THE SOLID WASTE MANAGEMENT FOR SUSTAINABLE DEVELOPMENT: A CASE STUDY OF HAMBANTOTA MUNICIPLE COUNCIL AREA IN SRI LANKA

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Abstract

The study explores the importance of Solid Waste Management (SWM) for Sound Environmental Development (SED) in Hambantota Municipal Council (HMC) area in Sri Lanka. Data for the study was collected using integrated research tools including Semi-structured interviews, self-completion questionnaires, focus group discussions and non-participatory observations. The 'Random Sampling Method' was used to select households and business population while 'Purposive Sampling' was used to select respondents for the interviews and focus groups. The study revealed that lack of awareness, little synergy between local authorities and the community and challenges of limited resources, facilities and funds and illegal dumping for proper SWM process were the dominant problems in SWM. In this regard, the paper suggests an integrated SWM process, with awareness programmes and cooperation between authorities and community for the process. Implementing SWM in to Development policies for Sustainable Development, has been further suggested.

Keywords: Sustainable Development, Solid Waste Management, Hambantota Municipal Council, Sri Lanka

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INTRODUCTION

Over the time, countries experience the development with growth of industrialization, trade and internationalization. To some extent, a discussion has emerged whether this development is sustainable. Recently, most development practitioners have focused on 'Sustainable Development' (SD)¹ as an environmental concept placing the emphasis on intergenerational equality (**Carter, 2001**). According to World Conservation Strategy (WCS), development depends on environmental conservation (**Adams, 2009**). However, the human way of life has put an immense pressure on the environment, because of high consumption patterns accelerating in parallel with the economic development.

Solid waste (SW) has become a major negative consequence of development in recent decades. SW largely affects the natural environment, and poses a serious threat in achieving Sound Environmental Development (SED) or so-called Sustainable Development (SD) (Anand, 2010). Therefore, sound SW management is one of the necessities in development process.

Sri Lanka may provide an example of this issue, with new development processes under the government's major development plans, since the environment is challenged with rapidly generating SW. Consumer behaviour has generated a significant amount of SW in

¹ As guided by the United Nations (UN) Brundtland Commission, sustainability is 'a system which can be considered sustainable if it ensures that today's economic development is not at the expense of tomorrow's development perspectives' (Malik et al, 2011).

recent years. According to the National Environmental Action Plan (NEAP), management of solid waste has been identified as one of the major challenges for sound environmental development in Sri Lanka.

However. when considering the sound environmental development/Sustainable Development in Sri Lanka, it is important to assess the impact of development project on the environment, especially for the generation of Solid Waste, as it is the first and the significant outcome of the development. Hambantota most development projects were implemented during last few years. There are no proper research studies on the impact of Solid Waste Management for sound environmental development in the area. Even though the development projects have mentioned about sustainable development, there is no proper description and procedure or discussion on the importance of Solid Waste Management for sustainable development process.

As Hambantota district is being developed under a master development plan, it is important to direct this development towards SED/SD for future generations. Therefore, the research considers SWM practices and its impact on SED/SD in Hambantota Municipal council (HMC). The study further focuses on identifying the importance of SWM for the formulation of on-going development processes towards sustainability. The objective of this study is to explore the existing SWM practices, analysis their impact on sustainable development in the study area finally make recommendation to improve the SWM processes.

81

CONCEPTUAL FRAMEWORK

Figure 1 depicts a Conceptual Framework (CF) to explain the link among SWM, Environmental Conservation and Sustainable Development. The framework elaborates that development occurs with growing economy and increasing population generates solid waste, which in turn causes environmental pollution and degradation.

Figure 1: Conceptual Framework



Source: Created by Author

Waste separation, recycling and composting can be used as methods for SWM with integrating of such measures as legal structure,

awareness raising, attitude change, and cooperation between authorities and community to mitigate the negative impacts on the environment. Integrated, sustainable SWM provides the ground for environmental conservation and in turn socio-economic development. Efficient waste management will facilitate steady state growth and to achieve the sustainable development/Sound Environmental Development at the end.

LITERATURE REVIEW

Over the past 30 years, most of countries in the world have achieved rapid economic development in term of improving the well-being of people and raising their living standards. Despite some remarkable progress, there are also pressing constraints on development with entrenched negative trends means that sustainability is remaining question (Dalal-Clayton, and Bass 2002). Development practitioners now recognize Sustainable Development as a matter of environmental conservation that should be followed by social and economic development. Environmental sustainability is a necessity for SD in order to balance the three pillars of economic and social development with environmental protection (Malik et al, 2011). The Recognition led to initiate discourser and create the United Nations Environmental Programme (UNEP) and United Nations Environment Department (UNED). Since then, worldwide acceptance of the importance of the environmental issues has grown enormously (Dalal-Clayton and Bass 2002). Concurrently, the report of the World Commission on Environment and Development (WCED - the Brundtland commission)

was introduced in response to increasingly informed analysis of the link between environment and development (Dalal-Clayton and Bass 2002).

Focusing on environmental aspects of the Sustainable Development, the crucial condition appears to be that of reducing environmental degradation and resource consumption combined with economic development (Clini et al., 2010). However, accelerating environmental degradation indicates that the world is facing a stronger sustainability challenge than ever (Ayres, 2007). The achievement of sustainability in national development requires a strategic approach, which is both long term in its perspective and integrated or joined up in linking various development processes; so that they are as sophisticated as the challenges are complex (Dalal-Clayton and Bass. 2002). The important message is that environment and the socio-economic development are so intricately linked that development cannot be sustained without considering its environmental dimensions (UNEP, 2013). Therefore, to achieve Sustainable Development goals, countries should develop attentiveness towards sound environmental development and mitigate impacts on the environment.

Sustainable Development rejects the practices that support depletion of natural resources and that leaves future generations with poorer prospects (Repetto, 1986). Human actions have caused many challenges to the environment, especially with tremendous amount of waste generated due to population growth, industrialization and increasing consumption patterns. Unmanaged development influences

84

the production of wastes in different ways and strongly affects the environment all over the world. This cannot be avoided as long as waste generation is a necessary reality associated with economic development (Vallero and Letder, 2011). Waste is described as something that has 'no value,' something which is 'useless' and something that the owner wants to 'discard.' The words Rubbish, Garbage, Trash or refuse are often used as synonyms for waste. The UNEP (2009) classifies waste as; Municipal Solid Waste (MSW) including Plastic waste, Construction and Demolition waste (C&DW), Hazardous solid wastes (HW), Bio-Medical Waste (BMW) and Electronic waste (E-waste). Out of all these wastes, many countries are facing serious problems with the increasing amount of Solid Waste (SW) SW is viscid, dense, hard and substantial materials. SW has been further called 'Municipal Solid Waste' (MSW). The urban development process, population growth and consumption patterns have increased the generation of SW/MSW in many countries. The institutions both Government and non-government have responsibility to manage the waste in order to mitigate the possible impact on health and environment of the people.

According to the Schübeler, (1996) Solid Waste Management (SWM) is an essential task for ensuring public health and well-being, quality and sustainability of the urban environment and efficiency and productivity of the urban economy. As Chandrappa & Das (2012) described, SWM processes may vary due to different lifestyles of the inhabitants and type of the natural resources in the respected region.

Therefore, the strategy towards SWM should be differentiated accordingly.

The aim and purpose of Solid Waste Management is to ensure a sound environment and increase resilience. The underlying principle of the Basel Convention (1989), points out that the environmentally sound management is an approach that has the potential to bridge the makers to the breakers and thus contributing worldwide to the protection of human health and the environment. Therefore, Sound Environmental Waste Management should focus on integrating all practical steps to protect human health and the environment from the adverse effects of all kinds of wastes (Portas, 2003). The Integrated Solid Waste Management ² is a new, broad, international consensus on the Management of SW/MSW in sustainable ways and the concept was introduced by the organization WASTE first and was later developed and expanded by the

Collaborative Working Group on Solid Waste Management in Low and Middle-Income Countries (UN Habitat, 2010). 'Integrated Waste Management' is a framework of reference for designing and implementing new waste management systems and for analysing and optimizing existing systems (UNEP, 2005).

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According to McDougall et al (2001), ISWM uses a range of collection and treatment methods. All materials in the waste stream are handled in environmentally effective, economically affordable and socially acceptable ways. The Integrated Approach to Solid Waste Management can deliver both environmental and socio-economic sustainability. Countries that can achieve SW/MSW with ISWM may move towards sustainability.

A healthy environment has the ability to serve as a sink or waste repository. It can absorb, redistribute and transform waste, produced by human action or natural phenomenon, into harmless forms (Coward, 1995; Park, 2001; Hawken, 2003). However, the process of unbalanced development has its price in the form of an increased pressure on natural resources through inefficient and wasteful utilization (Anand, 2010). As such, the amount of waste in recent decades has exceeded, "the environment's ability to absorb the waste" (Ritzre, 2010).

The significant issue with this increasing amount of waste is that they have depleted the ecosystems by pollution and degradation. The capacity of many ecosystems to provide services has been reduced and it has had profound negative impacts on opportunities for Sustainable Development around the planet (UNEP, 2007). In this situation, the future options for sustainable development become limited or eroded as the ecosystem products and services are not managed effectively and efficiently (UNEP , 2007).

Environmental conservation, protecting the ecosystem and services should be the main concerns. Especially, as discussed above,

SW/MSW may have significant impacts on the environment, and managing them properly is a necessary prerequisite for making development more sustainable. The well-formed Solid Waste Management is the only way to reduce the impact of SW/MSW on the environment. Due to the implementation of successful Solid Waste Management, both public health and the quality of the environment will benefit directly and substantially (UNEP, 2005)

The escalating development process in Sri Lanka has significant impacts on the environment. Today the country's bio-diversity is endangered and environmental degradation has increased due to unmanaged development and economic growth. Population growths, consumption of ecosystem products and services have caused significant impacts on the environment, including the generation of large amounts of SW/MSW.

SW/MSW is a growing issue in urban development in Sri Lanka and is aggravated due to the absence of proper solid waste management systems at local authorities (CEA, 2005). According to the Sri Lanka National Report to the WSSD (2002), there are a number of critical environmental problems and issues caused by SW/MSW such as: deforestation, coastal erosion, soil erosion, water pollution and atmospheric pollution due to development processes. Therefore, SW/MSW is considered as one of the main environmental problems which affects urban air pollution, water pollution and soil erosion in Sri Lanka (Wanasundara, 2002). The Ministry of Environment & Natural Resources of Sri Lanka launched a national level Solid Waste Management programme called 'Pilisaru' (renovation). The Project was undertaken to find solutions to the increasing solid waste problem with the participation of other organizations such as the Urban Development Authority, private institutions, NGOs & experts in the field in Sri Lanka. Under this Project, waste management will be managed by adhering to reduction of waste generation by reuse, recycling and resource recovery to the maximum extent possible followed by appropriate treatment and finally the disposal of residual waste in an environmentally sound manner (CEA, 2008).

METHODOLOGY

Study Area

The study area of this study is Hambantota city which is governed by Hambantota Municipal Council (HMC) since 2011. The city located in Hambantota District of Sothern dry-zone of Sri Lanka. It includes 7 Grama Niadhari Divisions (GNDs): Koholankala, Keliyapura, Siribopura, Samodagama, Hambantota East, and Hambantota West. The total population in HMC is 23,090 with 5852 households and 565 registered Business Places.

Hambantota has rich ecosystems including a diverse flora and fauna and various environmental resources as shown in Map 1. The conservation of these ecosystems is a concern of many environmental

practitioners and policy makers in order to support sustainable development in the country. However, as Hambantota area is being developed under the government greater development plan (See maps 2), there are potential impacts on the environment. In this situation, the study focuses on the impact of SW/MW on the environment in order to discuss the importance of proper SWM process for SD/SED in the study area.

Map 1: ecosystem in Hambantota



Source: Urban development authority



Map 2: Greater Development Plan in Hambantota

Source: Urban Development Authority (2011).

Data and Analysis

Both qualitative and quantitative methods including the semistructured interview, self-completion questionnaire, focus group discussions and non-participatory observation were used to collect data. Government reports, municipal council reports and many other documents from different organizations and academic papers regarding waste management and its impact on the environment were used to collect secondary data. Random sampling was used to select 69 households and 59 business populations for SCQ, of 5852 households and 412 business places with expected errors 0.12%. The sample size was determined by using a mathematic function ($n = \frac{N}{1+N(\alpha)^{2}}$ (See table 1). Purposive sampling was used to select participants for interviews and focus groups and self-observation areas. Qualitative

data was analysed with the Thematic Analysis Approach, where the researcher looked for patterns to build up themes.

GND	Number of HI	Hs/BPs	Equation	Sample
Tatal	Households	5852	$n = \frac{5852}{1+5852(0.12)^{2}} = 68.63$	69
Total	Business Places	412	$n = \frac{412}{1+412(0.12)^{2}}, = 59.42$	59
Koholankala	Households	756	$n = \frac{68.63}{5852} \times 756 = 8.86$	9
	Business Places	24	$n = \frac{59.42}{412} \times 33 = 4.75$	5
Sinihonuno	Households	1675	$n = \frac{68.63}{5852} \times 1675 = 19.64$	20
Siribopura	Business Places	56	$n = \frac{59.42}{412} \times 56 = 8.07$	8
Keliyapura	Households	503	$n = \frac{68.63}{5852} \times 503 = 5.89$	6
	Business Places	14	$n = \frac{59.42}{412} \times 14 = 2.01$	2
Samodagama	Households	432	$n = \frac{68.63}{5852} \times 432 = 5.06$	5
	Business Places	1	$n = \frac{59.42}{412} \times 1 = 0.14$	0
Hambantota East	Households	1757	$n = \frac{68.63}{5852} \times 1757 = 2.59$	2
	Business Places	62	$n = \frac{59.42}{412} \times 62 = 8.94$	9
Hambantota West	Households	221	$n = \frac{68.63}{5852} \times 221 = 20.60$	21
	Business Places	212	$n = \frac{59.42}{412} \times 212 = 30.57$	30
Mirijjawila	Households	508	$n = \frac{68.63}{5852} \times 508 = 5.95$	6
	Business Places	34	$n = \frac{59.42}{412} \times 34 = 4.90$	5

Table 1: Sample Size

Source³: Author Calculation

³ Author used statistical data from Sri Lanka CSD and HMC register

When the final classification of the themes and discussion of the findings was done with regard to the literature review and the data from documents reviewed. The research findings supported by the qualitative data, which was used to find relationships such as deviations, correlations, regressions and tendencies of given statistics.

RESULTS AND DISCUSSION

Waste Management Practices in HMC

The sources of SW include residential and commercial activities in HMC. In this study, waste has been categorized into nine categories including paper and carton, plastic, food waste, tins and cans, fiber bags, glass, tree leaves, coconut shells and charks & ashes.





Source: Survey Data

As shown in figure 1, households in the sample mostly discard food waste (22%), tree leaves (21%) and plastics (16%) while business places mostly discard paper and carton (39%); plastic (29%) and food waste (20%). Sample as a whole however, 59% from households (HH) and 61% from business places (BP) discard organic waste and therefore it is possible to manage these wastes with composting processes. There are 21% of HH and 29% of BP discard plastic waste, it is important to manage these wastes effectively as plastic materials significantly impacts to the environment.

Illegal disposal practices have become a challenging issue in the study area. As shown in Figure 2, 81% of HH and 43% of BP dispose (or dump) their SW in to unauthorized places nearby water bodies, roadsides, open spaces and use other unauthorized.





It is found from the Focus Group Discussions that lack the supply of public waste bins by HMC has encouraged the community to dispose their waste in the unauthorized places. The survey further revealed that about 96% of HH and 83% of BP do not have access to public waste bins to dispose SW.

The observation was able to discover many illegal dumping sites in the study area. Especially the unauthorized dumping sites near 'Bundala' National Park, sub roads, near water resources are challenging. The researcher further observed that most of the unauthorized waste dumping sites has the wind-blown polythene which caused a myriad of nuisances to residents, to the public and to the environment.

The illegal dumping has further increased due to the lack of proper waste collection process by HMC. The HMC has not broadened their waste collection process, since they became a Municipality with seven GNDs. Only 19% of the HH and 49% of BP has access to Municipal Council waste collection tractor for disposal. This indicates that HMC is ineffective and inefficient in providing waste collection facilities to the community.

During the survey period, three important components which are affecting towards both the primary disposal practices, waste collection and transportation in the study area. These include: a) lack of funds, facilities and recourses b) lack of education information and awareness and c) lack of synergy between the local authorities and civil society.

Respondents in the focus group discussion suggest that raising funds, improving infrastructure and increasing equipment and human

resources would be a positive impact on the delivery of the SWM services. In contrast, HMC members and responsible authorities for SWM view that these suggestions will impose an economic burden to the HMC and emphasized the needy of Central Government support to be a solution for the lack of financial resources.

Moreover, HMC has the responsibility to use the allocated funds effectively and efficiently to improve facilities and to increase resources and human resources for SWM processes. This can reduce the illegal dumping practices by provisioning adequate skips and public waste bins and improving waste collection processes.

Disposal is the final element in the solid waste management process. This is done either through land filling or land spreading. Sanitary land filling sites are the most appropriate place of final disposal for solid waste. But in the case of HMC, there is no sanitary landfill site for final disposal. In the focus group discussion officer in charge of the site pointed out that, "We do not identified sanitary landfill site and therefore we use the open dumping strategy. We don't have facilities, resources or funds to maintain such a sanitary land fill for the moment. We just dump all the waste in to the land we have. We do separate recyclable waste to some extent and for the lefts we use open dumping"

The workers in Hambantota Integrated Solid Waste Management Centre (HISWMC) is collecting some selected wastes using tractors for composting processes before the final dumping. As pointed out by workers in the centre, they are used to recycle plastic waste. Thus, the observation revealed that the process is not effective or efficient at the

The Solid Waste Management for Sustainable Development:

date. However, according to information gathered by SSI revealed that impossibility to separate waste on the site or compost due to the lack of facilities, equipment and labours as well as inability the HMC to maintain a sanitary land fill. The photograph 1 below shows the landfill site of HMC. Moreover, the composting facilities in HMC have been ineffective and insufficient, due to inadequate monitoring of the composting process and quality of the compost being produced.

Photo 1: Landfill Site of HISWMC





Source: Author (Self Observation)

These evidences call for necessity of adopting the Integrated Solid Waste Management strategy to ensure effective Solid Waste Management in HMC. The landfill site should be properly managed to avoid heaping of waste and burning. Hambantota Integrated Solid Waste Management Centre (HISWMC) should be adequately resourced by the government to ensure efficient and effective waste management in the area because of the massive government led development project has been initiated in the area. The HMC should coordinate with corporate bodies like National Solid Waste Management Centre as well as with NGOs to obtain the technical

supports and financial resources to sustain the institutions. Improving technical knowledge about the SWM processes and developing a monitoring process are important for Sustainable Waste Management process in HMC.

Waste Separation, Recycling and Reuse

Waste separation practices in the HMC area are similarly low. Results reveal that community members do not separate waste as the waste collectors again mix them together with the transportation. Yet, willingness of community members for waste separation is higher, if there is a programme with an ISWM strategy. 81% of households and 63% of business places are willing to separate waste while 17% of households and 15% of business places were not. Research further reveals that some of the householders recycle their waste and sell them to local waste collectors in order to get an income. However, lack of opportunities and places to sell these collected waste decreases the interest of recycling industry.

The findings suggest that the importance of improving the recycling processes with Integrated Solid Waste Management (ISWM) process of HMC. Development of recycling processes in the study area can be done through organizing community awareness programmes such as a) Providing communities with information about how to sort waste b) economic and social benefits can gained form recycling process, and how they can participate in the designing of the programs. The success

of recycling not only depends on participation levels of the local community, but also on the efficiency of the equipment and infrastructure for the SWM process. Finally, the synergy between community and local authorities should improve to develop cooperative processes. Citizens should share responsibility with the municipality for decision making on the SWM in the study area.

The Evaluation of Environmental Impacts of Solid Waste Management for SED/SD in Hambantota Municipal Council

According to Wanasundara (2002), the main environmental problems that Sri Lanka faces include urban air pollution, water pollution, erosion and indiscriminate garbage disposal. There can be found many places where illegal dumping had been done near to the environmentally sensitive areas in Hambantota. Due to these wastes, significant impacts on soil and land could be identified in the HMC area.

Photo 2: Waste on the Water Bodies



Photo 3: Burning Waste Causes Air Pollution



Moreover, there are impacts of SW/MSW on water bodies. Water is a basic requirement for sustaining the life. Yet, due to the pollution caused by waste, concentration of dissolved carbons, heavy metals, biohazards such as bacteria and virus and other nutrients will increase in the water sources resulting in loss of bio-diversity and making the water unsafe for consumption.

As illustrated in the photograph 2, the channel system and canals are filled with waste. Furthermore, the research identified possible

impacts of SW/MSW on the air, due to landfilling and waste burning (see photo 3).

As discussed above, most of the waste dumping sites in the study area were illegal and has accelerated environmental pollution with high level of waste on water bodies and land. It is further found that a significant correlation is among the variables: "the wastes dumping place" and "waste on land" (soil pollution), "waste on water bodies" (water pollution) and "burning wastes" (air pollution). Dumping waste on illegal lands has increased the amount of 'waste on land' and 'burning waste.' Waste on land has also increased the amount of waste on the water bodies.

 Table 2: Correlation between Wastes on Emptied Place and Waste

 on Land, Water Bodies & Burning Waste

		WASTE ON	WASTE ON	BURNING	EMPTIED
		LAND	WATER	WASTE	PLACE
WASTE ON LAND	Pearson Correlation	1	.443**	361**	.481**
	Sig. (2-tailed)		.000	.002	.000
	N	69	69	69	69
WASTE ON	Pearson Correlation	.443**	1	262*	.310**
WATER	Sig. (2-tailed)	.000		.029	.009
	N	69	69	69	69
BURNING WASTE	Pearson Correlation	361**	262*	1	297*
	Sig. (2-tailed)	.002	.029		.013
	N	69	69	69	69
EMPTIED PLACE	Pearson Correlation	.481**	.310**	297*	1
	Sig. (2-tailed)	.000	.009	.013	
	Ν	69	69	69	69

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Survey Data

The table 2 shows the correlation coefficient (r) between waste on the land and the waste dumping places is 0.481 and it is significant at 0.01

Level, indicates a strong relationship between two variables. Higher correlation between the waste on water bodies and emptying place of solid waste was also observed [(0.310 (0.01)]. The value of correlation coefficient between the burning waste and the waste emptied place is 0.297 which is significant at the 0.05 confidence level. The table 2 further reveals a positive relationship with waste on the land and waste in the water. This means that the waste on the land increases the waste in the water eventually cause water pollution.

Furthermore, the final disposal site also has significantly impacted on the land and air pollution. As expressed by the community participants the ordo and dark water has made nuisance in the final disposal site. The Mosquitoes, Cockroaches and Rats have caused lots of health problems including the dengue and fever. The improper disposal of polythene causes deaths of animals such as birds, dogs, and some other wild animals.

In depth inquiries about this issue was done with members of participating to Focus Group Discussions (FGDs). The discussion reveals that even though people are aware of these health issues, lack the knowledge about bad impact of improper waste management practices and related impacts on the environment and public health. This finding (e.g. there is not enough information about environmental impacts of solid waste management) can be confirmed by the data collected from the sample survey. It is evidence from the survey data that only 7% of households and 17% business places agreed about the idea that there is adequate enough information while 93% of

households & 83% of business places said that there is no enough information about SWM impact on the environment. Participants to the face to face Interviews also pointed out that lack of any system to obtain the information to the community in the HMC.

With the findings, the study reveals the negative impacts of SWM processes on the local environment. Implementation of proper SWM process is the only way to manage SW/MSW. Therefore, the responsible authorities should take steps to reduce environmental impacts of SW, by implementing an Integrated Solid Waste Management strategy with the support of the central government and the central environmental authority.

As lack of knowledge about SW, SWM, and SWM impact on environment and health were significant, awareness campaigns, educational workshops and waste recycling and composting trainings should be conducted for community members. Moreover, in order to decrease the usage of natural resources and waste disposal, the waste prevention strategies should be promoted with an ISWM strategy.

The developmental process has accelerated the generation of SW/MSW and has increased impacts on the environment and sustainable development and vice versa. 56% of the households and 47% of business places agreed that the new development process has impacts on solid waste generation in the area while 28% households and 12% business places have no idea about it. 16% of households and 41% of business places did not agree.

103

Since the SW/MSW has significant impacts, as discussed in the previous sections, the generation of waste with the growth of development should be a concern if it is a goal to achieve sustainable development. Further discussion with the respondents of the interviews and focus group discussions revealed that there are environmental challenges due to new development processes in the study area. As expressed by a community leader, "there was no much impact on the environment before. But, with new development project, impact of SW was significant" (Field work, 2014).

Focusing on these environmental aspects of the sustainable development, the crucial condition appears to be that of reducing environmental degradation caused by SW. Thus, the new developmental process in the study area has significant negative impacts on the environment with rapidly generated solid waste. Chart 3 shows the cross tabulation of the two variables; the impact of the new development process on SW generation and the waste on the land and water. Moreover, a Pearson Chi-square test was conducted to examine the statistical significance of the cross tabulation table and find out whether there is a relationship between the impact of the new development process on SW generation and the waste on the land and water. As shown in table 2, the results reveals that there is a significant relationship between the two variables.

Chart 3: The Impact of the New Development Process on SW Generation and the Waste on the Land and Water





Source: Research Statistic

Table 3: New Development Impact on SW Generation, the Waste on the Land & Water

	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	2.402ª	2	.301
Likelihood Ratio	2.381	2	.304
Linear-by-Linear Association	.392	1	.531
N of Valid Cases	69		

Chi-Square Tests with waste on the land

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.35.

Chi-Square	Tests	with	waste	on	the	water
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	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	1.345ª	2	.510
Likelihood Ratio	1.325	2	.516
Linear-by-Linear Association	.193	1	.660
N of Valid Cases	69		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.59.

Source: Research Statistics

Research findings further reveal that there is a gap in environmental coverage in the waste management law. The community is not well aware about the existing laws and regulations. The need for regulation and policies regarding SWM is a prevalent concern of community leaders and the council members. In this regard, the development practitioners and policy makers should focus on improving development plans and implementing Sustainable Development Policies to mitigate the negative impacts of development processes on sound environment and Sustainable Development. Reducing the gap

in environmental coverage of waste management laws and adopting new Laws and regulations to improve effective and efficient SWM process is suggested.

Community participation in development processes in the region is essential for achieving sustainability for future generations. Increasing communities' knowledge and education about Sustainable Development, Sound Environmental Development and possible impacts of environmental pollution and degradation on SD/SED is important. However, the important issue here is that the community members are not aware of 'Sustainable Development' or 'the Impact of Solid Waste Management on Sustainable Development.' Most of the people in the study area including development agents and government officials are also not aware of sustainable development concepts. 75% of households and 80% of business places have not heard about sustainable development. Only 25% of households and 20% of business places are aware of SD.

Awareness campaigning, educational programmes and sharing information about sound environmental SWM processes and sustainable development are suggested as information and education may encourage the community to act more properly.

Moreover, the development authorities should have more interaction with the local governments as the development accelerates the SW generation. The development authorities have the responsibility to interact with the responsible persons for SWM and develop strategies for better SWM processes with the development policy. Finally, it is

important that the responsible persons for SWM in HMC should become involved in the process effectively and efficiently. Especially the political bodies in HMC and managerial persons should be involved in the activities more actively in order to carry out a better SWM in the study area.

CONCLUSION AND RECOMMENDATIONS

The study has investigated the central importance of SWM for Sustainable Development in Hambantota Municipal Council. The result supports the idea that lack of proper SWM process has significant impact on environment and Sound Environmental Development. One of the major findings to emerge from this study is that lack of proper SWM process which has increased illegal waste dumping and open dumping. Research also identifies lack of education, information and awareness of citizens and municipal leaders on the impacts of waste on environment and SED. Lack of synergy between members of the local authorities and civil society (local community, Community organizations, NGOs and other organizations) was also significant in Hambantota context.

Although the current study is based on a small sample of participants, the findings suggest that SWM practices must be improved by using the Integrated Solid Waste Management process with waste separation from the domestic level, more efficient waste collection systems and sustainable recovery and disposal practices. Considering the nature and

components of generated waste; the reuse, recycling and composting processes would be more suitable to address the waste management challenge in Hambantota. Public education, awareness and cooperation between authorities and community should also be improved.

Since the development processes have accelerated the generation of SW in the Hambantota area, it is necessary to implicate SWM policies into development projects, and implement them before, during and after the projects towards sustainable development and/or Sound Environmental Development. Generally, the study contributes to knowledge by determining the importance of SWM for SED/SD. Therefore, future research should be focused on the investigation of the importance of proper SWM process and its impact on sustainable development process.

REFERENCES

- Adams, W. M., (2009). Green Development: Environment and Sustainability in a Developing World, 3rd Ed, New York: Routledge Publication
- Ayres, R., (2007). On the practical limits to substitution. Ecological Economics, vol. 61, No. 1.
- Carter. Neil. (2001). *The Politics of the Environment: Ideas, Activism, Policy,* Cambridge: Cambridge University Press
- CEA (2005).*Technical guidelines on solid waste management in Sri* Lanka. <u>http://www.cea.lk/pdf/Solod%20Waste%20Management</u> <u>%20Guidlines.pdf</u> [Accessed on 2013/10/20]
- Chandrappa, R. and Das, D.B., (2012). Solid wastes management principles and practice, New York: Springer Publication

- Clini et al., (2010).Sustainable development and environmental management: experiences and case studies, New York: Springer publication
- Coward, A.G., (1995). Population consumption and the environment: Religious and secular responses. New York: Suny press
- Dalal-Clayton, D.D.B., Bass, S., (2002). Sustainable development strategies: A resource book. London, Earthscan Publication
- Letder, T.M., Vallero, D.A., (2011). *Waste; A handbook for management*. Amsterdam: Academic press
- Malik, Abdul et al (2011).*Environmental protection strategies: an overview*. In Malik, Abdul and Grohmann, Elisabeth (Ed), environmental protection strategies for sustainable development New York: Springer Publication
- McDougall, et al., (2001). *Integrated solid waste management: a life cycle inventory*, Oxford: Blackwell
- Park,C. Chris., (2001). *The environment: principals and applications*. Psychology press
- Portas .P. (2003).*From makers to breakers: a new dimension in worldwide waste management*. In, Dhir, K.R. et al, ed. Sustainable waste management, Thomas Telford publication
- Repetto, Robert C., (1986).World enough and Time: Successful Strategies for Resource Management. New Haven: Yale University Press
- Ritzre.G. Ryan, J.M., (2010).*The concise encyclopedia of sociology*. New Jersey : Jhon Wiley and sons
- Schübeler, P., (1996). Conceptual Framework for Municipal Solid Waste Management in Low-Income Countries, World Bank.http://www.worldbank.org/urban/solid_wm/erm/CW G%20folder/conceptualframework.pdf [accessed on 2013/09/25]

- UN Habitat (2010). Solid waste management on the world cities: water and sanitation on the world cities. London, Earthscan publication
- UNEP (2005). Solid Waste Management, http://www.unep.org/ietc/Portals/136/SWM-Vol1-Part1-Chapters1to3.pdf [Accessed 2013/03/12]
- UNEP (2009), Developing Integrated Solid Waste Management Plan: Training Manual, VO 4: ISWM Plan
- UNEP (2013). Embedding the Environment in Sustainable Development, Goalshttp://www.unep.org/pdf/embeddingenvironments-in-SDGs-v2.pdf [Accessed on 2013/11/18]
- Wanasundara, N.P., (2002). *Culture of the world*: Sri Lanka. : New York: Marshall Cavendish

Wickramesinghe, R.H., (1990). *Pollution in Sri Lanka* .NARESA: Colombo http://dl.nsf.ac.lk/bitstream/1/5584/1/VIDU%2012_1_1.pd f [Accessed on 2012/02/30]