

Environmental Education Program for the Segregation of Municipal Solid Waste in Mandalay City

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Abstract

In Mandalay, solid waste problem is one of the most considerable challenges with the management of waste in recent years. Mandalay is the second largest city and the last capital in Myanmar with the population of 1.3 million. With the growth of population and urbanization, current total garbage generation is 1090 tons per day and collected rate is only about 900 tons (85%) of the waste. The conventional way of managing solid waste being the sole responsibility of a single body, Mandalay City Development Committee (MCDC) is facing constraints due to a lack of resources, improper collection and management of disposal sites, a lack of awareness, and cooperation from the public in managing the solid waste. In this respect, the objective of this study is to discuss the importance of environmental education program for transforming from throw-away society to recycle-based society through active learning program involving students. This study intends to achieve a more radical shift in thinking and behavior towards sustainable lifestyles in building 3R practice. This study based on the descriptive method and qualitative approach to data collection, analysis of the primary reports, the secondary documents, articles from open literature and relevant websites. This study examines the challenging factors in establishing recycle-society, and how to overcome these challenges. This study is an initial stage of implementing the environmental education. Thus, findings are still limited and general. It is necessary to do more details analysis in the future to understand the positive behavioural changes within community regarding with the 3R activities in waste management.

Keywords: environmental education, throw-away society, 3R society, waste management, Mandalay

1. Introduction

Mandalay city is one of the major cities in Myanmar, in addition to Yangon and Naypyitaw. It is the second largest city and the last royal capital in Myanmar with the population of 1.3 million. The administrative area of the city is composed of six townships, 96 wards, 42 village tracts, and 170 villages with the total area of the city is 315 km² (or 121.5 miles²). According to an exclusive interview with U Min Aung Phyoe, the total number of households in Mandalay is 271487. The growth rate is just over 2% per year. But, there is no accurate data on the domestic migrants coming and going entering and leaving Mandalay. Therefore, the population of Mandalay will have reached over 3 million by 2040 (ADB, AECOM, 2016).

Mandalay City Development Committee (MCDC) has 14 departments to implement its vision statement - to keep the city clean, to make city beautiful and green, and to enable the residents to enjoy a pleasant life. Among them, the Cleansing Department is responsible for handling solid waste collection, transport and disposal.

With the economic growth and rapid urbanization, there are gradually shifts in consumption and production patterns which have led to increasing waste generation. According to the Cleansing Department of MCDC, current total garbage in the city is estimated to be about 1020 to 1090 tons per day and the per capita generation is determined to be 0.73 kg per capita per day. Of the total generation, it is estimated that only about 900 tons (85%) of the waste are being collected by MCDC, (5%) are collected by informal sectors. Only 10 % of them are illegally disposed dumped into drains and creeks.¹ There is limited segregation of waste at

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¹ Min Aung Phyoe, U. (2017). Staff Officer from Cleansing Departments of Mandalay City Development Committee (MCDC), Interview on 6 November. (Henceforth, Interview with Min Aung Phyoe, ²⁰¹⁷).

source before disposal. These wastes are usually mixed together and disposed without being classified into the final dumpsites. In this case, the life span of landfill sites in Mandalay is not more than 5 years of additional life due to the growing waste generation rate.² Therefore, MCDC is facing the problem to find the suitable new disposal sites and transfer station. In order to overcome this problem, there is an urgent need for waste reduction, reusing, and recycling measures at the source for MSW management in Mandalay city. In this respect, the Cleansing Department under the Mandalay City Development Committee (MCDC) has implemented building awareness among the target audience to explain the constraints of solid waste management.

Based on the mentioned factors, the objective of this study is to discuss the importance of environmental education program for transforming from throw-away society to recycle-based society through active learning program involving students. This study intends to achieve a more radical shift in thinking and behavior towards sustainable lifestyles in building 3R practice.

1.1 Methodology

This research is exploratory, using a qualitative approach to data collection and analysis of the primary reports, secondary documents, and articles from open literature and relevance websites. Personal interviews have been conducted with U Min Aung Phyo, Staff Officer from the Cleansing Departments of the Mandalay City Development Committee (MCDC).

2. What is Environmental Education?

Environmental education is not a destination. Rather, it is a journey toward mitigating environmental problems. It is a holistic approach to the learning process to bring out desirable changes in human knowledge, attitude and skills. The definition of environmental education has been varied from each other. United States Environmental Protection Agency (EPA) defined environmental education as “a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment”³. As a result, individuals enable to develop a deeper understanding of environmental issues and the skills to make informed and responsible decisions. The United Nations Educational, Scientific and Cultural Organization (UNESCO, 2004)⁴ stated that environmental education is vital in imparting an inherent respect for nature amongst society and in enhancing public environmental awareness. This shows that EE program is possible to change people’s behavior by making them more knowledgeable about environmental issues. It also goes beyond an awareness of issues to give more opportunity to the students to develop a sense of ownership and empowerment so that they fully become active citizens. The three crucial elements of environmental education as highlighted by Anijah-Obi⁵ are:

1. Creating awareness and understanding about the environment.

² San Myint Yi (2017). “A Study of Municipal Solid Waste Management in Mandalay City”, Presented at the 2017 AMI Conference on Progress towards Myanmar’s Sustainable Development Goals, Yangon: University of Yangon, 27-30 November, 2017, (Henceforth, San Myint Yi, 2017).

³ “Environmental Protection Agency (EPA)”, <www.epa.gov/education>, Accessed on 12 November, 2017.

⁴ UNESCO (2004). United Nations Decade of Education for Sustainable Development 2005-2014), UNESCO, Paris.

⁵ Anijah-Obi, F.N.(2010). *Fundamental of Environmental Education and Management*, Calabar: 2010.

2. Recognizing man's relationship, responsibility, attitudes and commitment to the Environment.
3. Developing efficient and effective environmental management skills for the survival of present and future generations.

Thus, active learning programs involving students directly in their community and in the resolution of environmental issues have a great effect on students' attitudes towards their environment.

3. An Overview of the Current Municipal Solid Waste Management in Mandalay

The management of solid wastes is one of the most considerable serious environmental problems and public health in recent years for developing countries. In Myanmar, both the national and city-level governments are also facing the several challenges in managing the solid waste with increase in population and high consumption patterns. It is estimated by World Bank (2012) that the solid waste generation in Myanmar was 5,616 tons per day with the per capita waste generation rate of 0.44 kg. With increasing urbanization, it is expected to reach about 21,012 tons per day with 0.85 kg by 2025.⁶ Approximately 55 % of the country's total waste is generated by three major cities including Yangon (1,981 tons/day), Mandalay (1090 tons/day), and Nay Pyi Taw (160 tons/ day).⁷ In most urban cities, solid wastes are thrown away without separation in any available space it affects on the environment. This practice results from lack of knowledge and education needed for separation of wastes at the source of generation and free of concern attitude towards solid wastes management on the part of citizens.

Myanmar's municipal solid waste (MSW) composed mainly of organic materials, plastic waste, paper and cardboard, wood, metal, and glass, with some hazardous household wastes. Myanmar has experienced great challenges in solid waste management, not only in the collection, transfer, and final disposal of waste, but also a lack of public awareness of the solid waste system and changing consumption patterns. Moreover, currently there is no effective publicly organized recycling and no official waste separation systems in Myanmar. The lack of an official separation and recycling policy is the problem. Therefore, education in solid waste management is a critical one.

There are a number of national and local policies, laws and regulations associated with waste management. In December 1994, Myanmar adopted a National Environmental Policy which emphasizes the responsibility of the State and every citizen to preserve its natural resources in the present and future generations.⁸ In addition, in 1997, Myanmar Agenda 21 was developed to establish a blue print for sustainable development.⁹ Within the Myanmar's Agenda 21 of the environmental protection policy, the 3Rs initiative of reduce-reuse-recycle has been introduced as an important method that should be monitored, adopted, and promoted by the government. Therefore, it advocates environmental education programs in both formal and non-formal schools for making environmental awareness which in turn lead to changes of mindset and behavior among its citizens.

⁶ Premakumara, Dickella & Matthew, H (2016). *Development of Environmental Learning Programme for Establishing a Sustainable Solid Waste Management System in Mandalay*, Myanmar, Presented at the HDCA 2016 Conference, Hitotsubashi University, Tokyo, 1-3 September (Henceforth, Premakumara,2016)

⁷ Premakumara, Dickella & Others (2017). *Waste Management in Myanmar: Current Status, Key Challenges and Recommendations for National and City Waste Management Strategies, Policy Report*, Japan, IGES, p.8 (Henceforth, Premakumara, 2017).

⁸ Hla Hla Win (2001). "Environmental Awareness and Environmental education in Myanmar", <www.socialstudies.org>. Accessed on 5 October 2017.

⁹ Premakumara, 2017, p.16.

Waste separations at the source and 3R activities are very limited in Myanmar, although some cities conduct public awareness-raising campaigns and environmental education programs for local residents in order to promote 3R activities. Municipal solid waste management (MSW) is a major environmental concern in Mandalay City in Myanmar, as it is for many cities in the developing world.

With the growth of population and urbanization, current total garbage generation is 1090 tons per day and collected rate is only about 900 tons (85%) of the waste. Municipal solid waste (MSW) in Mandalay is mainly generated from households (75%), commercial sector (24%) and tourism (1%). The physical composition of MSW includes organic (65%), plastic waste (15%), paper and cardboard (6%), textile (4%), glass (2%), compound material (2%), metal (1%), hazardous waste (1%) and other (4%).¹⁰ There is limited segregation of waste at source. In the evaluation of current waste generation, Mandalay has a high percentage of organic and plastic waste composition in MSW.

Composition of MSW	
Organic	65 %
Paper and Cardboard	6 %
Glass	2 %
Metal	1 %
Plastic	15 %
Compound material	2 %
Textile	4 %
Hazardous Waste	1 %
Others	4 %

Figure (1): Municipal Solid Waste Composition in Mandalay City

Source: MCDC, 2016

Municipal solid waste collection system in Mandalay can largely be characterized as labour intensive, relying on the use of both manual workers and non-standard vehicles. Current waste collection systems in Myanmar include both primary and secondary collection. The primary waste collection system is carried out either or in combination of push carts and tri-bicycles while secondary collection is performed mainly with tipper trucks.¹¹ MCDC is operated 225 trucks for carrying the wastes to the final dumping sites, and a total number of collection vehicles are 934 in 2016.¹² Cleansing department is currently public ownership. In doing so, the conventional way of managing solid wastes being the sole responsibility of a single body, the Mandalay City Development Committee (MCDC) has been facing considerable challenges due to the lack of resources, improper collection and management of disposal sites, lack of awareness, and cooperation from the public in the solid waste management.

¹⁰ Minn Aung Phyoe, U. (2016). *Job Report*, Staff Officer, Head of Cleansing Department, Mandalay City Development Committee (Henceforth, Minn Aung Phyoe, U. 2016).

¹¹ Interview with Min Aung Phyoe, 2017.

¹² Lin Tun Tun (2016). *Overview on Solid Waste Management in Mandalay City*, Assistance Supervisor, Cleansing Department, MCDC, 25 July 2016.

4. Partnerships in Municipal Solid Waste Management

In this background, Mandalay City Development Committee has attempted to overcome this problem through the cooperation of both local and international partners. In order to improve waste management in Mandalay city, there are a number of grants available to MCDC covering environmental services in Mandalay City from ADB, AFD, JICA, KOICA, EU, UNEP. To become a sustainable green city, MCDC has signed to promulgate a 25 years urban development plan for Mandalay city with the cooperation of the Asian Development Bank (ADB) and French Agency for Development (AFD) on 30th October 2103. This is called Mandalay Urban Services Improvement Project (MUSIP) which sets a 2025 target for improving the city's water supply, waste water and drainage, solid waste management.¹³ Regarding with the solid waste, component of MUSIP project are to: (1) increase a collection rate of 95% by 2020 and 100% 2025; (2) sort recyclable waste up to 25% by 2020 and 27 % by 2025; (3) mitigate the risks caused by the current landfills on the environment and human health; and (4) reduce the waste dumping to the final landfills by the implementing the segregation of waste at source for organic and recyclable material by 2020.¹⁴

There are some projects in Mandalay city for sustainable solid waste management such as the KOICA project, "Capacity Development Program on Solid Waste Management" is a 3-year program (KOICA, 2015), the IGES project, "Development of the Solid Waste Management (SWM) Strategies at National and City Level in Myanmar" is to set up a national legislative frame work through awareness-raising, capacity building and national level strategies and action plans.¹⁵ And also ASEAN ESC Model Program, "municipal solid waste management model project in Mandalay City" aimed to upgrade the people awareness and public participation in the MSW sector.¹⁶ These programs mentioned above are essential steps for Mandalay City to develop a radical transition towards an environmentally sustainable city.

5. Environmental Education Programs on Municipal Solid Waste

Public participation is the importance of the success of any recycling program. So, the recovery of a large amount of high quality recycling depends on citizen involvement. Waste separation at household would reduce collection time and collection cost.¹⁷ In this respect, waste reduction, waste prevention and minimization are the most favoured choices that enable individuals to separate wastes at the source of generation in order to attain effective management of waste in Mandalay. In the approach of the waste minimization, the MCDC has initiated a number of programs in cooperation with local stakeholders and above mentioned partners to increase public awareness and participation in the promotion of 3R activities. In 2014, the Cleansing Department cooperated with ASEAN ESC Model Cities to implement the education program for waste minimization. Under this program, by the dissemination of leaflets including key messages the MCDC encourages food industry for reducing unnecessary packing and educates people for reducing the food waste at domestic and commercial sources.¹⁸ This program designed to understand the people waste recycling

¹³ Citynet (2016). *City Voices: Smart Cities for Sustainable development*, Vol.07, No.02, Autumn/Winter. (Henceforth, City Voices, 2016).

¹⁴ ADB, AECOM (2016). *Mainstreaming Integrated Solid Waste Management in Asia*, ADB, AECOM, December.

¹⁵ Premakumara, Dickella & Others (2016). *Quick study on waste management in Myanmar: Current Situation and Key Challenges*, Japan, IGES, June (Henceforth, Premakumara, Dickella & Others 2016).

¹⁶ Min Aung Phyo, 2016.

¹⁷ Hassan, M.I & Others (2010). *Solid Waste management in Southeast Asian Countries with Special Attention to Malaysia*, Italy, CISA, Environmental Sanitary Engineering Center, p.5.

¹⁸ AECOM and ADB, 2016.

activity as a source of household income. Figure (2) shows the recycling waste prices which are varied based on the market demand and supply.

 		
<p>Glue Bottles (1 Viss = 700ks)</p>	<p>Papers, News papers (1 Viss=200ks) Cardboards (1Viss=300ks)</p>	<p>Beer Bottles (1 bottle =35ks)</p>
		
<p>Tin bottles (1 Viss=2500ks)</p>	<p>Red copper (1 Viss=10000ks)</p>	<p>Yellow Copper (1 Viss = 5000ks)</p>

Figure (2): Awareness-raising for Source of Household Income

Source: Author, 2017

With the development of a new environmental learning program a series of participatory learning workshops were conducted in order to establish a 3R society in Mandalay City on 11-12 November 2014, 2 July 2015, and 21-22 November 2015 respectively. Currently, there is no official waste separation and recycling systems exist in Mandalay except for some pilot projects. Against this background, in Mandalay City, the Institute for Global Environmental Strategies (IGES) has conducted a pilot project in partnership with Kitakyushu City in which an environmental learning program for junior high schools. Among them the project selected three model schools – Basic Education High School No. 4, 14, 26 together with MCDC, Department of Basic Education and other key stakeholders during the period of 2014-2015.¹⁹

¹⁹ Premakumara, 2016, p.1.

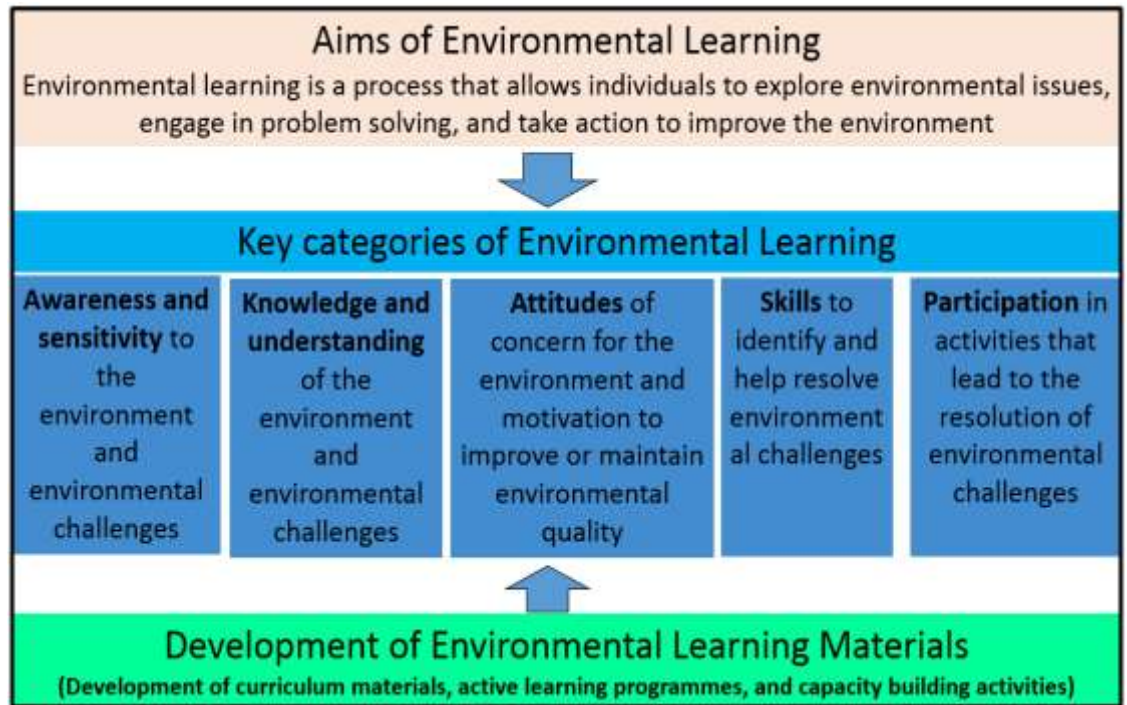


Figure (3): Environmental Learning Process

Source: Permakumana, 2016, p.4

Since 2014, through a city-to-city cooperation, MCDC has collaborated with Kitakyushu City in partnership with the Institute for Global Environmental Strategies (IGES) to develop a new environmental education (EE) program for elementary schools in Mandalay. As a result, MCDC successfully implemented environmental learning program.



Figure 4: The Issue of Waste Management in the Mandalay City

Source: Permakumana, 2016, p.8

Environmental Education (EE) Program has been implemented by MCDC in local schools to raise the awareness of students on waste separation and recycling with the cooperation of IGES, Kitakyushu City and ASEAN ESC model Cities Program. This program designs to enhance the people awareness and public participation in the SWM sector in a

collaborative manner.²⁰ In this case, MCDC, the Department of Education, Ministry of Education in the Mandalay region and other stakeholders are implementing the EE program in 18 model schools in 2016 and will gradually bring it to all 250 schools in the city.²¹ All of these programs are for developing city waste management strategy and action plan to help the city achieve a zero waste.²² This program shares the knowledge to the students about 3R practices by conducting classroom lectures and some practical activities, such as practice of waste separation at school, making compost with organic waste, tree planting using compost and making handicrafts using recyclable materials.



Figure 5: Sharing the Knowledge of Waste Separation and Recycling
Source: MCDC, 2017



²⁰ Premakumara, D.(2014). *Participatory Learning Workshop: Application for Designing a Municipal Solid Waste Management Model Project in Mandalay City, Myanmar, Japan, IGES, p.1*
²¹ Citynet, 2016, p.17.
²² MCDC (2017). *Waste Management Strategy and Action Plan for Mandalay (2017-2030)*, Mandalay, MCDC, May 2017, p.17 <<http://www.iges.or.jp.com>>.



Figure (6): New Environmental Learning Program in Mandalay

Source: Author, 2017

Figure (6) shows to encourage students to critically think about the issue of waste management in the city and what will happen to their environment if they all continue to throw things away. Students are encouraged to consider that every time they dispose of some item, they also dispose of the energy, money, raw materials, and water.²³ Further, new materials are introduced to encourage students to understand the value of reducing waste generation, through such actions related to waste reduction, reuse and recycle.



<ul style="list-style-type: none"> ➤ Try not to generate waste, by using thing with care as much as possible. ➤ Use your own shopping bag and my bag and try not to ask for supermarket plastic shopping bags. ➤ Ask for things you have bought to be wrapped as simply as possible 	<ul style="list-style-type: none"> ➤ Use things again and again by remaking or repairing them ➤ Repair toys and clothes instead of throwing away ➤ Give old clothing and toys to others when you don't need them 	<ul style="list-style-type: none"> ➤ Recycle waste into different things to use them again. ➤ Remake old newspaper and milk paper carbons into newspaper and toilet paper ➤ Make compost from kitchen waste in a compost treatment container
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Source: Premakumara, 2016, p.8

Figure (7) shows the basic information about organic and inorganic waste, as well as recyclable or reusable waste. Organic waste is waste composed of easily biodegradable compounds (decomposition under natural conditions). Simply, organic waste is derived from organisms (plant and animal). Inorganic waste consists of two kinds of waste, (1) inorganic waste and (2) recyclable or reusable waste. (1) Inorganic waste includes glass, porcelain, old clothes, coal, tissue waste, plastic bags, toys, (2) Recyclable or reusable waste is not true waste but more of a resource that can be reused, such as cans, bottles, newspapers, and clothes, iron, metal, copper.²⁴ The department has also a new public education program to separate dry recycle waste and food waste before disposing. Recycling programs are required to address the generation of both biodegradable and non-degradable waste. The MCDC is now

²³ Premakumara, Dickella & Others, 2016, p.9.

²⁴ Thu Thao Phan Hoang & Kato, T. (2016). "Measuring the effect of environmental education for sustainable development at elementary schools: A case study in Da Nang City, Vietnam", *Sustainable Environment Research Journal*, 26, 274-286
 ,<www.journals.elsevier.com/sustainableenvironmentresearch/> Accessed on 10 November, 2017

planning to implement a composting program under the business operation plan. The drawing of the plan is supported by the UN-Habitat and the plan will be implemented in collaboration with the private investors for the production of fertilizer.²⁵ This program is especially targeted on households at community level to educate them on a better waste management system.

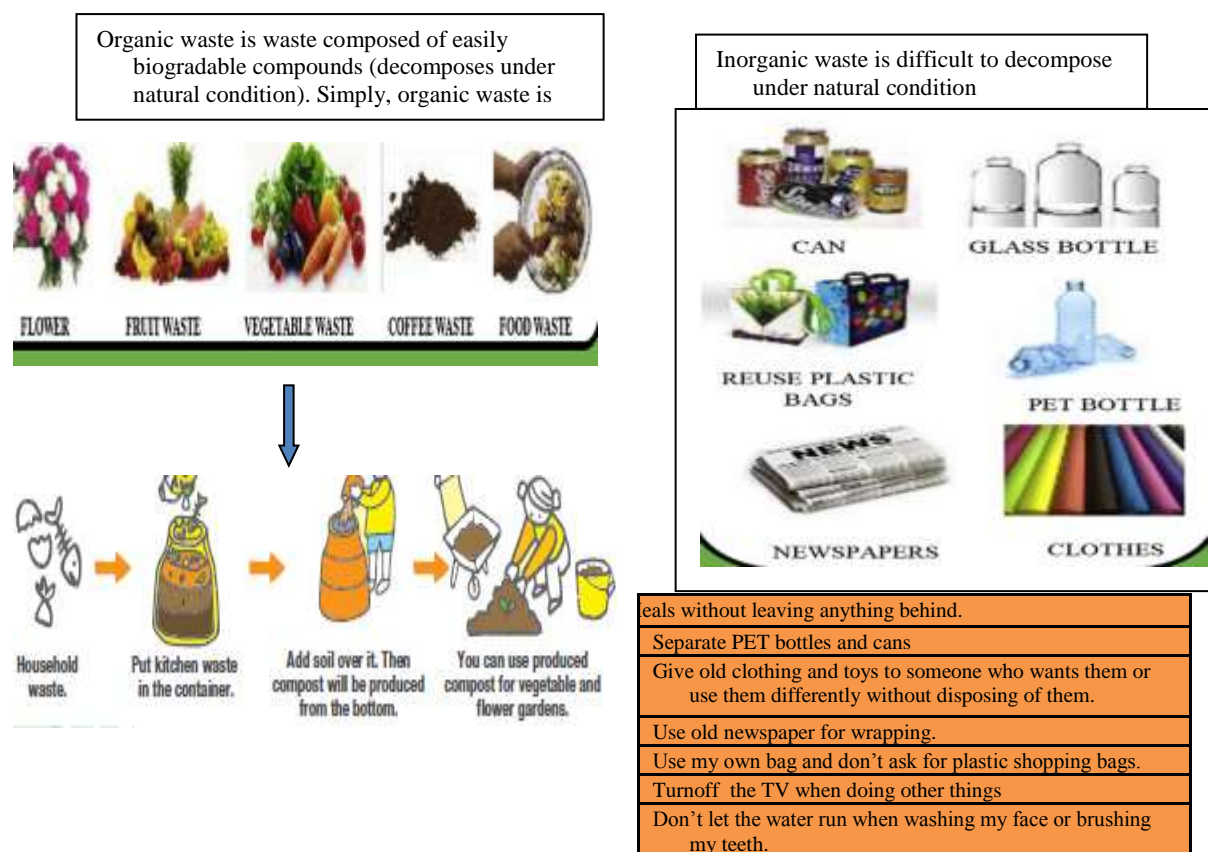


Figure (7): Let's Start to Separate Waste at Home with Your Family Members

Source: Author, 2017

As mentioned above, the environmental education and awareness creation on MSW management is essential for solving the problem associated with waste management and it enhances better practices of managing wastes. Some of the benefits resulted from education and awareness creation on MSW management are:

- development of knowledge about MSW and its associated problems when managed improperly;
- Opportunity to the students to develop a sense of ownership and empowerment to become responsible and to take actions as active citizens;
- encouragement of positive attitudes, skills, values and concerns towards the environment in all the citizens and authorities responsible for managing wastes;
- Engaging with key different stakeholders to actively participate in segregation, reduction, reuse, composting and recycling of solid wastes;
- development of appropriate skills needed for segregation of MSW at source;
- decreasing the rate of improper management of wastes and consequently the spread of diseases in the environment;
- enhancing the protection and conservation of public health, the environment and natural resources;

²⁵ AIT/UNEP (2010). *Municipal Waste Management Report: Status-quo and Issues in Southeast and East Asian Countries*, AIT/UNEP Regional Resource Center for Asia and the Pacific, p.47.

- enhancing policy implementation by decision makers on waste management.

This study found that there are challenges to build 3R society in MDY city:

- the lack of public awareness and civic engagement
- a lack of cooperation among the different sectors (public, citizen and private)
- a lack of technology and innovations
- a lack of investment
- the lack of a common vision, policies and laws and
- a lack of incentives and enforcement

To overcome these challenges, the study identified that priority actions based on the analysis of participatory works are as follows:

- development of an environmental education program
- building partnership and cooperation
- identifying/ studying new technology and innovations
- encouraging private sector participation
- establishing new policies and regulations and
- establishing an effective incentive and enforcement system

Conclusion

This paper discussed the present situation of environmental education program for segregation of MSW management in Mandalay City, and also identified the importance of environmental education program to transform from throw-away society to recycle-based society through active learning program involving students. It is expected that environmental education starting at elementary education level will raise environmental awareness of today's children but individuals of the future has gained more importance. In this case, even when waste separation at source before disposal, different categories of wastes are still dumped together and disposed at the same point. So, this paper revealed the challenge factors in establishing recycle-society, and priority actions how to overcome these challenges. So, the government should try to implement a waste separation and recycling policy throughout the country. The successful planning and implementation of a new environmental education program depends on the combination of action principles and supportive policies established by the local and national governments. In this paper, findings are still limited and general due to the MCDC's EE program is an initial stage of implementation. It is necessary to do more detailed analysis in the future to understand the positive behavioural changes within the community.

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