal of this study to identify how these perspectives have affected contemporary ideas of conservation. Subsequently, if

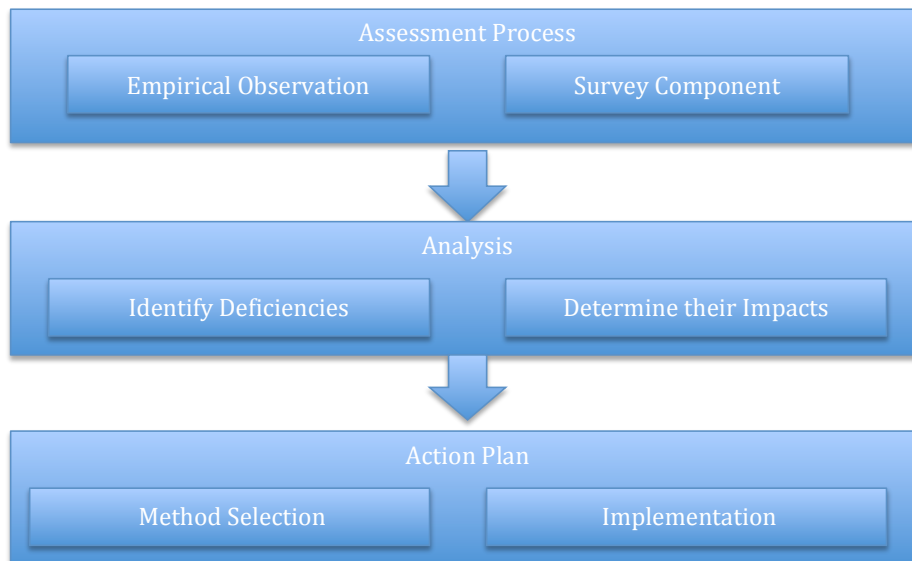
measurable effects are present, this study hopes to develop and execute an action plan that seeks to address any deficiencies. Specifically, targeting material use habits that could become more sustainable if the practitioners had more information. By providing context through the medium of conservation education, the action plan will seek to influence choices of individuals relating to consumption and disposal of materials. Finally, the age group of 15-25 year-olds was chosen as an audience of focus, for reasons that will be justified in appropriate sections.

The background provided in 1.1 serves to justify the belief held by both the authors of this study and the United Nations **Environment** Programme²—that conserving our resources is of benefit to the human race. The content within the project and resulting actions are motivated by this view. The aim of this project is to sustainable behavior related to material use, and the approach is from a cultural perspective.

1.3 Methodology

The method employed for achieving these goals began with empirical observation in a suburban community within the metropolitan area of Bangkok. The [], Bang Mod, was the area of interest for both aspects of the assessment process, the empirical observation as well as the subsequent survey component. Through analysis of the ensuing survey data an action plan was designed to address the deficiencies observed (both within the data and during the empirical observation process). The action plan was then implemented through the method developed and justified within the study.

The structure of the study described above is also displayed in the diagram below:



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Comment [2]: Something seems to be missing here.

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Comment [3]: ?

2.0 Assessment Process

2.1 Empirical Observation

Several months of observation in the Bang Mod area revealed trends in the residents' consumption behavior. Of the common daily goods consumed in various settings, plastic products were by far the most frequently depended upon. Uses varied from PET bottles, straws and cups (and parts related to cups i.e. lids) to LDPE plastic bags for clothes, food and trash. Retail suppliers almost always opted to supply the consumer with a plastic bag regardless of the characteristics of their purchase.

A large part of excessive plastic bag use was practiced by convenience stores. The most popular of these stores, by sheer number of locations, was 7-Eleven. 7-Eleven operates more stores globally than any other convenience store, with its third largest market located in Thailand (6,800 locations) (Phillips 2005). In the neighborhood of Bang Mod, 7-Eleven has roughly 21 locations. Many of these stores are found in such high concentrations that it is not uncommon to see two or three of them located within a few hundred meters of each other.

It was observed that when a consumer made a purchase at any one of the numerous locations of 7-Eleven, the store practice was to opt for placing the consumer's goods into a plastic bag, regardless of how many items were selected. If the consumer purchased several items, then the cashier often placed those items in two bags, using the second to support the first. In addition, 7-Eleven cashiers were observed distributing plastic straws for each soft drink a consumer purchased. In many instances, handfuls of straws were grabbed and placed into consumer plastic bags. Other convenience stores in Bang Mod performed similar practices to 7-Eleven, as well as food and clothing vendors.

In contrast to the high rates of plastic consumption, there were some observations of sustainable material use practices. Some residents of Bang Mot reduced plastic bag consumption by storing and collecting bags for multiple uses. Efficient use of reusable water jugs was carried out in many of the restaurants and outside food vendors as well. Most businesses offered the option to purchase bottled beverages and a clean, safe option for free water. This was typically dependent on their available seating and accommodation for customers. However, if the vendor or restaurant was designed for sit-down style eating, HDPE pitchers of clean water were placed on the table and durable, HDPE plastic cups with plastic straws were distributed to customers. In all cases, the cups were gently washed with clean water and re-used. It was apparent that the re-use of durable cups coincided with the utilization of straws to maintain hygiene. The straws were also noted being re-used in several restaurants. This occurred after they underwent the same light washing for cups.

Sources for recycling and a portion of the recycling process were also examined. Recycling waste bins were located at several of Bang Mot's educational centers. One was a technology university; the other three were secondary schools. Apart from these locations, there were no public containers for recyclable materials available in Bang Mot. Most municipal waste was disposed of in large bags and left

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Comment [4]: This must be surely outdated; I wouldn't be surprised if 7-Eleven has an even larger market 10 years from the study.

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Comment [5]: Please use consistent spellings. I corrected in one place for you just a few sentences before.

Shabbir H. Gheewala 7/19/14 5:56 PM

Comment [6]: Good heavens ... I'm not using straws at restaurants again!

for collection at designated areas. However, significant portions of waste could be seen collecting in informally selected areas. These areas included, but were not limited to, the backstreets of neighborhoods and unoccupied land.

A trip to a nearby landfill demonstrated the impact of informal sector recycling. Groups of both men and women were observed wearing protective gear and sorting through solid waste for recyclable plastic bottles, glass bottles, and aluminum cans. Once they were collected in large trash bags, the materials were then re-sold as recyclable waste to the onsite recycling plant. Presence on site at the landfill revealed that the composition of the leftover solid waste predominantly consisted of plastic bags.

2.2 Survey Component

Through information gained in the empirical observation stage, survey questions were developed. These questions kept in mind the goal of changing consumption behavior with the action plan. Furthermore, the prevalence of plastic consumption documented in the previous stage directed the focus of the survey to that issue. Plastic bags, bottles, and water bottle seals were the topic of the six-question survey. This stage sought to find trends in the use and disposal habits of plastic material by Thais.

The area selected for the execution of the survey was a sub-district of Bangkok known as Bang Mod. The area is a sub-urban district, in that it has the characteristics of a city center with dense population and access to modern amenities, but lacks the high-rises that distinguish the true, urban density of Bangkok's center. This was appropriate for the study because it is representative of a massive sector of Thailand's material consuming population. Bangkok's total metropolitan area is 22.2% of Thailand's total population and at least half of that area has a structure similar to Bang Mod ("Thailand Pop..." 2014). Furthermore, other metropolitan areas in Thailand that harbor a large portion of its population, such as Chiang Mai and Nakhon Si Thammarat, have a similar structure to Bang Mod.

Bang Mod is also home to one of Thailand's largest and most prestigious Universities (King Mongkut's University of Technology Thonburi). Consequently, young adults dominate much of the area's population during the school year. They were surveyed in larger numbers, not only in a reflection of the area's population, but deliberately, as they were the demographic chosen as the focus of the study. The 15-25 year old age range was partially selected for its accessibility, but more specifically for the characteristics of the age group. The impressionable years hypothesis (supported through scientific testing) suggests that in the late adolescent years to young adulthood humans are more susceptible to attitude change (Krosnick, 1989). That trait, combined with their tendency to have a higher usage rate of Internet than other age groups (that will prove important and be explained further in the action plan section), motivated the selection of that age range to be the most frequently surveyed ("Asia Pacific...", 2013).

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Comment [7]: There is quite some informal recycling before the garbage reaches the landfill. Right from the trash can at your floor in BaanSuanThon for example, plastic and glass bottles, cans, etc. are separated and most likely sold.

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Comment [8]: You may get some brownie points from us for stating this; but is KMUTT really one of Thailand's "largest" universities?

Shabbir H. Gheewala 7/19/14 6:08 PM

Comment [9]: I would have thought schoolchildren would be quite impressionable too ...

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Comment [10]: Krosnick and Duane ... actually.

Translation of the survey from English to Thai was also an integral part of the survey process. This was completed in three stages; first the English version was translated to Thai by a bilingual native Thai affiliated with the Bang Mod area University (KMUTT), next the translated survey was given to a test group of native Thai speakers who identified areas where the survey lacked clarity. Finally, the test group's concerns were shared with a separate bilingual Thai who reviewed them and made the final survey.

2.2.1 Questions

The survey in its English form is shown below:

Gender:

- a) Male
- b) Female

Age:

- a) 9 or younger
- b) 10-14
- c) 15-18
- d) 19-25
- e) 26-35
- f) 36-45
- g) 46-55
- h) 56 or older

Where region are you from?

- a) North
- b) Northeast
- c) West
- d) Central
- e) East
- f) South

1. How likely are you to re-use your plastic water bottle after drinking the original water?

- a) Never
- b) I usually fill it up at least once more
- c) I use the same one for a week+
- d) I don't use plastic water bottles

2. How do you dispose of plastic water bottles?

- a) I always put them in a regular waste bin
- b) I always put them in a recycling specific bin
- c) I find it hard to distinguish the recycling specific bin
- d) I don't normally bother throwing them away properly

3. How often do you get plastic bags with your purchases?

- a) Everytime
- b) Most of the time
- c) Most of the time but not when purchasing a single item
- d) Only when it is too much for me to carry
- e) Almost never

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Comment [11]: Are we overstating things here?

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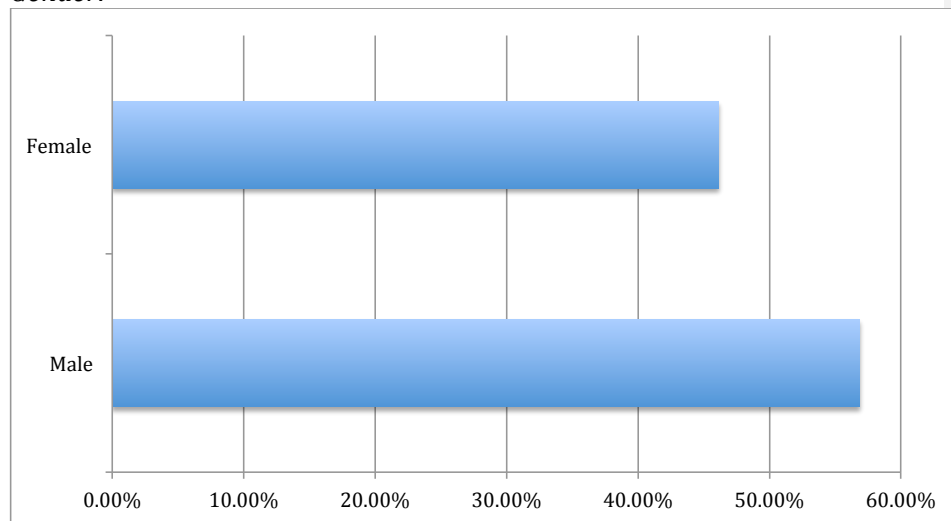
Comment [12]: But you had mentioned earlier that there are no recycling-specific bins outside of some educational institutes, isn't it? Also, this is a bit ambiguous; so how do these people then dispose of the plastic bottles? Do they put them in the regular waste bin or what?

4. How do you dispose of plastic bags?
- I always properly put them in a waste bin
 - I save them for reuse
 - I don't always properly put them in a waste bin
 - Don't know
5. How do you dispose of plastic water bottle seals?
- Always throw them away
 - Most of the time throw them away
 - Usually throw them on the ground
 - Don't know
6. How do you feel about plastic water bottle seals?
- They are unnecessary but I don't mind them
 - They assure me that the water is safe
 - They are wasteful and should not be used
 - No opinion

2.2.2 Results

416 individuals were administered the above survey in the selected area of Bang Mod. The demographics and survey answers are displayed in the graphs below:

Gender:



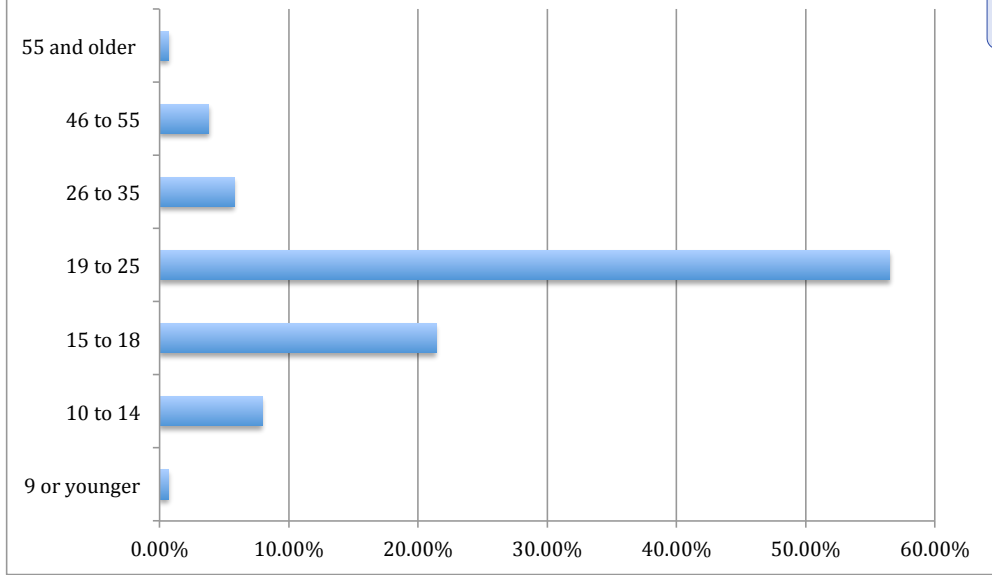
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Comment [13]: If you don't "throw them away", what would you do with them anyway? This question seems ambiguous unless you are specifying that "throwing away" means not in the trash bin or something like that.

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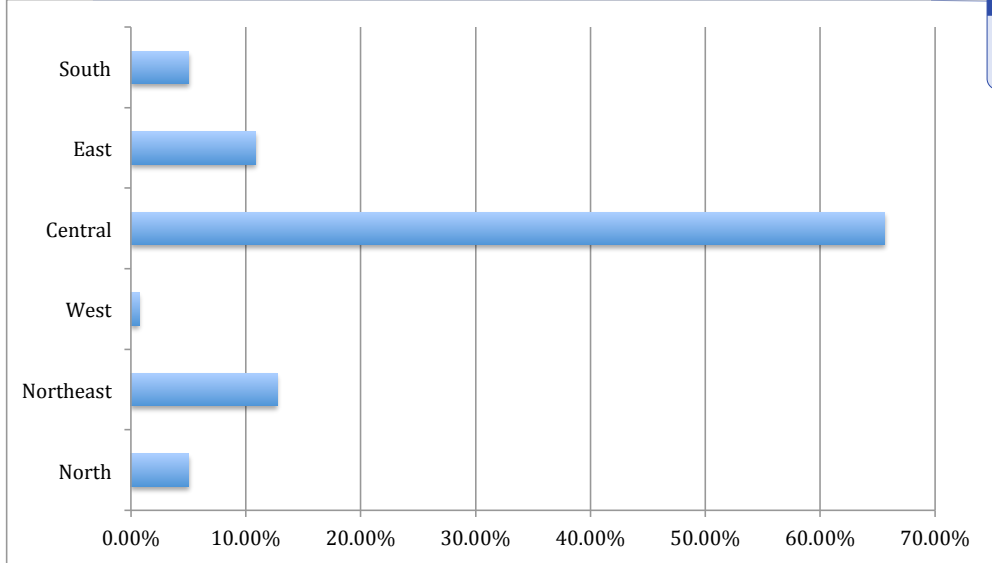
Comment [14]: Please use figure numbers and captions. Avoid using excessive significant figures in the axes, i.e. replace 0.00% with 0% and so on.

Age:



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Comment [15]: Are you going to relate this age information to user behavior?

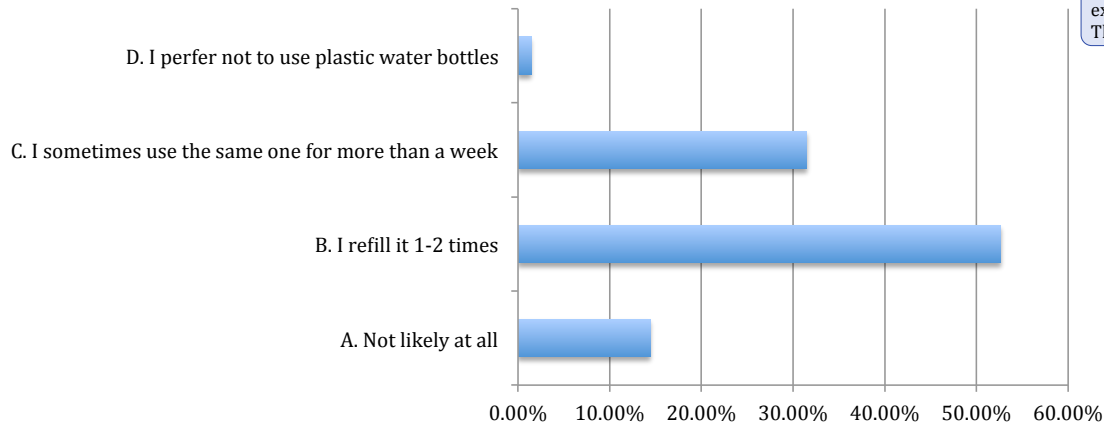
Origin:



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Comment [16]: Are you going to use this information to correlate with user behavior?

Question 1:

How likely are you to re-use your plastic water bottle after drinking the original water?



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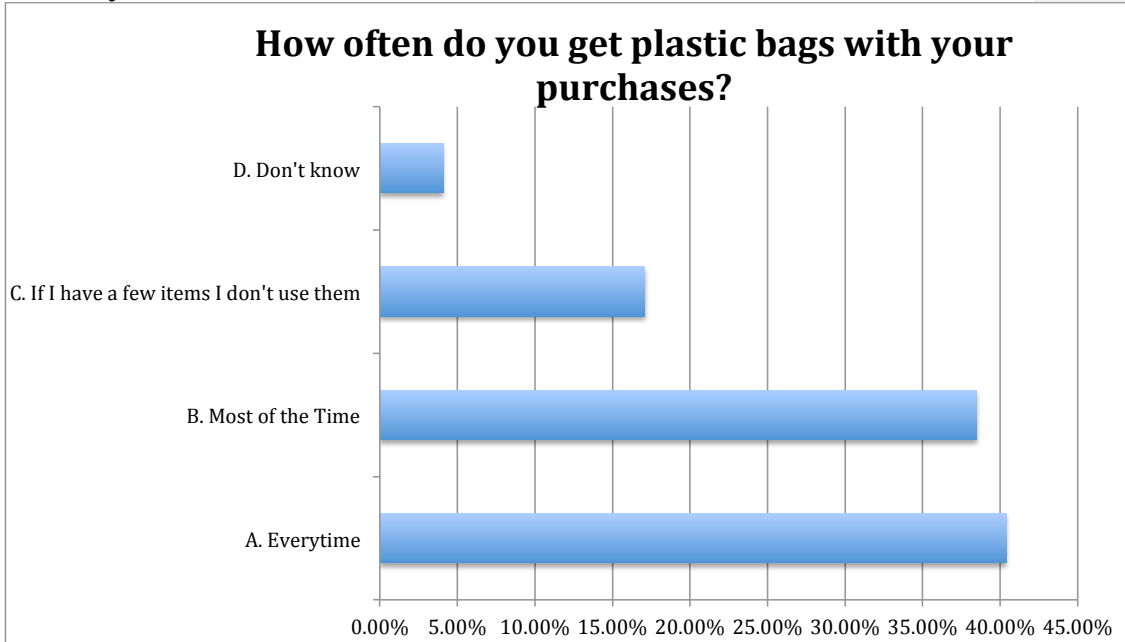
Comment [17]: How does the use of bottled water relate to demographics? Do all age groups use bottled water almost equally? This will have serious implications especially when you are trying to extrapolate the results to all Bangkok, Thailand or elsewhere.

Question 2:

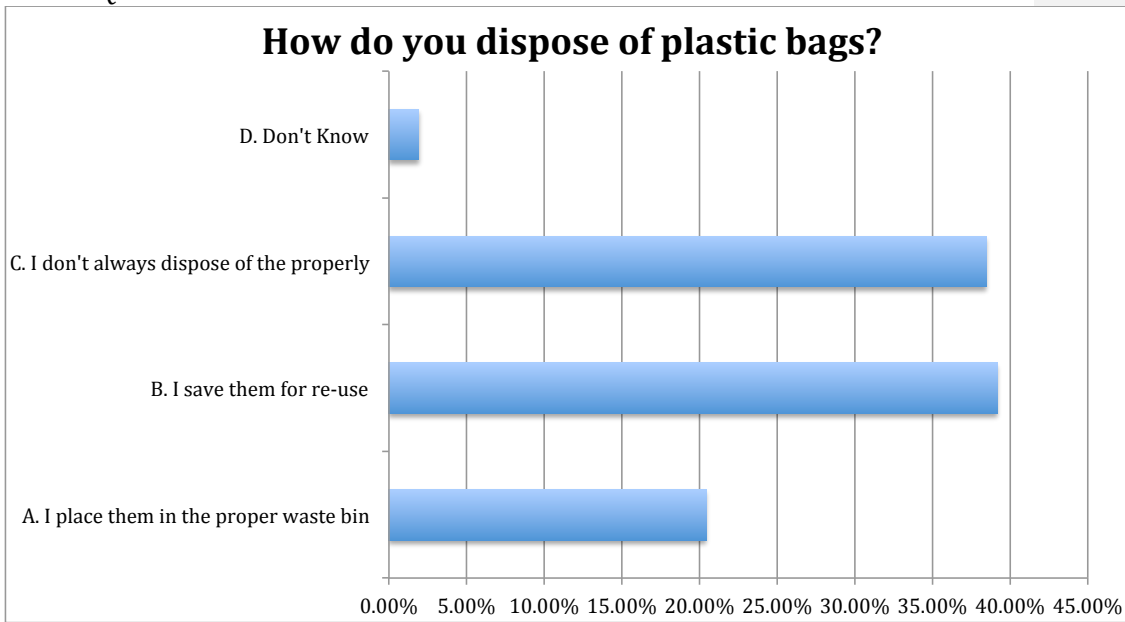
How do you dispose of plastic water bottles?



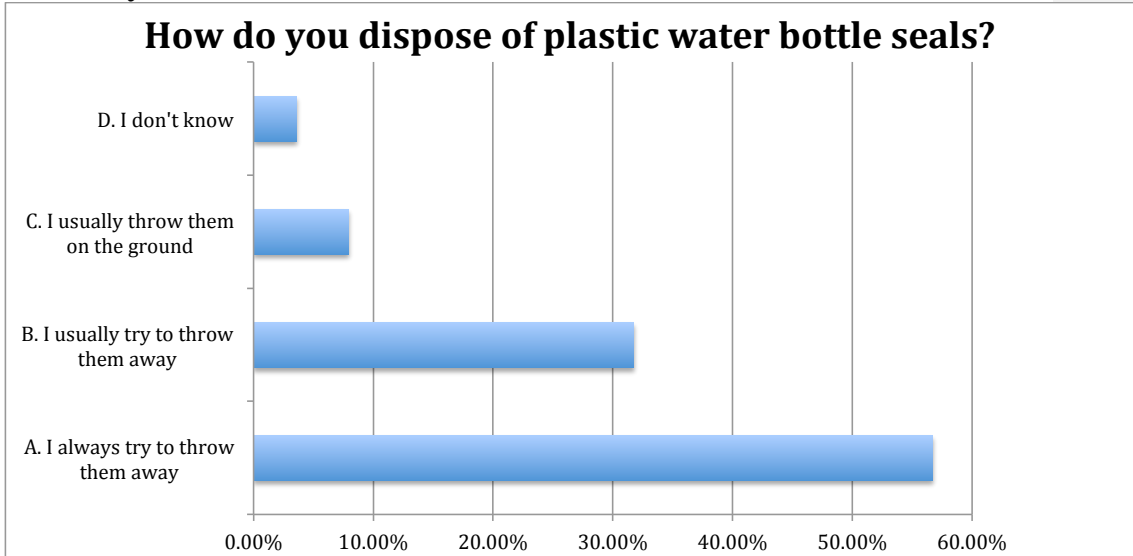
Question 3:



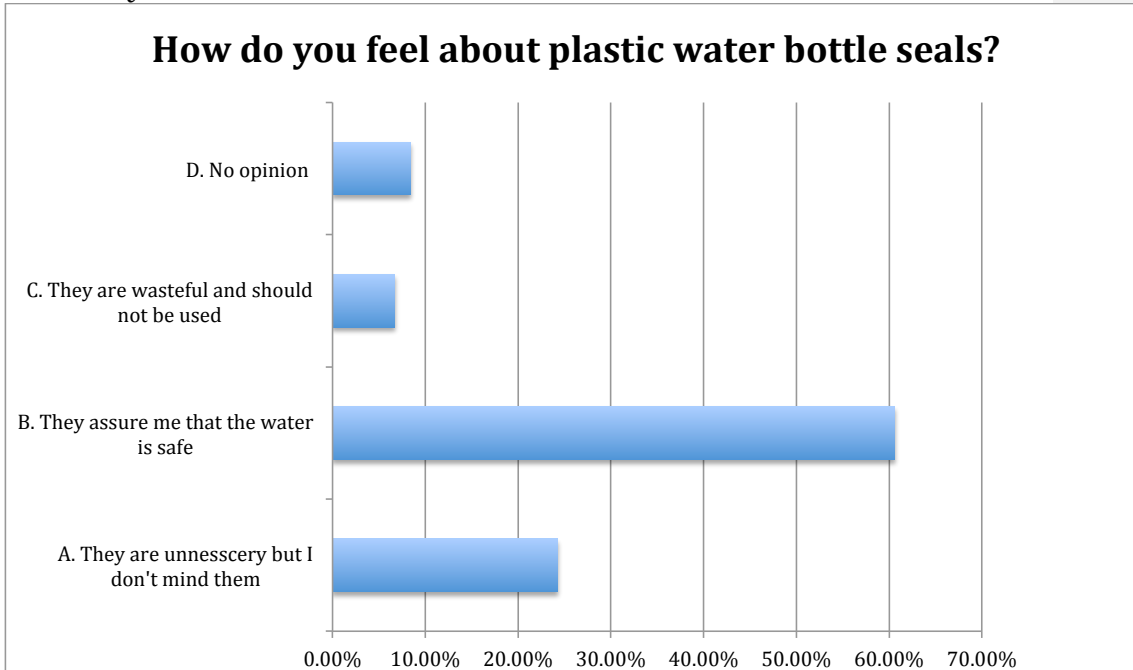
Question 4:



Question 5:



Question 6:



Table

	Percentage	Total #
Sex		
Male	54.85%	228
Female	45.15%	188
Age		
9 or younger	0.72%	3
10 to 14	7.93%	33
15 to 18	21.39%	89
19 to 25	56.48%	235
26 to 35	5.77%	24
46 to 55	3.81%	16
55 and older	0.72%	3
Origin		
North	5.05%	21
Northeast	12.74%	53
West	0.72%	3
Central	65.63%	273
East	10.82%	45
South	5.05%	21
Question 1		
A. Not likely at all	14.42%	60
B. I refill it 1-2 times	52.64%	219
C. I sometimes use the same one for more than a week	31.49%	131
D. I prefer not to use plastic water bottles	1.44%	6
Question 2		
A. I put them in a regular waste bin	34.62%	144
B. I put them a in recycling specific bin	36.30%	151
C. I find it difficult to distinguish the recycling specific bin	25.72%	107
D. I don't normally bother throwing them away properly	3.37%	14
Question 3		
A. Every time	40.38%	168
B. Most of the Time	38.46%	160
C. If I have a few items I don't use them	17.07%	71
D. Don't know	4.09%	17
Question 4		
A. I place them in the proper waste bin	20.43%	85
B. I save them for re-use	39.18%	163
C. I don't always dispose of the properly	38.46%	160
D. Don't Know	1.90%	8

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Comment [18]: The table repeats the information already provided in the figures. Maybe you want to choose either of the forms of presentation, but not both?

Question 5

A. I always try to throw them away	56.73%	236
B. I usually try to throw them away	31.73%	132
C. I usually throw them on the ground	7.93%	33
D. I don't know	3.61%	15

Question 6

A. They are unnecessary but I don't mind them	24.28%	101
B. They assure me that the water is safe	60.58%	252
C. They are wasteful and should not be used	6.73%	28
D. No opinion	8.41%	35

3.0 Analysis

3.1 *Quality of Data*

3.2 *Discussion of Observations*

Early in the Assessment Process it became clear that a focus on plastic consumption would be an effective direction for the study. Plastic use is a critical modern issue—in both a practical, physical sense, as well as a psychological one (the approach to material use by a conscience human consumer) (Cherrier 2006). The science behind the harmful effect plastic persistence has in the environment will be explored later, first however, it must be explicitly stated and recognized that plastic consumption is a conscience choice that is influenced by economic and social conditions in the environment. Affirming this is vital if plastic consumption is to be the focus of the study; since the end goal is to provide information that will change a behavior, the behavior must be subject to influence by information. This is a view upheld in observations during the Assessment Process and one given precedent by H el ene Cherrier's study in *The International Journal of Consumer Studies* (Cherrier 2006).

With this position solidified, plastic consumption seemed an appropriate issue if it can be concluded that its use was especially prevalent in the geographic area of interest, Bang Mod. Background research suggests strongly that is the case. Dow Chemical director Deepak Parikh predicted Asia to drive plastic demand through 2010, with Thailand mentioned specifically as a center of the market (Lazell 2006). In 2012, Bangkok alone generated 1,496 tons of plastic waste per day³. This represents a significant impact on the area's environment. Even if properly disposed of plastic waste does not decompose for hundreds of years. Improper disposal leads to such environmental persistence in areas where plastics can have severe negative effects on the mechanical processes the ecosystem (Laist 1987). This research was supported by the perceived conditions in the empirical observation stage, where focus was narrowed to three specific modes of plastic waste generation.

The use of plastic bottles, plastic bags, and small plastic water bottle seals became the avenues of interest during the latter part of the Assessment Process.

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Comment [19]: Where is the text in this section?

Shabbir H. Gheewala 7/19/14 6:36 PM

Comment [20]: I'm sorry you've lost me here; can you please dumb it down a bit for me? What is the point being made?

Shabbir H. Gheewala 7/19/14 6:37 PM

Comment [21]: What are these?

Plastic bottles, in particular, hold a special importance in Thailand. Drinking tap water is not a common practice because of perceived health risks, resulting in a very high demand for plastic containers for drinking water. While there are other options, the convenience and availability of disposable plastic water bottles was observed to drive their widespread popularity as the option of choice. Questions 1 and 2 in the Survey were directed at plastic bottle consumption. Question 1 addressed the tendency of respondents to reuse bottles—which can be a very efficient tactic for reducing their environmental impact. While reusing the bottles was shown to be a common practice, the question also reaffirmed their affinity for their use, with only 1.4% stating they preferred not to use plastic bottles. Question 2 asked about disposal habits in regards to recycling awareness. This in the Bang Mod area proved to be relatively **conscious** in their effort to recycle bottles, with over a third of respondents claiming to recycle them regularly. However, this was seen as a number that could be improved, specifically because of data suggesting that recycling bin availability and distinguishability was suspect. Nearly 18% of survey takers questioned the availability of recycling bins, and another 8% found it difficult to recognize them.

The concern raised in the empirical observation section regarding plastic bags was supported by the survey data. The answer distribution in question 3 reaffirmed the speculation of abundant plastic bag consumption, with only 17% of consumers electing to refuse them when they have just a few items, and over 75% regularly receiving them in grocery store transactions. The amount of waste generated by this form of plastic consumption is very likely to be a significant portion of the 1,496 tons of plastic discarded in Bangkok by the day. Furthermore, the physical characteristics of plastic bags make them especially threatening to the environment and therefore of concern to the project. Besides plastics persistence in the environment, the lightweight and malleable nature of plastic bags **makes** them susceptible to movement over large distances, propelled by the natural flow of wind and water. This facilitates their encroachment into ecosystems where they have harmful disruptive effects.

Physical attributes were also a keynote factor in the plastic water bottle seals becoming an area of interest. The small, brittle plastic film that seals new disposable water bottles can be perceived as an afterthought because of their size. However, their accumulation can have adverse effects as well. Survey statistics reflected this theory of the seals as an afterthought, with 39.6% of respondents admitting to not always disposing of seals properly, according to data from question 5. If that portion Bangkok's population was to dispose of plastic seals improperly, 7.5 million seals could accumulate in the environment after just three individual water bottle purchases. These seals also possess the trait prescribed to the plastic bags; they are easily moved vast distances, making them a real threat to intrude in the process of natural environments.

3.3 Impacts

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Comment [22]: Such as? If you're referring to water vending machines, these are not so common, except maybe in BaanSuanThon.

Shabbir H. Gheewala 7/19/14 6:39 PM

Comment [23]: Please correct language.

Shabbir H. Gheewala 7/19/14 6:40 PM

Comment [24]: The signs on the bins are quite large and easy-to-see, wouldn't you say?

Shabbir H. Gheewala 7/19/14 6:42 PM

Comment [25]: Many people actually prefer to have these plastic bags as they use them later for the household trash; I've observed this in my conversations with many people, though I do not have supporting statistics as I wasn't formally studying this issue.

Shabbir H. Gheewala 7/19/14 6:44 PM

Comment [26]: You should try to find out the composition of the 1,496 tons of plastic that is finally discarded (after the separation by the informal sector).

Shabbir H. Gheewala 7/19/14 6:46 PM

Comment [27]: How did you calculate this number? Did you assume that everyone in Bangkok buys bottled water?

Shabbir H. Gheewala 7/20/14 4:03 PM

Comment [28]: This section is very general and not from your study; rather from literature. Please consider removing or integrating into the introduction as background information.

Impacts of interest in this study are focused in two areas; the effect plastic waste, overconsumption, and improper disposal have on natural systems, and, the opportunity costs associated with those actions. The two areas are interconnected in many ways; for instance, a decrease in the efficiency of natural systems is an opportunity cost of plastic encroachment into ecosystems—as a result of consumption. However, it is advantageous to the structural form of this paper to provide some separation between them. The science behind how plastics can negatively **affect** the environment is important and must be individually addressed to afford clarity. Nevertheless, the reader must keep in mind that the impact remains holistic—the environmental disruption caused by plastic is most certainly part of the opportunity cost born by the consumers.

3.3.1 Environmental effects

The effect plastic has on the environment has been an important question since widespread consumption began. Postulation that the chemicals used in making the product could be harmful if leached into the environment initially of concern. Studies carried out in both *The Journal of Toxicology* and the journal of *Water Research*, however, found the toxicity of polyethylene to have “no adverse effects, and its leaching to be very limited (Final Report..., 2007; Schmid, 2008). Such conclusions suggest strongly that the problem with plastics is not in harmful chemical effects. However, plastic accumulation, and the adverse *mechanical* effects it causes, is a true threat.

High consumption of plastic materials coupled with a low overall recycling rate in Bang Mod and the rest of Thailand lead to high levels of accumulation. Plastic materials have only been mass-produced for a period of 60 years; therefore measurements of their longevity are limited (Hopewell, Dvorak, and Kosior 2009). However, it is argued that the majority of durable polymers seen in **everyday** use, such as the PET bottles and **LDPE** bags used in Bang Mod, will sit around for centuries (Hopewell, Dvorak, Kosior 2009). This generates a concern that the end-of-life plastics accumulating in landfills and as debris in the natural environment cause waste-management issues and **environmental** damage (Hopewell, Dvorak, and Kosior 2009). The environmental damage is particularly evident in marine ecosystems. The U.S. Marine Mammal Commission has recorded plastic debris ingestion to affect, 6 out of 7 types of sea turtles, 111 of 312 seabirds, and 32 species of marine animals. Furthermore, debris accumulation has damaged coral reefs and other habitats (Sheavly **and Register**, 2007). Both the harming of important marine species and the destruction of pristine habitats engenders systemic, negative effects on marine ecosystems. The death of keystone species can hurt the ecosystem on many levels, disrupting natural cycles and damaging the value that exists in organic conditions. Similarly, habitat destruction caused by encroachment of plastic debris inhibits proper functioning of animals and natural processes—synergistic effects of which are complex and dangerous. Research on plastic debris impact in the marine environment has gone as far as to **suggest** the presence of plastic debris has facilitated the encroachment of “invader” species—posing a serious threat to the

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Comment [29]: This is not as direct, I think. The people consuming and those facing the most severe effects from the environmental disruption may not necessarily be the same.

Shabbir H. Gheewala 7/19/14 7:42 PM

Comment [30]: Please correct language.

Shabbir H. Gheewala 7/19/14 7:43 PM

Comment [31]: Are you focusing only on formal recycling or is the informal sector also included?

Shabbir H. Gheewala 7/19/14 7:46 PM

Comment [32]: This should be cited as Hopewell et al., 2009. Same for the other places.

Shabbir H. Gheewala 7/19/14 7:49 PM

Comment [33]: This is a careless omission. Please be aware.

fragile balance of the ecosystem (Derraik 2002). In the terrestrial environment plastic debris acts in much the same way, through ingestion by animals and inhibition of natural processes such as photosynthesis, the terrestrial world is similarly affected (Hopewell *et al.*, 2009). Consequently, the negative impact of plastic debris accumulation in the global environment is far reaching and merits action to ameliorate its effects.

3.3.2 *Opportunity Cost*

It is important to mention value when addressing the environmental impacts of plastic, as the decrease in value engendered by plastic debris is central to the argument of decreasing plastic consumption and promoting proper disposal. According to the Food and Agriculture Organization of the United Nations, fisheries are an important part of Thailand's food source and export revenue ("Coastal Fishing Communities in Thailand...", 1995). As *explicated* addressed above, plastic debris accumulation hurts these marine environments where the fishing industry is located. Effects from plastic debris can decrease yields in the amount of fish caught and raised the energy required in extraction. This decreases the profit margins of the fishing industry, which in turn adversely affects the food industry and import/export balance in Thailand—a negative for the entire country. The profit losses of the marine fisheries as well as the ensuing ramifications represent an opportunity cost born by the overconsumption and improper disposal of plastic waste.

Tourism is another major industry in Thailand, with over 26 million visitors in 2013 according to The Department of Tourism. Many of these travelers come with the intention of enjoying Thailand's beautiful landscapes and coastlines, and the dollars they bring help to drive Southeast Asia's second largest economy. Unfortunately, much of this revenue is at risk of becoming a casualty to overconsumption and improper disposal. The tourists will not keep coming if the natural areas they are in search of become overrun with unsightly plastic debris. The cost here is massive and recognition of its existence is powerful incentive for addressing material use habits.

Waste management issues and poor recycling programs related to plastic overconsumption are a major source of opportunity cost as well. Thailand has already experienced problems related to plastic waste management. Chak Cherdasatirkul, researcher at *Columbia* University's department of earth and environmental engineering, notes that with both increased GDP and municipal waste output came a decline in revenue streams and proper maintenance of waste disposal machinery (2012). The result is the shutting down of many of Thailand's MSW facilities, leaving substantial amounts of plastic debris to be deposited in informal landfills or unprotected areas (Cherdasatirkul 2012). The environmental damage and cost associated with plastic debris, if they were to leach into the environment from these unprotected areas, could easily be greater than the cost of improving waste management for the plethora of reasons described previously.

Shabbir H. Gheewala 7/20/14 4:04 PM

Comment [34]: I was almost expecting to see "costs", which was very exciting.

Shabbir H. Gheewala 7/19/14 7:51 PM

Comment [35]: ?

Shabbir H. Gheewala 7/19/14 7:54 PM

Comment [36]: Big difference ... please learn to be careful.

Thailand's recycling programs also appear to leave a lot of money on the table. Of the available recyclable solid waste, a mere 26% is actually recycled (Corporal 2010, *Solid Waste Management in Bangkok* 2009). The low recycle rate results from the lack of infrastructure and information to promote proper disposal (Cherdsatirkul 2012). When researchers at the Asian Institute of Technology investigated Thailand's municipal waste system, the same conclusions were drawn. Almost 4.5 million tons of commercially recyclable materials are discarded each year; the potential market value of these materials is THB 16 billion per year (Dutta...3 R's 2008).

Viewing the impact of overconsumption and improper disposal of plastic debris from a monetary perspective is advantageous for putting the effects into perspective, but the lesson it brings holds a greater purpose. If the opportunity cost of the status quo of plastic use is so high, there must be inherent flaws in that behavior. There is inefficiency in the economics of plastic use, that which if corrected would have greatly positive effects on the environment and the finances of Thailand.

3.4 What can be improved?

The observations illustrated (3.2) and their subsequent impacts (3.3) were examined in order to direct the study toward material use habits that could benefit from access to more information. Since the study focused on individual behavior and decision-making, large waste management programs were not addressed, nor were all encompassing recycling efforts. However, it was applicable to address individual recycling and disposal habits, as they are parts of the whole. Improving the habits of individual actors was employed as the vehicle for bringing wholesale changes to the observed situation and subsequent impacts. Changes in the individual habits that could decrease overconsumption and improper disposal of plastic goods are identified below:

- **Re-use of plastic bottles**—has energy saving potential, decreases waste generation and environmental accumulation, and research confirms leaching of chemicals in the plastic is not of particular concern
- **Recycling of plastic bottles**—recoups some the market value that they represent, saves energy used in creating new plastic, and decreases waste generation and environmental accumulation.
- **Decreasing use of plastic bags**—decreases waste generation and environmental accumulation, less demand for plastic bags causes less to be manufactured, thus generating savings in energy use.
- **Properly disposing of plastic bags**—engenders a decrease in environmental accumulation and the subsequent damage it causes. Ameliorates the aesthetic impacts of plastic encroachment and avoids the associated monetary loss.
- **Properly disposing of plastic water bottle seals**—similar in impact to improvements in plastic bag disposal.

Shabbir H. Gheewala 7/19/14 7:55 PM

Comment [37]: Please cite properly.

4.0 Action Plan

4.1 Method Selection

To achieve the changes in behavior described in 3.4, each behavior must be specifically addressed. The method employed provides information to the consumers in the Thai community through an education program focused on conservation. Specifically, the program will inform about the impacts of plastic use and provide context to the daily choices made by Thai consumers. More sustainable choices will then be described and demonstrated with reference to the positive impacts they include.

The medium selected for this education program was a collection of videos and multimedia productions that were accessible on the Internet. The stipulation of having the information available on the web was of particular importance. Utilizing the Internet as the medium of information exchange allows for a large audience to be reached with minimal investment. Furthermore, the age group of focus, 15-25 year-olds, accounted for over 28% of the distribution of Internet users in Asia (“Asia Pacific:..”, 2013). This portion represented by the age group is particularly high in comparison to others in the distribution—further bolstering the decision of putting the information on the web. Counting on the technological savvy of the target audience, an Internet campaign hopes to capture widespread interest through ease of use.

This affinity for an approach utilizing technology was held in the development of the education program as well. Informational videos were an integral part of information exchange. The videos sought to provide information about the negative impacts of plastic overconsumption and improper disposal, in order to help Thai viewers to understand the consequences of their material use choices. In doing so, the goal was to encourage more sustainable behavior. Thus, providing context of impact for motivation and a practical strategy for improvement, through the medium of online accessible multimedia was the method of choice.

4.2 Implementation

4.2.1 Project Design

Using a template provided by WIX.com, a free website building site, the multimedia productions were uploaded and made public. The content published as of the writing of this paper included two videos and an interactive article describing plastic consumption in Bang Mod. A shorter video served as advertisement for the website and also provided context that sought to promote awareness and encourage action. A second, longer video promoting the “Three R Method” (reduce, re-use, recycle) was created with the context of plastic’s impact and Bang Mod-specific strategies for carrying out the “Three Rs”. This second video was designed to have the substance deemed crucial in the method selection process. Finally, the article

was used to describe the plastic consumption situation in more detail and included images of Thailand that helped to support the portrayed observations.

4.2.2 Advertisement Strategy

Having the education program available online was the most important aspect of the advertisement strategy for reasons already described. Building on the Internet framework, a social media-advertising platform was the first effort employed. Social media is considered a viable and emerging medium of information exchange and awareness generation by advertising experts (Tuten 2008). Sites such as Facebook and Twitter were used to connect with members of the Bang Mod community and direct them to the website.

The first video created was a tool for the advertisement strategy as well. It was created to be informative, but also as a promotional video for the education program, directing viewers to the website to expose them to the other multimedia productions. The video was spread on the social media sites mentioned.

Finally, the educational institutions where much of the survey and observation components were carried out were bases of advertisement efforts. Teachers at a local secondary school were contacted with the hope they would direct their students to the program. Groups at Bang Mod's resident university, KMUTT, were also of importance. They were contacted and used as a vehicle of advertisement as well.

5.0 Conclusion

5.1 Overview

Like the American authors in the Progressive Era argued, conservative environmental practices aren't just nice things to do—they are good for business. The problems associated with overconsumption and improper disposal of plastic are serious and must be addressed to ensure a healthy economic and environmental future for Thailand. The situation must be approached from many angles; structural changes in waste management will need to be made by legislative powers in government. Government may also seek to limit overconsumption with regulatory policies, but it will take a committed effort from powerful businesses in the private sector to catalyze change. Finally, the grassroots approach, addressing individual choices and understanding, taken in this study is of no less importance. The will of the masses can have a great impact on current issue immediately, while providing the inertia for subsequent changes in the public and large private sector.

The method of providing information in an effort to create of culture of conservation remains as viable at the conclusion of this study as it was at the onset. Observation and research strongly suggested the situation could benefit from this approach. With development of the education program this study made significant progress in this area and found no information to suggest it would be an ineffective tactic. An extensive assessment and background research effort also proved to be a

Shabbir H. Gheewala 7/19/14 7:59 PM

Comment [38]: Is this a conclusion of your study? How?

Shabbir H. Gheewala 7/20/14 4:08 PM

Comment [39]: I don't know what that information to suggest "ineffectiveness" would look like. Sounds superfluous.

sound strategy. The inclusion of those components helped to focus the product of the study to where it could be most effective. Identifying what consumption habits to concentrate on and what improvements must be made to them resulted in a concise and direct education program. For these reasons the creation process of the action plan was deemed as a success by the authors of this study.

Shabbir H. Gheewala 7/20/14 4:08 PM
Comment [40]: Don't really know how; just a self-praise?

5.2 Future Considerations

While it may be appropriate to draw conclusions about the action plan's creation process, its effectiveness is still unknown. As of the completion of this study no impact analysis of the education program has been performed, nor has it existed sufficiently long enough to warrant such analysis. This speaks to the nature of this study as an ongoing project. Using the process demonstrated, content could be added to the website in order to address observed habits that could benefit in the same way as plastic consumption. Furthermore, analysis of the impact that the currently developed multimedia productions have should be performed. Judgment could be based on criteria ranging from website traffic to empirically observed changes in consumption and disposal behavior. Any analysis done with respect to the impact of the initial website content should focus on what can be done more effectively in subsequent productions.

Shabbir H. Gheewala 7/20/14 4:09 PM
Comment [41]: Self-praise, without any real evidence.

Shabbir H. Gheewala 7/20/14 4:09 PM
Comment [42]: Exactly my point in the above two comments.

5.3 Reproducibility

The possibilities for additional work building upon this project are not limited to the Bang Mod area. Bang Mod's geographical characteristics have already been compared to the rest of Thailand and it can be said with great confidence that this process could be effective all over the country. However, the spirit of the project allows for the process to be even more widely utilized. The central idea of imparting conservation awareness as an act of cultural exchange is broadly applicable.

As Globalization intertwines nations around the world, population growth and global development shed light on the value of resource management. This project exemplifies the benefits that can come from cultural exchange. Essentially, a foreign perspective was utilized to improve consumption habits. While cultural values tend to vary tremendously on a broad spectrum, there are basic and practical ideas that can benefit most countries. Conservation is one of them. Not only does it take into account environmental consequences, it is advantageous for a nation's economy.

One of the most important aspects of this project is its potential to be replicated. The simplicity of what was done to further improve an area's consumption habits could easily be duplicated and made to fit a variety of communities. Empirical observation coupled with survey methodology pinpoints key issues and the shared opinions influencing those issues. All it takes is effort on the researcher's part to find a medium through which they can best communicate their findings and solutions. This project demonstrates that with the proper

Shabbir H. Gheewala 7/20/14 4:14 PM
Comment [43]: What does this mean? What cultural exchange ... as in students coming from the US to impart their wisdom on the Thais? Why is this being mentioned?

Shabbir H. Gheewala 7/20/14 4:16 PM
Comment [44]: You've just mentioned (very honestly) in the previous paragraph that you do not yet know the effectiveness of your proposed plan.

assessment and course of action, cultural exchange can be used to encourage the improvement of unsustainable habits.

6.0 Works Cited

1. "Asia Pacific: Age Distribution of Internet Users 2013." *Statista*. Web. 15 July 2014.
2. Cherdasatirca, Chak. "Generation and Disposition of Municipal Solid Waste (MSW) Management in Thailand." Thesis. Columbia University, 2012. *Earth Engineering Center* (2012). Print.
3. Cherrier, Helene. "Consumer Identity and Moral Obligations in Non-plastic Bag Consumption: A Dialectical Perspective." *International Journal of Consumer Studies* 30.5 (2006): 515-23. Web.
4. "Coastal Fishing Communities in Thailand ..." *FAO Corporate Document Repository* (1995). *Regional Office for Asia and the Pacific*. Web.
5. "Communicating the Benefits of Recycling." *EPA*. Environmental Protection Agency. Web. 07 July 2014.
6. Corporal, Lynette L. "Thailand Fights Addiction to Plastic Bags." *Theguardian.com*. Guardian News and Media, 28 June 2010. Web. 19 June 2014.
7. Deane, Phyllis. *The First Industrial Revolution*. Cambridge: U, 1965. Print.
8. Derraik, José G.b. "The Pollution of the Marine Environment by Plastic Debris: A Review." *Marine Pollution Bulletin* 44.9 (2002): 842-52. Web.
9. "Final Report on the Safety Assessment of Polyethylene." *International Journal of Toxicology* 26.1 (2007): 115-27. Web.
10. Hopewell, J., R. Dvorak, and E. Kosior. "Plastics Recycling: Challenges and Opportunities." *Philosophical Transactions of the Royal Society B: Biological Sciences* 364.1526 (2009): 2115-126. Web.
11. Hopewell, Jefferson, Robert Dvorak, and Edward Kosior. "Plastics Recycling: Challenges and Opportunities." *Plastics Recycling: Challenges and Opportunities*. Royal Society, 14 June 2009. Web. 19 June 2014.
12. Krosnick, Jon A., and Duane F. Alwin. "Aging and Susceptibility to Attitude Change." *Journal of Personality and Social Psychology* (1989). Web.
13. Laist, David W. "Overview of the Biological Effects of Lost and Discarded Plastic Debris in the Marine Environment." *Marine Pollution Bulletin* 18.6 (1987): 319-26. Web.
14. Lazell, Mark. "Asia Set to Fuel Plastics Demand." *ICIS Chemical Business* 1.11 (2006). Web.
15. Noonin, Chalika, and Wontana Wuttiyinyong. *Solid Waste Management in Bangkok 2009*. Bangkok: Dept. of Environment, Bangkok Metropolitan Administration, 2009. [Http://office.bangkok.go.th/environment](http://office.bangkok.go.th/environment). Government of Thailand, 2009. Web.
16. Phillips, Stephen. *Strategic Sourcing*. Cambridge, MA: Harvard Business School, 2005. *Harvard Business Review*. Harvard Business School, 2005. Web. 20 June 2014.

Shabbir H. Gheewala 7/20/14 4:16 PM

Comment [45]: Same question as in SHG43.

Shabbir H. Gheewala 7/19/14 7:53 PM

Comment [46]: Is this correct?

Shabbir H. Gheewala 7/19/14 5:32 PM

Comment [47]: Why is this information mentioned in this way. You should cite in an academic style. Please check some journal papers for noting the style of referencing.

Shabbir H. Gheewala 7/19/14 7:46 PM

Comment [48]: Does this document give different information than the one above? If not, please limit the citation only to the one above as it appears to be peer-reviewed and easier to access.

Shabbir H. Gheewala 7/19/14 6:07 PM

Comment [49]: Please use consistent citation format

17. "Plastics, Common Wastes & Materials." *EPA*. Environmental Protection Agency. Web. 04 July 2014.
18. Rakshit, Dr., Ranamukhaarachchi, Dr., and Nitivattananon, Dr. "Thailand." *3R in Asia: A Gap Analysis in Selected Asian Countries*. By Dutta, Dr. 1st ed. KlongLuang: 3R Knowledge Hub Secretariat, 2008. 114-19. Print.
19. Rewlutthum, Kamala. "Evaluation of Plastic Waste Management in Thailand Using Material Flow Analysis." *Thesis*. Asian Institute of Technology School of Environment, Resources and Development, May 2013. Web. 8 July 2014.
20. Schmid, P., M. Kohler, R. Meierhofer, S. Luzi, and M. Wegelin. "Does the Reuse of PET Bottles during Solar Water Disinfection Pose a Health Risk Due to the Migration of Plasticisers and Other Chemicals into the Water?" *Water Research* 42.20 (2008): 5054-060. Web.
21. Schmid, P., M. Kohler, R. Meierhofer, S. Luzi, and M. Wegelin. "Does the Reuse of PET Bottles during Solar Water Disinfection Pose a Health Risk Due to the Migration of Plasticisers and Other Chemicals into the Water?" *Water Research* 42.20 (2008): 5054-060. Web.
22. Sheavly, S. B., and K. M. Register. "Marine Debris & Plastics: Environmental Concerns, Sources, Impacts and Solutions." *Journal of Polymers and the Environment* 15.4 (2007): 301-05. Web.
23. "Thai Style Recycling." *Waste Management World*. Pennwell Corporation. Web. 8 July 2014.
24. "Thailand Population 2014 - World Population Review." *Thailand Population 2014 - World Population Review*. Web. 10 July 2014.
25. Theoe, D. R. "Conservation in the Progressive Era: Classic Texts. Edited by David Stradling. Weyerhaeuser Environmental Classic Series, Seattle: University of Washington Press, 2004. Xii 110 Pp. Notes, Bibliographic Essay, Index. Paper \$12.95." *Environmental History* 10.2 (2005): 337-38. Web.
26. Toxicol, J. "Result Filters." *National Center for Biotechnology Information*. U.S. National Library of Medicine, 2007. Web. 19 June 2014.
27. Tuten, Tracy L. *Advertising 2.0: Social Media Marketing in a Web 2.0 World*. Westport, CT: Praeger, 2008. Print.
28. "U.S. EPA, The Benefits and Costs of the Clean Air Act from 1990 to 2020: Final Report." *Office of Air and Radiation* (March 2011). Web.

Footnotes:

- 1- Statistic found on an EPA page titled "Communicating the benefits of recycling" <<http://www.epa.gov/solidwaste/conserve/tools/localgov/benefits/index.htm>>
- 2- Nairobi, 27 June 2014 - Secretary-General's remarks at the first United Nations Environment Assembly [as delivered]
- 3- A presentation at a KMUTT workshop by Sirintornthep Towprayoon on waste management issues in Thailand, the proportion of plastic waste could be seen as 17%. This was juxtaposed to the figure of 8,800 tons of waste per day given by Thailand's Department of Pollution Control

Shabbir H. Gheewala 7/19/14 5:34 PM

Comment [50]: This is not a first name, but a title; same as for the other co-authors and editor.

Shabbir H. Gheewala 7/19/14 5:30 PM

Comment [51]: Same citation as 20; you should have noticed!