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**Development of an environmental education programme for
waste management with local communities in Sabah, Malaysia**

A thesis
submitted in fulfilment
of the requirements for the degree
of
Doctor of Philosophy in Education
at
The University of Waikato
by
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THE UNIVERSITY OF
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Abstract

Environmental education can play a major role in achieving sustainability. In the context of this research, environmental education is defined as a process to impart and instil knowledge, skills, attitudes, motivations and commitment among the population to work towards environmental solutions, problem prevention and to live sustainably. This research focussed on non-formal environmental education with adults in communities in Sabah, Malaysia.

In Sabah, solid waste is a significant problem, and oil palm plantations are one of the main agricultural activities that produce solid agricultural waste or by-products in rural areas. This research focussed on co-constructing an environmental education programme for waste management with villagers, including the independent oil palm smallholders, in local communities in Beaufort, Sabah.

This research has elements of both interpretivism and a critical theory approach. It has elements of interpretivism because of the interaction with the local communities to obtain their views and perceptions on waste management practices in their own areas. It was also partially aligned with the critical theory paradigm because it sought to create positive changes among the communities in terms of waste management practices by providing an avenue for discussions, creating empowerment and collaboration.

The theoretical principles of community environmental education drawn from the areas of community education and environmental education guided the framing of the research design. Data were collected in two stages. Stage one involved interviews with government officers, a community survey and a focus workshop with two rural communities. This data combined with the theoretical principles of community environmental education guided a co-construction of an educational programme on waste management for the two communities. Stage two involved the programme implementation, and an evaluation process which included a survey, interviews and observation. All closed and scale questions in both surveys were analysed quantitatively. The open-ended data gathered from the

questionnaires, interviews, focus workshop and observation were analysed using thematic analysis.

This study found that the communities had a genuine concern for the environment and a desire to improve their waste management practices. However, they did not seem to know how to do so, and their knowledge of environmental and waste management issues seemed low. An attitude-behaviour gap in which favourable environmental attitudes were not matched by environmentally-friendly behaviours was also observed. The community members were unaware or uncertain about guidelines that might guide their waste management. It was also reported there was a lack of environmentally-friendly options such as waste disposal and recovery facilities and services, as well as alternatives for proper disposal in their villages.

Change in attitudes and behaviour among the community seemed slow to progress, and it was found that changes in waste management practices at a personal level were easier to effect, rather than as a community. The findings of this research indicated a tendency towards pro-environmental behaviour motivated by goals other than environmental; in this case, monetary gains or incentives.

The evidence in this research showed that it was possible to co-construct an environmental education programme with local communities. The programme was co-constructed and implemented based on the literature and data on the perceptions, needs and current situation of community waste management through the perspectives of the government officers and local communities. There was clear evidence that the programme made a difference in a short-term; however, long-term outcomes of the programme were not apparent.

This study has shown that a model developed from theoretical principles of community environmental education provided useful guidance in practice but that implementation of the model in local contexts has many constraints that need to be considered.

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Table of Contents

Abstract	iii
Acknowledgements	v
Table of Contents	vii
List of Figures	xiii
List of Tables	xv
Chapter One: Introduction	1
1.1 Chapter Overview	1
1.2 Research Rationale.....	1
1.2.1 Background to the study.....	3
1.3 Research Questions	4
1.4 The Context of the Inquiry	5
1.5 Significance of the Research.....	11
1.6 Overview of the Thesis	12
Chapter Two: Environmental Education with Local Communities	15
2.1 Chapter Overview	15
2.2 The Origin and Development of Environmental Education	15
2.3 Definition of Environmental Education	22
2.4 Forms of Environmental Education and their Characteristics	25
2.4.1 Formal environmental education.....	26
2.4.1.1 The Malaysian context of formal environmental education	30
2.4.2 Informal environmental education	32
2.4.3 Non-formal environmental education	33
2.4.3.1 Adult education	38
2.4.4 Summary of forms of environmental education.....	43
2.5 Community and the Environment	45
2.5.1 Community development	45
2.5.2 Community environmental education	48
2.5.3 Community environmental education studies.....	51
2.5.4 Summary of community and environment.....	54
2.6 Community and Environmental Psychology	55
2.6.1 Attitudes and behavioural change	58
2.6.2 Pro-environmental behaviour.....	62
2.6.3 Summary of community and environmental psychology	64
2.7 Chapter Summary.....	64
2.8 Theoretical Framework of Community Environmental Education.....	66
Chapter Three: Waste Management in Local Communities	71
3.1 Chapter Overview	71

3.2	Background of Waste Management	71
3.2.1	Components of waste management	73
3.2.2	Summary of background of waste management.....	76
3.3	Waste Management Issues.....	77
3.3.1	Environmental and public health.....	77
3.3.1.1	Water pollution.....	78
3.3.1.2	Marine pollution	79
3.3.1.3	Air pollution	79
3.3.2	Poor aesthetics and odour problem.....	80
3.4	Waste Management Policies, Regulations and Practices	81
3.4.1	Waste management policies and practices in Malaysia.....	81
3.4.2	Waste management policies and practices in New Zealand.....	85
3.5	Agricultural Waste Management.....	87
3.5.1	The oil palm industry.....	87
3.6	Waste Management in Residential Areas.....	88
3.6.1	Summary of waste management in residential areas.....	92
3.7	Chapter Summary	93
3.8	Theoretical Framework of Research.....	94
	Chapter Four: Methodology	97
4.1	Chapter Overview	97
4.2	Research Questions	97
4.3	Methodology in this Research	98
4.3.1	Paradigms	98
4.3.1.1	Positivism	99
4.3.1.2	Interpretivism	100
4.3.1.3	Critical Theory Paradigm	101
4.3.2	Methodology chosen for this research.....	102
4.4	Community Research	103
4.5	Research Design	107
4.5.1	Methods	108
4.5.1.1	Surveys using questionnaires	109
4.5.1.2	Interviews	111
4.5.1.3	Focus Workshop	112
4.5.1.4	Observations	113
4.5.2	Data collection process.....	113
4.5.2.1	Background of the research area	113
4.5.2.2	Recruitment of participants	117
4.5.2.3	Stages of data collection.....	119

4.6	Data Analysis	123
4.7	Limitations	126
4.8	Data Validity and Trustworthiness.....	128
4.8.1	Data validity and trustworthiness approaches in the research	132
4.9	Research Ethics	133
4.9.1	Background of research ethics	133
4.9.2	Ethical considerations in research.....	134
4.10	Chapter Summary.....	135
	Chapter Five: Stage One Interview, Community Survey and Focus Workshop Data	139
5.1	Chapter Overview	139
5.2	Demographic Background	139
5.3	Perceptions of Waste.....	141
5.3.1	Environmental perceptions.....	141
5.3.1.1	Importance of the environment and cleanliness.....	141
5.3.1.2	Biodiversity, sustainable development and the environment.....	144
5.3.2	Waste management perceptions.....	145
5.3.2.1	Importance of waste management.....	145
5.3.3	Plantation waste	155
5.3.4	Summary of perceptions of waste.....	161
5.4	Environmental Policies	162
5.4.1	Waste management regulations.....	162
5.4.2	Enforcement & co-operation.....	168
5.4.3	Summary of environmental policies	169
5.5	Education and Awareness	170
5.5.1	Education.....	170
5.5.1.1	Importance of awareness, education and responsibility.....	171
5.5.1.2	Formal, non-formal and informal education	173
5.5.2	Programmes	174
5.5.2.1	Existing community programmes	174
5.5.2.2	Reinforce efforts.....	176
5.5.2.3	Participation	177
5.5.3	Summary of education and awareness	178
5.6	Waste Behaviours.....	179
5.6.1	Attitudes and behaviours.....	179
5.6.2	Lack of environmentally friendly options.....	181
5.6.2.1	Provision of proper waste management services	181
5.6.2.2	Handling waste in plantations	183

5.6.2.3	Traditional knowledge vs traditional methods	184
5.6.3	Summary of waste behaviours.....	185
5.7	Chapter Summary	186
	Chapter Six: Programme Development and Implementation.....	189
6.1	Chapter Overview	189
6.2	Framing the Programme	189
6.3	Key Ideas	193
6.3.1	Acknowledging the villagers' ideas	195
6.3.2	Theme: Healthy Environment, Healthy People, Healthy Future.....	198
6.3.3	Cleanliness and importance of waste management	200
6.3.4	Lack of waste collection services and awareness of guidelines	209
6.3.5	Connecting awareness, attitude and responsibility to act	210
6.3.6	Barriers to improve waste management	212
6.4	Implementing the Programme	212
6.4.1	The Programme structure	213
6.4.2	Programme delivery	214
6.5	Challenges in the Programme Implementation	219
6.6	Chapter Summary	220
	Chapter Seven : Stage Two Evaluation Data.....	223
7.1	Chapter Overview	223
7.2	Demographic Background.....	223
7.3	Perceptions about Waste Management.....	226
7.4	Education and Awareness.....	227
7.4.1	Importance of the environmental education programme and waste management issues	227
7.4.2	Environmental guidance and information-sharing	232
7.4.3	Summary of education and awareness.....	235
7.5	Waste Behaviours	236
7.5.1	Attitudes and behaviours	236
7.5.2	Limited waste management options	240
7.5.3	Summary of waste behaviours.....	243
7.6	Co-operation and Support.....	244
7.6.1	Importance of co-operation and family support	244
7.6.2	Formation of committee	246
7.6.3	Summary of co-operation and support	247
7.7	The Challenges of Change.....	247
7.7.1	Change Takes Time	247
7.7.2	Priority for change	249

7.7.3	Positive change in waste practices	250
7.7.4	Summary of the challenges of change	251
7.8	Chapter Summary.....	252
Chapter Eight: Discussion and Conclusions.....		255
8.1	Chapter Overview	255
8.2	Discussion	255
8.2.1	What are the current policies in place for community waste management?	256
8.2.1.1	Community waste management policy	256
8.2.1.2	Waste management policy in oil palm smallholder plantations 258	
8.2.2	What are the perceptions of local communities about the policies, processes and practices of waste management in their area?.....	259
8.2.2.1	Perceptions on policy	260
8.2.2.2	Perceptions on processes and practices by local communities 262	
8.2.3	What education programme can be designed and developed for sustainable waste management in local communities?	266
8.2.3.1	Role of education	266
8.2.3.2	Knowledge development.....	269
8.2.3.3	Participation	269
8.2.3.4	Co-construction process	270
8.2.4	How do local communities respond to the implementation of a co-constructed waste education programme?	273
8.2.4.1	Usefulness of the programme.....	273
8.2.4.2	Inconsistency of ideas	275
8.2.4.3	Creating a social movement.....	275
8.2.4.4	Lack of leadership.....	276
8.2.4.5	Lack of services.....	277
8.2.4.6	Challenges of change	278
8.2.5	The relevance of the community environmental education theoretical principles	280
8.2.6	Community environmental education model.....	286
8.2.6.1	Getting to know the community.....	287
8.2.6.2	Co-construction process	288
8.2.6.3	Programme planning and development.....	289
8.2.6.4	Conduct post-programme evaluation	289
8.2.6.5	Collaboration and leadership	289
8.2.6.6	Lifelong learning and learner-centredness	290
8.2.6.7	Empowered and self-sustaining community	290

8.3	Conclusions	291
8.4	Implications and Recommendations.....	293
8.5	Suggestions for Further Research.....	295
	Appendix A: Ethical approval.....	299
	Appendix B: Ethical approval for amendment.....	300
	Appendix C: Community survey (Stage one)	301
	Appendix D: Interview questions (Stage one).....	312
	Appendix E: Focus workshop programme (Stage one)	313
	Appendix F: Evaluation survey (Stage two).....	314
	Appendix G: Post-programme interview questions (November 2013).....	318
	Appendix H: Post-programme interview questions (March/April 2014).....	319
	Appendix I: Post-programme interview questions (November 2014)	320
	References.....	321

List of Figures

Figure 1.1 Rubbish strewn amongst rocks along Padas River	8
Figure 2.1 Theoretical framework of community environmental education	67
Figure 3.1 Overall model of environmental education on waste management practices with local communities	95
Figure 4.1 The research design	107
Figure 4.2 Map of Sabah	116
Figure 4.3 The locations of Lawa and Lupak in Beaufort, Sabah.....	116
Figure 5.1 Age group of respondents in community survey (June 2013).....	140
Figure 6.1 Introductory slides during the workshop with villagers	196
Figure 6.2 Types of waste at home as reported by the respondents.....	197
Figure 6.3 Types of waste in plantations as reported by the smallholders ..	197
Figure 6.4 The theme of environmental education programme in November 2013	198
Figure 6.5 Holistic roles of environment and maintaining biodiversity	199
Figure 6.6 Importance of ecosystem services	200
Figure 6.7 Impacts of waste on environment and health: Open burning of waste	202
Figure 6.8 Impacts of waste on environment and health : Breathing problems	203
Figure 6.9 Impacts of waste on environment and health : Skin problems.....	203
Figure 6.10 Impacts of waste on environment and health : Dioxin sources.....	204
Figure 6.11 Impacts of waste on environment and health : Infectious diseases.....	204
Figure 6.12 Impacts of waste on environment and health : Malaria.....	205
Figure 6.13 Impacts of waste on environment and health : Rivers and oceans.....	206
Figure 6.14 Components of waste management	207
Figure 6.15 Components of waste management: Waste minimisation.....	208
Figure 6.16 Components of waste management: Waste recovery	208
Figure 6.17 Components of waste management : Waste disposal.....	209
Figure 6.18 Current initiatives in waste education.....	211
Figure 6.19 Emphasis on community empowerment.....	212
Figure 6.20 The audience during programme implementation in Lawa Village (12 November 2013).....	214
Figure 6.21 The English version of the poster	218
Figure 7.1 Age group of respondents in evaluation survey (November 2013)	224
Figure 8.1 Overall model of environmental education on waste management practices with local communities	281
Figure 8.2 The community environmental education model derived from the research.....	287

List of Tables

Table 4.1 Data collection process and programme implementation	117
Table 4.2 List of government officers interviewed in June 2013	120
Table 4.3 List of respondents during the three phases of interviews: Two weeks, four months and one year post-programme	123
Table 5.1 List of government officers interviewed pre-programme	140
Table 5.2 Villagers' responses to a list of statements regarding the environment and waste and general waste management in the village	143
Table 5.3 Villagers' responses to a list of statements regarding own waste management practices	143
Table 5.4 Villagers' responses to a list of statements regarding general waste management in the village	147
Table 5.5 Villagers' responses to a list of statements regarding the environment and waste.....	150
Table 5.6 Villagers' responses to a list of statements regarding own waste management practices	151
Table 5.7 Villagers' responses to a list of statements regarding the environment and waste.....	153
Table 5.8 Villagers' responses to a list of statements regarding own waste management practices	154
Table 5.9 Villagers' responses to a list of statements regarding general waste management in the village	156
Table 5.10 Oil palm smallholders' responses to a list of statements regarding general waste management in oil palm plantations ...	158
Table 5.11 Oil palm smallholders' responses to a list of statements regarding waste management practices in own plantations	159
Table 5.12 Oil palm smallholders' responses to a list of statements regarding general waste management in oil palm plantations ...	166
Table 5.13 Oil palm smallholders' responses to a list of statements regarding waste management practices in own plantations	166
Table 5.14 Villagers' responses to a list of statements regarding the environment and waste.....	178
Table 5.15 Villagers' responses to a list of statements regarding the environment and waste.....	181
Table 6.1 The key ideas and programme development process.....	194
Table 6.2 Programme schedule with the theme "Healthy Environment, Healthy People, Healthy Future"	213
Table 7.1 List of respondents during the three phases of interviews: Two weeks, four months and one year post-programme	225
Table 7.2 Villagers' and smallholders' responses to a list of statements regarding their experience after the implementation of the environmental education programme.....	230
Table 7.3 Villagers' and smallholders' responses to a list of statements regarding their experience after the implementation of the environmental education programme.....	239

Chapter One: Introduction

1.1 Chapter Overview

This chapter gives an introduction to this research that began in May 2012. The research was a project to develop an environmental education programme for waste management practices with the local communities in Beaufort, Sabah, Malaysia.

This chapter discusses the research rationale, background to the study, research questions, the context of inquiry, significance of the research and overview of the thesis contents.

1.2 Research Rationale

Sustainability is the overarching focus of this research. Environmental education has a major role in achieving sustainability. Sustainability has different meanings for people and individuals' understanding and definitions depend on their local, social, physical, environmental and economic conditions. Sustainability is a term commonly used to express the need to live in the present in ways that do not jeopardise the opportunities for future generations (Senge, Smith, Kruschwitz, Laur, & Schley, 2008, p. 9). Sumner (2003, p. 42) stated that although the term sustainability is overused, it "still resonates deeply with many people" and it "projects the hopes and fears that humans carry about their present life and about the future world of their children and grandchildren". Adams (2006, p. 13) stated that "sustainability is the path that allows humanity as a whole to maintain and extend quality of life through diversity of life". Adams added, however, that there was a paradox whereby the twenty-first century was indicated as the era of sustainability while on the other hand, there was also evidence of the global human enterprise becoming less sustainable.

The environmental challenges – locally and globally - have dated back to the times of Industrial Revolution (Senge et al., 2008, p. 14). These authors (2008, p. 10) argued that 'to shape a sustainable future, we will need to work together differently than we have in the past'. Wals and Noorduyn (2010, p. 59) further

argued that present systems and lifestyles are significantly unsustainable and that there is a need to engage people to creatively be more sustainable.

As there are concerns about how the world's population of seven billion can live together sustainably, efforts and attempts towards doing so, as well as fostering collaboration across all boundaries, are vital (Senge et al., 2008, p. 11). Environmental and social problems exist in many parts of the world, which can be seen as symptoms of un-sustainability. Osbaldiston and Schott (2012, p. 258) indicated that these problems included "climate change; armed conflicts over resources, particularly oil; and pollution of the air, water, and soil" and that the "ultimate impacts of these problems are drastic changes to quality and quantity of all life, including human life". On one scale, government policies, international agreements, educational programmes and technological innovations are among the possible ways to tackle these problems (Osbaldiston & Schott, 2012, p. 258). At another level, the process of sustainability can be achieved by citizens' acts of stewardship towards the environment. As Osbaldiston and Schott (2012, p. 258) noted, "all people consume materials and energy in their daily lives, and as such, each person can choose to adopt behaviours that are comparatively better for the environment".

Environmental education is one of the means which can help people choose to adopt environmentally-friendly behaviours, and it enables participation and learning of various age groups – in either formal, non-formal or informal ways. Environmental educators have a vision for a better and more equitable world whereby citizens, industry, government and business practise environmental stewardship and are a part of community based decision-making (McKeown & Hopkins, 2005, p. 221). The *Belgrade Charter* (and other subsequent documents) highlighted that the major target groups of environmental education were the formal education sector (e.g. pre-school, primary, secondary and higher education students as well as teachers and environmental professionals in training and retraining) and the non-formal education sector (e.g. youth and adults, individually or collectively from all segments of the population) (UNESCO, 1975b). In the context of this research, the emphasis was on non-formal education focussing on community environmental education.

1.2.1 Background to the study

My interest in environmental issues began when I was deciding my undergraduate course. The environment was a relatively new field of study in Malaysia at that time compared to the more established fields such as education, medical sciences, law or agriculture. At the time I was deciding my career path, environmental issues were gaining more public attention and were also emerging in the media. The initial exposure to environmental issues inspired me to explore more and to understand why environmental protection was vital locally and globally. During a three-year undergraduate course in environmental sciences from 1994 until 1997 at the University of East Anglia, United Kingdom, I was exposed to the broad spectrum and interdisciplinary nature of the field, studying subjects such as public health, environmental epidemiology, meteorology, risk management, surveying, environmental pollution and toxicology, and development studies. With such an interdisciplinary background, I became interested in many areas of the environment. It was when I began working at the Environment Protection Department Sabah, Malaysia in 2000 that my interest in environmental education developed. It was a new state department at that time, being established only in 1998, and it was still in a process of developing and improving its various roles in project assessment and law enforcement, as well as environmental education and awareness, while building its staff capacity and skills.

When I was assigned to the awareness section (as it was named at that time), I realised that environmental education was the area in which I wanted to focus. Amongst the resources produced by the department, the team developed exhibition posters, flyers, and presentations about various environmental issues such as waste management, climate change and biodiversity, for target groups such as school children, university students, government staff and local communities. Numerous activities and programmes to create awareness about the importance of the environment were carried out.

My colleagues and I felt at the time that what would have improved the efforts was conducting a series of post-programme evaluations to gauge any change after implementation. However, this could not be done regularly due to the lack of staff knowledge and time to conduct and analyse the evaluation data. Presentations of talks on environmental issues for specific audiences in environmental education

programmes were pre-packaged or prepared beforehand based on what the team thought and assumed was important for them to know and understand.

While this was understandable considering the limitations faced by the team, we felt there could be a better way to convey environmental messages to people through non-formal environmental education. Therefore, in this PhD study, I have sought to explore this by developing an environmental education programme together with local communities focussing on waste management, which is a serious environmental issue in Malaysia. With more than 10 years of experience working with various communities and students in Sabah, I have some experience of the local cultures of various ethnic groups and the ways of working with local communities. These experiences have helped me to understand how to work with the communities.

In relation to the concepts of environmental education, I was initially exposed to the early theories and therefore, my foundation was rooted in the simplistic belief that developing awareness could lead to positive attitudes, which in turn could result in favourable actions towards the environment. However, experiencing the complications of this supposed linear relationship while conducting environmental education throughout the years had been revealing of an attitude-behaviour gap. This study gave me the opportunity to explore other studies and concepts related to this gap.

1.3 Research Questions

The objective of this research was to develop an environmental education programme together with local communities and the independent oil palm smallholders in Beaufort, Sabah, Malaysia focussing on sustainable waste management practices. The main research question, and its subsidiary questions, were therefore, as follows:

How can an environmental education programme on waste management practices be developed with local communities in Sabah?

1. What are the current policies in place for community waste management?

2. What are the perceptions of local communities about the policies, processes and practices of waste management in their area?
3. What education programme can be designed and developed for sustainable waste management in local communities?
4. How do local communities respond to the implementation of a co-constructed waste education programme?

These research questions were explored based on the data collected and findings derived both from a literature review and the data.

1.4 The Context of the Inquiry

In the Malaysian context, the first principle in the Malaysian National Policy on the Environment is stewardship of the environment, which states that people should exercise respect and care for the environment in accordance with the highest moral and ethical standards (Ministry of Science Technology and the Environment Malaysia, 2002). In line with the national policy, the Sabah Environmental Education Policy published in 2009 also reiterates the importance of instilling environmental stewardship and sustainable lifestyle practices among the people in Sabah (Ministry of Tourism, Culture and Environment Sabah, 2009). In the 10th Malaysia Plan covering the period of 2011 until 2015, the Malaysian Government introduced the AFFIRM framework – Awareness, Faculty, Finance, Infrastructure, Research and Marketing – to develop a complete system for environmental sustainability (The Economic Planning Unit, Prime Minister’s Department, 2010, p. 299). One of the strategies is to continuously increase the level of awareness of all Malaysians that environmental sustainability is a shared responsibility, and to enhance co-operative efforts with the private sector and civil society.

Environmental stewardship is defined in the USA as the responsibility for environmental quality shared by those whose actions affect the environment (EPA Innovation Action Council, 2005). The choices that individuals, communities, government and private sectors make reflect their sense of responsibility, and were shaped by environmental, social and economic interests (EPA Innovation Action Council, 2005). People’s actions could affect the quality

of the environment. The United States Environmental Protection Agency's Science Advisory Board (1995, p. 9) stated that "in the long run, environmental quality is not determined solely by actions of governments, regulated industries, or non-governmental organisations. It is largely a function of the decisions and behaviour of individuals, families, businesses, and communities everywhere." The acts of environmental stewardship could contribute to the aspiration for, and path towards achieving, sustainability.

Managing human interaction with the environment is a challenging task when there is pressure for development due to population growth, economic gains and demands for better infrastructure and amenities services. Díez and Dwivedi (2008, p. 5) observed that "developing nations suffer from the accelerating rate of environmental deterioration because either their laws and institutions remain largely diffuse or sectoral, or their management tools and regulatory mechanisms remain ineffective". There is indeed a significant struggle to deal with escalating environmental issues in developing countries, as highlighted by examples in India and Malaysia. Dwivedi (2008, p. 134) stated that in India "the mounting pressures of population, expanding urbanisation, and growing poverty have led to the ecologically unsustainable exploitation of natural resources that is threatening the fragile balance between ecology and humanity". This author further added that India faces various environmental challenges such as diminishing forest cover due to over-grazing and tree-harvesting, pollution from large industries and the uncontrolled use of pesticides (Dwivedi, 2008, p. 115–116). In the case of Malaysia, Salih and Yahya (2009, p. 215) stated that "the high rate of economic development experienced in the recent decades, particularly in the 50 years since independence, has drawn heavily on Malaysia's renewable and non-renewable resources." The rapid developments had brought about an array of environmental challenges such as pollution, solid waste disposal, deforestation and reduction in air and water qualities (Platje & Slodczyk, 2009, p. 215).

Due to the increasing challenges and the need to control environmental pollution in Malaysia, in 1975 the federal Department of Environment (then known as Environment Division) was established based on the Environmental Quality Act, which was enacted in March 1974 and came into force in April 1975 (Department of Environment Malaysia, n.d.). The establishment of an environmental agency in

Malaysia indicated the importance of managing environmental problems throughout the country. The department has core services that are consistent with the objectives of the Act which included environmental education and awareness (Department of Environment Malaysia, n.d.). As mentioned earlier, the Environment Protection Department Sabah is a state environmental agency. It is guided by the Environment Protection Enactment 2002, and has a role in environmental education and awareness. In the context of this research, the importance of environmental education and awareness is given emphasis through the regulations such as the Environmental Quality Act 1974 and the Environment Protection Enactment 2002, and is being implemented through the roles and core duties of the environmental agencies.

This research focussed on the state of Sabah which is the second largest state in Malaysia. Sabah lies on the northern part of the island of Borneo, and covers an area that spans 72,500 sq. kilometres, and is surrounded by South China Sea in the West, the Sulu Sea in the Northeast and Celebes Sea in the East (Sabah State Government, 2015).

The present environmental issues in Sabah are related to soil erosion, water quality, habitat degradation and threats to biodiversity, pressure on coastal and marine resources, solid waste disposal, air quality, flooding, forest fires and noise pollution (Jain, 2001). Solid waste disposal is one of the major environmental problems in both the cities and rural areas of the state, and waterways are a main target of indiscriminant dumping of waste. Collection and disposal of solid waste is a major problem due to lack of manpower, budget constraints, collection limited to rated areas only, public apathy and too many departments involved in solid waste management (Chemsain Konsultant, 2007a, p. 9). Rated areas refer to “where assessment rates are charged by the local authorities and only the rated properties are provided with waste collection services” (Chemsain Konsultant, 2007b, pp. 1–2). Based on a report published in 2007, one million tonnes of garbage per year was generated by more than three million people in Sabah, most of which was organic and recyclable (Chemsain Konsultant, 2007c, p. 1). The population of Sabah in 2010 was about 3.26 million, and that has increased to 3.49 million in 2013 (Department of Statistics, Malaysia, n.d.). No up-to-date figures on waste generation could be obtained at the time of writing. However, the

increasing number of people in Sabah could indicate more demand for efficient waste management services. The media has been reporting news highlighting the recurrent waste issues in various areas in Sabah. For example, in December 2014, it was reported that one of the villages in Sabah had experienced a serious problem in which rubbish was “dumped on the road resulting in it becoming impassable to vehicles” (Borneo Post, 2014). In another news item, communities from an island nearby Kota Kinabalu denied that they were responsible “for the perennial rubbish problem there” and they blamed visitors and mainland dwellers for the problem (Daily Express, 2014b). The same newspaper item reported that a campaign called “My Rubbish, My Responsibility” was carried out on the island; however, “heaps of rubbish were found despite a massive clean-up exercise a day before the campaign's launching, which was in conjunction with the Environment Week from October 21 to 27” (Daily Express, 2014b). Figure 1.1 shows rubbish strewn along Padas River in June 2013.



Figure 1.1 Rubbish strewn amongst rocks along Padas River

Agriculture is one of the main sources of economy in Sabah, besides tourism and manufacturing (Sabah State Government, 2015). In terms of agricultural waste, the oil palm industry is a major contributor in Malaysia (Ahmad, 2001). Waste or

by-products generated are dead fronds, empty fruit bunches, palm oil mill effluent (POME), palm kernel and fertiliser containers. According to a report by the Malaysian Palm Oil Board published in January 2015, “Sabah is still the largest oil palm planted state [in Malaysia], with 1.51 million hectares or 28% of total oil palm planted area, followed by Sarawak with 1.26 million hectares or 23%, while Peninsular Malaysia accounted for 2.62 million hectares or 49%” (Malaysian Palm Oil Board (MPOB), 2015, p. 1). Peninsular Malaysia consists of 11 states and two federal territories. The 2014 data showed that in Malaysia, independent smallholders account for 15% of the total oil palm planted area, private estates 62% and other state or federal schemes 23% (Malaysian Palm Oil Board (MPOB), 2014).

At present, in Malaysia, there are two main types of arrangements for smallholders, namely independent smallholders and scheme smallholders. In a Malaysian Sustainable Palm Oil (MSPO) document, independent smallholders are defined as “individual farmers who own or lease less than 40 hectares of an oil palm farm and manage the farm themselves. Independent smallholders or leases may employ workers to carry out daily work at their farms” (Department of Standards Malaysia, 2013, p. 2). The Roundtable on Sustainable Palm Oil (RSPO) defined independent smallholders as having “freedom to choose how to use their lands, which crops to plant and how to manage them; being self-organised, self-managed and self-financed” and may “receive support or extension services from government agencies” (RSPO, 2010, p. 3). On the other hand, scheme smallholders “are structurally bound by contract, by a credit agreement or by planning to a particular mill” and are “often not free to choose which crop they develop, are supervised in their planting and crop management techniques, and are often organised, supervised or directly managed by the managers of the mill, estate or scheme to which they are structurally linked” (RSPO, 2010, p. 3). The RSPO is a not-for-profit organisation consisting of stakeholders of the palm oil industry, namely the “oil palm producers, processors or traders, consumer goods manufacturers, retailers, banks/investors, and environmental and social non-governmental organisations (NGOs), to develop and implement global standards for sustainable palm oil” (Roundtable on Sustainable Palm Oil (RSPO), n.d.-a). Smallholders can become members of RSPO if they form a group which is led by a group manager (Roundtable on Sustainable Palm Oil (RSPO), n.d.-b). In the

context of this research, independent oil palm smallholders are those who own, farm and manage their oil palm plantations of less than 40 hectares, and they often reside in villages without waste collection services and facilities. The smallholders, as a significant part of these local communities, were a focus of this study, together with other villagers, as little was known about waste management practices in these plantations.

Solid waste is a significant problem in Sabah and oil palm plantations are one of the main agricultural activities that produce agricultural waste or by-products in rural areas. This research focussed on developing an environmental education programme on sustainable waste management practices with villagers, including the independent oil palm smallholders, in local communities in Beaufort, Sabah. Beaufort is 90 kilometres south of Kota Kinabalu, the capital city of Sabah. The economic activity of the people in the study areas of Lawa, Lupak and nearby villages is mainly related to agriculture (oil palm plantations and rubber) though some work in government or in the private sector. Villagers have electricity and running water facilities in their homes. Most people live in extended families in densely populated villages with their lands around them. However, some own land further away than from where they live. Most of the oil palm smallholders in Lawa and Lupak sell their oil palm fruit bunches to the mills through middle persons or fruit dealers. The Malaysian Palm Oil Board, a government agency, provides assistance in terms of guidance, training and one-off seed money to develop the smallholder's plantations.

Data on current policies, processes and practices of waste management from the perspectives of government officers and villagers collected through interviews and survey, as well as from a focus workshop with the local communities, were analysed and used to inform the co-construction of an environmental education programme focussing on waste management practices. The programme was then implemented among these communities and an evaluation survey and interviews with villagers were carried out.

1.5 Significance of the Research

In the context of this research, the participation of citizens or communities in improving their daily household and work practices through environmental education programmes could facilitate their capacity in managing waste in their own area, create a sense of belonging and strengthen collaboration between each other, as well as with other parties. Citizen participation is defined by Arnstein (1969, p. 216) as “citizen power”, and she further explained it as a redistribution of power to enable citizens to be included in political and economic processes (Arnstein, 1969, p. 216). Maser and Kirk (1996, p. 170) highlighted that “community development is the mechanism through which people empower themselves by increasing their ability to control their own lives in order to create a more fulfilling existence through mutual efforts to resolve shared problems”.

Community environmental education is an important part of this local community development process because people are encouraged to act as catalysts for sustainable social change at the grassroots level (Maser, 1997, p. 102). It provides avenues for possible solutions to local environmental problems such as waste management, provided there is a strong collaboration within the group as well as with relevant stakeholders. Blair (2008, p. 49) stated that “collaboration between all statutory bodies, relevant stakeholders and local communities can increase the likelihood of programme success”.

The goal of the research was to produce an environmental education programme focussing on sustainable waste management practices with villagers and independent oil palm smallholders with an emphasis on strengthening community co-operation as well as “rekindling the spirit of community” (Maser, 1997, p. 240). Ameyaw (1992, p. 267) highlighted that “the local, not the national communities, are the major vehicles through which sustainable development decisions and projects, human resource inputs, techniques, values and ideas are, or will have to be, implemented”. In choosing local communities as a focus of this research, it was hoped to contribute to the improvement of the delivery of community environmental education in Sabah. Any model for community environmental education derived from the research may help to improve the current processes of

implementation of community environmental education, both at my department and in other agencies within Sabah, across Malaysia, and in other countries.

1.6 Overview of the Thesis

This thesis is organised into a further seven chapters. Each chapter is briefly explained as follows:

Chapter Two presents the literature review that revolves around environmental education with local communities, with a particular focus on non-formal environmental education in these settings. Topics discussed are the origin and development of environmental education, definition of environmental education, the forms of environmental education and their characteristics, community and the environment, community and environmental psychology.

Chapter Three presents the second part of the literature review focussing on waste management in local communities. It discusses the background of waste management, important issues, waste management regulations and practices, agricultural waste management and waste management perceptions and practices in communities.

Chapter Four presents the methodology and methods used in this research. It begins with the research questions and a discussion of three major paradigms of research, namely positivism, interpretivism and the critical theory paradigm. The methodology chosen for the research, the background of community research, the research design that included methods and stages of data collection, data analysis, limitations and challenges encountered in the research methodology, validity and trustworthiness are also discussed, followed by the ethical considerations.

Chapter Five presents the findings from the first stage of data collection in June 2013 in Kota Kinabalu and Beaufort, Sabah, Malaysia. Topics discussed are the demographic background of respondents and the main themes of perceptions, environmental policies, education, and awareness, as well as waste behaviours. The main themes were developed during the analysis of data in which responses were coded and grouped according to the themes.

Chapter Six presents the process of developing the environmental education programme and its implementation. The development of the programme which focussed on waste management practices took place from June until October 2013. The focus workshop, held in June 2013 in Beaufort, Sabah was a platform for a discussion with the local communities towards the development of the environmental education programme. Data and findings from interviews and the community survey presented in Chapter Five were also used to inform the development of the programme.

Chapter Seven presents the findings of evaluation data collected in the second stage. The evaluation of the programme included a questionnaire and interviews with villagers carried out in November 2013, and follow-up telephone interviews from New Zealand to Malaysia in March/April 2014 and November 2014.

Chapter Eight presents the discussion and conclusions of the research, research implications, recommendations and suggestions for further research.

Chapter Two: Environmental Education with Local Communities

2.1 Chapter Overview

The literature reviewed in this chapter revolves around environmental education with local communities, with a particular focus on non-formal environmental education in these settings. In this chapter, topics discussed are the origin and development of environmental education, the definition of environmental education, the forms of environmental education and its characteristics, community and the environment, and community and environmental psychology.

2.2 The Origin and Development of Environmental Education

Early significant influences on the environmental education field date back to the eighteenth- and nineteenth-century, where thinkers, writers and educators such as Goethe, Rousseau, Humboldt, Haeckel, Froebel, Dewey and Montessori contributed to environmental thought and practice (Palmer, 1998, p. 4). However, Sir Patrick Geddes (1854-1933) was regarded by many as being the first to make important links between the qualities of the environment and education (Palmer, 1998, p. 4). Patrick Geddes was mostly known as a town planner, but had an aim to develop a better understanding of humans in their natural, built and social environments (National Library of Scotland, n.d.). Among his enduring ideas were ‘think global, act local’, and green-belt concepts for town planning (Leonard, 2007). His ideas are still relevant now through their application to numerous contexts such as the environment, education, business and town planning. For example, the concept of ‘think global, act local’ is used in environmental education programmes. Amati and Taylor (2010, p. 143) stated that “the green belt is an internationally recognisable approach to planning urban regions”.

The first recorded public professional use of the term ‘environmental education’ was at a meeting in Paris of the International Union for the Conservation of

Nature (IUCN) in 1948 (McCrea, n.d., p. 3; Palmer, 1998, p. 5). In Britain, the first recorded use of the term may be traced to a conference held in 1965 at Keele University, Staffordshire, with the purpose of investigating conservation of the countryside and its implications for education (Palmer, 1998, p. 4). In the United States, the publication of Rachel Carson's *Silent Spring* in 1962 made a significant contribution to the beginning of the environmental movement in that country and elsewhere (Heimlich, 2002, p. 1). These various events promoted the importance of nature and the overall environment and pushed an environmental agenda as one of the prevailing issues.

An early definition of environmental education was formulated and adopted during the landmark International Working Meeting on Environmental Education in the School Curriculum by IUCN/UNESCO held in 1970 at the Foresta Institute for Ocean and Mountain Studies in the United States. It was defined as “the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality” (International Union for Conservation of Nature and Natural Resources, 1970, p. 11). In this definition, the importance of the relationship between people and their surroundings was emphasised, which was of relevance to this research.

A series of events at the international level have further developed contemporary understanding of environmental education. The first major United Nations gathering, which focussed on environmental problems and their impacts, and also suggested that environmental education be used as one of the means to shift the pattern of human development to be more healthy, just and sustainable, was the Conference on the Human Environment held in Stockholm in 1972 (Clover, 2000). The Conference drew international attention by “acknowledging that protection of the environment is a major issue which affects the well-being of people and economic development throughout the world” (Government Offices of Sweden, 2012, p. 4). This event became the platform for more intergovernmental conferences such as in Belgrade (1975), Tbilisi (1977), Moscow (1987), Rio De

Janeiro (1992), Johannesburg in (2002) and again in Rio De Janeiro (2012) (Clover, 2000; Gough, 2006; United Nations, 2012) .

The Belgrade Charter – A Global Framework for Environmental Education was produced during the UNESCO/UNEP International Workshop on Environmental Education held in Belgrade, Yugoslavia in 1975 (UNESCO, 1975a, p. 1). It listed the aims, objectives, key concepts and guiding principles of environmental education (Palmer, 1998, p. 7). The goal of environmental education as outlined in the *Belgrade Charter* was “to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively towards solutions of current problems and the prevention of new ones” (UNESCO, 1975a, p. 3). The charter defined the general public as the principal audience of environmental education, reached through both formal and non-formal education sectors (UNESCO, 1975a, p. 4). Therefore the importance of the non-formal education sector had been recognised more than three decades prior to this current study and remains important today. This recognition is fundamental to this research because “youth and adults, individually or collectively, from all segments of the population” were highlighted as part of the non-formal education sector (UNESCO, 1975a, p. 4). The goal of environmental education was focussed on environmental problems, although as “citizens become increasingly aware of environmental problems, the challenge for environmental education remains to foster a sense of responsibility and environmental stewardship” (Venkataraman, 2008, p. 9).

UNESCO’s first Intergovernmental Conference on Environmental Education was held in Tbilisi, Georgia, USSR in October 1977 and attended by official government delegations of 66 UNESCO member states together with representatives of various non-governmental organisations (NGOs) (Palmer, 1998, p. 8). The final conference report contained a declaration (the *Tbilisi Declaration*) which was based on the principles outlined during the UNESCO/UNEP International Workshop on Environmental Education in Belgrade.

The Conference endorsed the following goals of environmental education:

1. to foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;
2. to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; and
3. to create new patterns of behaviour of individuals, groups and society as a whole towards the environment.

(UNESCO, 1978, p. 26)

The categories of environmental education objectives were also endorsed as follows:

1. Awareness: to help social groups and individuals acquire an awareness of and sensitivity to the total environment and its allied problems.
2. Knowledge: to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associate problems.
3. Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection.
4. Skills: to help social groups and individuals acquire the skills for identifying and solving environmental problems.
5. Participation: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

(UNESCO, 1978, pp. 26–27)

The *Declaration* clearly specified the central importance of awareness, knowledge, attitudes, skills and participation to build a society that is environmentally responsible. These goals and objectives of environmental education continue to be relevant to the resolution of environmental problems today. The Conference also recommended that, with respect to formal and non-formal environmental education, a deeper understanding of the natural environment should be promoted (UNESCO, 1978, p. 29). The goals and objectives in the *Declaration* are still used as a framework to design various environmental programmes for both formal and non-formal education (Monroe, Andrews, & Biedenweg, 2008, p. 206), as they continue to provide “the blueprint for the development of environmental

education in many countries of the world today” (Palmer, 1998, p. 8). Overall, the Conference reiterated and emphasised the important role of environmental education at the global level. Through this research, the importance of the environment and its inter-connectedness with people was discussed and promoted among the local communities.

The *World Conservation Strategy* was published in 1980 by the International Union for the Conservation of Nature and Natural Resources (IUCN) in collaboration with the United Nations Environment Programme (UNEP) and (then) World Wildlife Fund (WWF). A key point in the document was the importance of resource conservation and the concept that conservation and development were inter-dependent, and that education around this notion was necessary (Palmer, 1998, p. 15). The document highlighted that “the long term task of environmental education is to foster or reinforce attitudes and behaviours compatible” with conservation objectives (International Union for Conservation of Nature and Natural Resources, 1980, sec. 13). It was also stated that “the need for environmental education is continuous because each new generation needs to learn for itself the importance of conservation” (International Union for Conservation of Nature and Natural Resources, 1980, sec. 13). This statement points to the need to develop environmental education strategies that are durable over many generations, strategies which communities can commit to over the long term.

In December 1983, The Brundtland Commission (World Commission on Environment and Development, 1987) was created. The group was asked to formulate a global agenda for change by the General Assembly of the United Nations (World Commission on Environment and Development, 1987), and in 1987, a report called *Our Common Future* was published. The term ‘sustainable development’ was adopted by the Commission in this report and its definition is often quoted: “humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, pt. I). There were many aspects of sustainable development discussed in the document and one of them was education. The report highlighted that “the changes in human attitudes that we call for depend on

a vast campaign of education, debate and public participation” (World Commission on Environment and Development, 1987, pt. II). It was stated that the “Commission has been concerned with people – of all countries and all walks of life” and for which the report was addressed to them (World Commission on Environment and Development, 1987, pt. II). The report noted that implementation of the broad concept of sustainable development requires a substantial amount of work and needs to be prioritised especially in developing countries that are struggling to deal with social, economic and environmental issues.

The call for sustainable development in *Our Common Future* has become the foundation for more global initiatives. *Agenda 21*, a major action programme towards sustainable development in the twenty-first century, was adopted during the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, 3 to 14 June 1992 (Palmer, 1998, p. 17). One of its 40 chapters highlighted the importance of promoting education, public awareness and training. In relation to this research, the importance of non-formal environmental education at the local community level was emphasised in Chapter 36 (Education, Training and Public Awareness) of *Agenda 21*, where it was stated that “countries should facilitate and promote non-formal education activities at the local, regional and national levels by co-operating with and supporting the efforts of non-formal educators and other community-based organisations” (United Nations, 1992, chap. 36.5.k).

The World Summit on Sustainable Development was held in Johannesburg, South Africa in 2002. World leaders at the summit “declared education as critical for promoting sustainable development” (Gough, 2006, p. 74). Gough also (2006, p. 74) noted that during the United Nations World Summit on Sustainable Development in Johannesburg in 2002, “the vision from Agenda 21 had broadened from focussing the role of education in pursuing the kind of development that would respect and nurture the natural environment to encompass social justice and the fight against poverty as key principles of development that is sustainable”. In December the same year, the United Nations General Assembly adopted Resolution 57/254 declaring the United Nations Decade for Education for Sustainable Development (2005-2014), emphasising the vital role of education in

achieving sustainable development (UNESCO, 2007, p. 5). The aim of the Decade was to “integrate values, activities and principles that are inherently linked to sustainable development into all forms of education and learning and help usher in a change in attitudes, behaviours and values to ensure a more sustainable future in social, environmental and economic terms” (UNESCO, 2007, p. 5).

The introduction of the term education for sustainable development, which is broad in scope, has received mixed reactions from the environmental education communities throughout the world. For example, a survey carried out in Sabah, Malaysia by Pudín and Joeman (2011, p. 14) among environmental educators found that “education for sustainable development has become the buzzword among educators” and that “most people have started to use environmental education and education for sustainable development interchangeably”. It was also found that some of the environmental educators “feel that the implementation of education for sustainable development in Malaysia is unclear and therefore it is very challenging to reach to the grass-root communities” (Pudín & Joeman, 2011, p. 14).

The Rio+20 United Nations Conference on Sustainable Development held on 22 June 2012 in Rio de Janeiro, Brazil resulted in a document called *The Future We Want*. During the conference, world leaders renewed their commitment “to sustainable development and to ensuring the promotion of an economically, socially and environmentally sustainable future for our planet and for present and future generations” (UNESCO, 2012, p. 1). The importance of an integrated approach to sustainable development was recognised (UNESCO, 2012, p. 10). The importance of factors contributing towards sustainable development such as human rights, freedom, peace, security, environmental protection, education, good governance and economic stability were reaffirmed during the conference. In the context of this research, the importance of non-formal education was highlighted “in accordance with the goals of the United Nation Decade of Education for Sustainable Development (2005-2014)” (UNESCO, 2012, p. 60). The conference report noted the importance “to integrate sustainable development more actively into education beyond the Decade of Education for Sustainable Development” (UNESCO, 2012, p. 60).

As a summary of the origin and development of environmental education, various events in environmental history, especially at the international level, have shaped contemporary environmental education. Earlier introduction of concepts and terms closely linked nature and environmental awareness with education. The 1972 Conference in Stockholm drew significant global attention to environmental problems and impacts and the importance of environmental protection. The 1975 International Workshop in Belgrade (UNESCO, 1975a) called to attention the importance of both formal and non-formal environmental education in reaching the general public. The momentous 1977 Conference in Tbilisi (UNESCO, 1978) was a significant event attended by many heads of governments and from which the goals, objectives and definition of environmental education were clearly outlined and emphasised. The *World Conservation Strategy* published in 1980 highlighted the importance of resource conservation and long-term environmental education. The Brundtland Report of 1987 introduced the holistic term ‘sustainable development’, which is still widely discussed and debated. *Agenda 21* (United Nations, 1992), which contains 40 chapters of holistic blueprint for actions on sustainable development, continues to guide environmental actions in many countries. The 2002 World Summit in South Africa emphasised the vital role of education in sustainable development. The World Summit preceded the United Nations Decade for Education for Sustainable Development (2005-2014) during which further progress towards sustainable development has been variable. The recent 2012 Rio+20 Conference witnessed the reaffirmation and renewal of commitment by world leaders in pursuing sustainable development in a holistic manner.

The next section focusses on the definition of environmental education as is used in this research.

2.3 Definition of Environmental Education

Before discussing further the definition and characteristics of environmental education, it is useful to address the basic foundation of education. Many scholars and writers, from the time of the Greek philosopher Plato, have contested the meaning of ‘education’ (Bates & Lewis, 2009, p. 21). Education, as described by Fagan (1996, p. 147), is “a process not a place”, and is about “stretching the

boundaries of comfort, change and challenge” as well as “understanding the local to make sense of the global” and “being informed, celebrating experiences and fitting that experience into a framework of understanding”. For the purpose of this research, education is viewed as “learning opportunities that are constructed to create a framework for the transfer of knowledge” (Heimlich, 1993, p. 1). So what then is the link between learning and education? Learning is “a conceptual criterion for education” (Heslep, 2006, p. 26) and defined as “a cognitive activity because it influences or changes the way we understand, perceive or respond to the world around us” (Bates & Lewis, 2009, pp. 30–31). Bates and Lewis (2009, pp. 30–31) further highlighted that “education is inextricably linked with the process of learning”. Jackson (2011, p. 30) stated that “learning results from reflecting on experience”, where “reflection means holding a particular experience (physical things, thoughts, emotions or feelings) in awareness and seeking its significance”. The author further added that “experience gains meaning, and this learned meaning enables us to act in definite ways in the future” (Jackson, 2011, p. 30). Understanding the link between learning and education could clarify the environmental education issues discussed later in this chapter.

Education is then used to convey or transfer knowledge to an audience or target groups. An analysis of literature carried out by Bates and Lewis (2009, p. 24) concluded a general consensus about the purpose of education within society as follows:

1. to meet the needs of the individual in terms of personal development and the achievement of life and career goals;
2. to meet the needs of society by enabling individuals to become active citizens and agents for social change;
3. to meet the needs of the economy by investing in human capital and preparing individuals for the world of work; and
4. to promote what is desirable and worthwhile, such as truth, rational thought and the pursuit of excellence.

In relation to this research, the purpose of education is to meet the needs of society in terms of environmental protection by enabling local communities to become active citizens and agents for change.

The term 'environmental education' has various definitions. In Tbilisi in 1997, environmental education was defined as “a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problems and has the attitudes, motivations, knowledge, commitment and skills to work individually and collectively towards solutions of current problems and the prevention of new ones” (Stapp, 2001, p. 36). Environmental education also “encourages citizens to realise the connection between government policies, their own ways of life and those of future generations, and the importance of active participation in the political process thus constituting them as catalysts for environmental policy change” (Skanavis, Sakellari, & Petreniti, 2005, p. 321). In the Sabah Environmental Education Policy published in 2009, customised to local conditions, environmental education was defined as “a learning process in which individuals and groups acquire awareness, knowledge and skills about the total environment, resulting in attitudinal and behavioural changes, thus, contributing towards environmental conservation and sustainable environmental management” (Ministry of Tourism Culture and Environment Sabah, 2009, p. 6). The United States Environmental Protection Agency defined environmental education as “a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment” and “as a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions” (United States Environmental Protection Agency, n.d.).

These definitions in the literature tend to highlight ideas of environmental education as a process, the importance of awareness, skills and attitude and behavioural change, and active participation of people including making informed decisions towards solutions of existing problems and future prevention. Being defined as a process indicates that environmental education is a series of actions over a period of time. Its impacts may not be observed immediately and to determine its effectiveness, evaluation is usually conducted after a certain period from the time of implementation.

In the context of this research and based on the above definitions, environmental education is defined as a process to impart and instil knowledge, skills, attitudes, motivations and commitment among the population to work towards

environmental solutions, problem prevention and to live sustainably. This definition aligns well with the objective of this research to work with local communities to improve waste management practices by imparting and instilling relevant knowledge and skills. A desired outcome of this research was that positive attitudes and motivations could be fostered towards improved waste management practices.

The next section highlights the forms and characteristics of environmental education important to this research.

2.4 Forms of Environmental Education and their Characteristics

The population could be informed about the myriad of environmental issues occurring and possible solutions towards improving environmental conditions through various approaches and activities in environmental education. Positive outcomes of environmental education approaches and activities can contribute to the vision of a sustainable world. Many current systems and lifestyles are fundamentally unsustainable and that there is a need to engage people to creatively be more sustainable (Wals & Noorduyn, 2010, p. 59). In the context of this research, by working alongside the local communities and the independent oil palm smallholders to develop an environmental education programme on waste management for their own villages and plantations, it was hoped to be able to contribute to a certain extent to sustainability within the district of Beaufort in Sabah.

To be effective in promoting social change, education needs to reach out to people at all levels of society (Clover, 1996, p. 93). Although it is broadly described that education is a process to impart knowledge, its success is dependent on the readiness of those being educated (Clayton & Myers, 2009, p. 189). The power of education is in the fact that knowledge can be instrumental in transforming an individual and not merely being transferred to the individual (Andrews, Stevens, & Wise, 2002, p. 168). Being educated is about one's "ability to learn, to adapt, to reason and to change" and not merely having knowledge and understanding (Bates & Lewis, 2009, p. 43). There are elements of this discussion on general

education which apply to this research. Firstly, the readiness of the local communities to learn new knowledge on waste management practices needed to be established. Secondly, understanding that knowledge can transform an individual is a key element in the process. Thirdly, the combination of learning, adapting, reasoning and eventually changing is vital throughout the educational process.

Clover (2000, p. 214) asserted that environmental education should be “understood as a lifelong process, actively, critically and creatively engaging children and the adult population in the daily decisions that affect the biosphere”. Engaging children or other individuals in investigating real issues or finding solutions would likely be more meaningful if the issues are important to them (Stevenson & Stirling, 2010, p. 227). Environmental education does not only engage various target groups; it is also multifaceted and continually evolving, as highlighted by Monroe et al. (2008, p. 206). Stevenson and Stirling (2010, p. 232) reiterated that “engaging in environmental education is a lifelong process as learners constantly seek information and meaningful understanding”. Environmental education also “focusses on local contexts” in which educators in each country “must work to achieve balance across their own social, economic and environmental situations” (N. Taylor, Littledeyke, Eames, & Coll, 2009, p. 325).

Education can be characterised, as can environmental education, as formal, non-formal and informal. Based on the goals of environmental education, whether formal, informal or non-formal, interventions need to be customised based on local needs and the target audience. The formal, informal and non-formal forms of environmental education are now discussed.

2.4.1 Formal environmental education

Formal education is “usually institutionalised in schools and colleges” and is “highly structured, based on different stages, has extremely determined outcomes and leads to certification” (Bates & Lewis, 2009, p. 112). The formal learning in environmental education takes place in schools and higher learning institutions with a specific syllabus, course structures or guidelines. At present, formal environmental education in most countries is not “a discrete subject in its own

right” but rather incorporated into other subject areas (N. Taylor, Littleddyke, et al., 2009, p. 319), and this integrated approach is adopted in countries (N. Taylor, Taloga, & Tagivakatini, 2009, p. 30). However, some countries only offer environmental education as an optional or voluntary activity (Manolas, 2009, p. 94). In delivering formal environmental education in schools, most countries adopt a system which integrates, infuses or embeds environmental education in all subjects (Bolstad, Eames, & Robertson, 2006, p. 38; Calik, 2009, p. 110; Platje & Slodczyk, 2009, p. 100; Salih & Yahya, 2009, p. 216; N. Taylor, Littleddyke, et al., 2009, p. 319; N. Taylor, Taloga, & Tagivakatini, 2009, p. 30). For higher learning institutions, many universities offer specific environment-related courses.

The purpose of formal environmental education at the primary and secondary school level is to mainstream environmental education in the formal education system to ensure environmental issues are prioritised and included in the curricula. A selection of examples of the implementation of formal environmental education are discussed in the following section. These examples are similar to the education system of Malaysia in the sense that formal environmental education is taught in an integrated manner.

Fiji, a Pacific Island nation, has a high degree of endemism of its terrestrial flora and fauna (N. Taylor, Taloga, et al., 2009, p. 29). The country is also developing rapidly and this development exerts impacts on the environment, causing problems (N. Taylor, Taloga, et al., 2009, p. 30). Environmental education is seen as one of the effective ways to reduce these problems. This discussion of environmental education in Fiji is focussed on the study carried out by N. Taylor et al. (2009). Fiji takes an integrated approach to its formal environmental education, in which the Ministry of Education categorises five dimensions of environmental education – biological environment, physical environment, resources and economics, social environment and aesthetic environment - for 18 subjects and 12 years of school (primary Class 1 to secondary Form 6). One of the main challenges faced in environmental education implementation is the teaching methodology in Fiji. Teaching styles are often highly transmissive and involve little student engagement. As in many developing countries, environmental education in Fiji “suffers from an examination culture that has stifled innovative teaching” (N. Taylor, Taloga, et al., 2009, p. 34). N. Taylor, Doff, Jenkins and

Kennelly (2007, p. 377) stated that “there is a need for more effective professional development in environmental education of primary teachers in Fiji” but that could be improved with the reforms in curriculum and assessment at the primary level, which would include “a move away from summative examinations to more continuous assessment” and give greater “flexibility for teachers”. Although Fiji takes the integrated approach to teaching environmental education, some academics are arguing to include environmental education as a subject within the Fiji curriculum.

Among the environmental problems faced in Turkey are excessive use of natural resources and waste disposal (Calik, 2009, p. 109). Environmental education is seen as one of the ways to improve people’s awareness and to behave responsibly towards the environment (Calik, 2009, p. 109). Formal environmental education in Turkey is implemented in “all curricula from kindergarten through secondary school” in which learning is expanded and reinforced throughout the school years (Calik, 2009, p. 111). The education curricula, enriched with environmental education, provide teachers with “concrete examples including specific teaching activities, and sample measurement and assessment documents” (Calik, 2009, p. 117). However, one of the challenges in implementing formal environmental education in Turkey is the lack of professional development for teachers (Calik, 2009, p. 117). The achievement of the goals of environmental education depends on the “teachers’ own efforts and enthusiasm” (Calik & Eames, 2012, p. 432). Appropriate settings for teaching environmental education such as parks or outdoor activities could improve the formal implementation of environmental education (Calik, 2009, p. 118). More emphasis on the interests and need of learners could also be given by teachers (Calik, 2009, p. 118).

Internationally, New Zealand is well-known for its clean and green image, an image continuously promoted in tourism (Calik & Eames, 2012, p. 429). However, this image is being questioned due to environmental issues, such as the negative impacts of dairy farming on waterways, and greenhouse emissions (Calik & Eames, 2012, p. 429). Concerns for conservation in New Zealand have increased, reflected in calls for more education for sustainability (Calik & Eames, 2012, p. 429). *The New Zealand Curriculum* for all primary and secondary schools was revised by the Ministry of Education in 2007 (Ministry of Education, 2007).

Among other views, the document outlined the vision to encourage learners to “seize the opportunities offered by new knowledge and technologies to secure a sustainable social, cultural, economic, and environmental future for our country” and “continue to develop the values, knowledge, and competencies that will enable them to live full and satisfying lives” (Ministry of Education, 2007, p. 8). The *Curriculum* has eight learning areas namely “English, the arts, health and physical education, learning languages, mathematics and statistics, science, social sciences, and technology” (Ministry of Education, 2007, p. 16). Environmental education in New Zealand is infused in its *Curriculum* (Eames, Cowie, & Bolstad, 2008, p. 37) of which environmental and sustainability elements are included in health education, mathematics and statistics, science, social science and technology (Ministry of Education, 2007, pp. 23, 26, 29, 30, 32). The “flexible approach” in the *Curriculum* “allows schools the opportunity to include environmental education in their own curricula in an integrated manner” (Calik & Eames, 2012, p. 430). However, one of the challenges encountered is the lack of support by the Ministry of Education for teachers to implement environmental education initiatives in the *Curriculum* (Eames & Barker, 2011, p. 187). It has been argued that teachers need more support and exposure to content knowledge around sustainability issues (Calik & Eames, 2012, p. 431). Eames et al. (2008, p. 45) reported that “leadership was seen as critical in building environmental education programmes in schools” and that some teachers expressed “frustration in the lack of support for environmental education from their colleagues and leaders”. An interdisciplinary approach to deliver environmental education effectively has proven to be more attainable in primary than secondary schools, as teaching at secondary level is more segmented based on subjects (Calik & Eames, 2012, p. 431). Some teachers saw environmental education as a burden, being part of the ‘over-crowded curriculum’ and this was more obvious in secondary than in primary schools (Eames et al., 2008, p. 45).

It is clear that different countries have different approaches to environmental education based on their environmental, socio-cultural and economic contexts (Calik & Eames, 2012, p. 423). Studies from the three countries above are interesting because there are similarities in their formal environmental education implementation. The introduction of environmental education in the education system seemed to have been triggered by concern for better environmental quality,

as rapid development has brought about negative effects on the environment. The three countries appeared to prefer to integrate environmental education across their curriculum instead of in a single subject. Both Fiji and Turkey face similar challenges in terms of lack of effective professional developments for teachers.

Based on the examples above, formal environmental education has a range of challenges in its implementation, most commonly whether to continue integrating environmental education in the curriculum or to develop it as a subject in its own right. This is further discussed after the next sub-section which highlights the context for formal environmental education in Malaysia.

2.4.1.1 The Malaysian context of formal environmental education

The Malaysian Government has produced systematic plans for development every five years since the 1960's, and its educational system is linked to these plans (Salih & Yahya, 2009, p. 215). One of the plan requirements is for the Ministry of Education to provide education for young people to equip them with skills and knowledge needed for Malaysia to develop, and one of the challenges faced is to provide education related to environmental protection (Salih & Yahya, 2009, p. 215). The Ministry of Education Malaysia (1997, as cited by Periasamy 2004, p.2), highlighted that “the incorporation of new components like environmental education [...] was felt imperative to enable students to enhance their ability and play a meaningful role in society”.

In Malaysia, as with many countries, environmental education in primary and secondary schools is taught by integrating environmental education throughout the education system (Salih & Yahya, 2009, p. 216). Environmental education is supposed to be integrated through daily teaching and learning processes as well as through co-curriculum activities (Salih & Yahya, 2009, p. 216). Students are brought outdoors to experience nature and other aspects of the environment. Outdoor learning for students is important because it gives them an avenue to appreciate nature and its processes first-hand. However, the implementation of environmental education in Malaysia is not without challenges. One of the findings of Pudín's research (2008, p. 88) that was carried out in Sabah, Malaysia was that “about 87% of the schools (out of 39 schools) did not have any method to

ensure teachers infuse environmental education through their Teaching and Learning.” Based on the findings, the principals did not have a clear picture of the overall implementation of environmental education across the subjects by their teachers. This could be due to the fact that environmental education is not given a high priority and other examinable subjects are given more attention. Although the Ministry of Education Malaysia has formulated guidelines for primary and secondary schools, implementation of environmental education in schools is uneven, and some teachers are not teaching and utilising these guidelines (Pudin, Tagi, & Periasamy, 2005, p. 5). Among the reasons given by teachers are that they do not have enough resources for environmental education, and it is not easy to incorporate environmental elements in their subjects. Teachers also lack formal professional development in teaching environmental education (Periasamy, 2004, p. 2). For example, out of the 594 teachers who responded to questionnaires during research in schools in Sabah (Pudin, 2008, p. 85), only about 10 per cent had attended an environmental education course before the environmental-friendly school programme known as *Sekolah Rakan Alam Sekitar* was introduced in their schools. This may be due to the lack of environmental education courses for teachers at that time.

There are efforts to counter the lack of resources through the publication of teaching materials. For example, in Sabah, Malaysia, environmental modules called “Learning through Friends of the Environment” for English, Science and Mathematics for primary and secondary schools were published in 2006 to improve the pool of resources (Science and Technology Unit Sabah & Sabah Education Department, 2006). The modules highlight environmental values, environmental questions and evaluation. The modules were disseminated to most schools in Sabah through the Sabah Education Department.

To summarise this section on formal environmental education:

1. Many countries believe formal environmental education is one of the tools to educate their population to live sustainably.
2. Formal environmental education has contributed significantly in the field of environmental education.
3. There is a lack of professional development courses in environmental education for teachers.

4. Arguments on whether environmental education should be embedded in the curriculum or given a subject status still prevail in many countries. However, according to N. Taylor et al. (2009, p. 324), only “in extreme circumstances where environmental education has low status and very limited impact” should it “be given subject status and examined in the same way as other curriculum areas” as “this approach is very much at odds with what has long been advocated in most of the literature on environmental education”.
5. Challenges faced by countries in implementing formal environmental education are similar and perhaps are difficult to solve.

Highlighting formal environmental education is relevant in this research because it is occurring in the local communities of this study through the schools, and the level of environmental awareness of the youth and adults in the community would possibly depend on what they have experienced at school. The literature on formal environmental education shown that many countries believe formal environmental education is one of the key elements to educate their population about environmental importance, and that this formal education has a significant contribution to the field of environmental education. Although formal environmental education was not directly included in this study, it may contribute through the involvement of teachers or school staff who were part of the local communities upon which this study was based.

The next section discusses the characteristics of informal environmental education.

2.4.2 Informal environmental education

Informal education can be misconstrued as non-formal education. La Belle (1982, p. 162) made the point that the difference between them “rests with the deliberate instructional and programmatic emphases present in non-formal education but absent in informal education”. Informal education is defined as a “lifelong process in which individuals learn from their environment – from the variety of experiences, from their family, friends, work and the media” (Bates & Lewis, 2009, p. 112). Although it seems unorganised or unsystematic, many people develop knowledge and understanding through informal education (Coombs, 1973, p. 289).

Informal environmental education is acquired through the media such as newspapers, radio talk shows, information in nature centres or environmental publications. A learner could learn, or ignore totally, the messages conveyed by educators. For individuals who are keen to learn about the environment, informal education could continuously fuel their interests daily. However, the risk of informal learning, according to Heimlich (1993, p. 4), is that “misinformation is learned in the same manner that good information is learned”. Informal education is a lifelong process without any particular structure and is highly dependent on the learners’ own motivation and interests. An editorial article in the *International Journal of Lifelong Education* highlighted that “informal learning is very difficult to shape” and that “it is to formal and non-formal educational institutions that people principally go when they decide to try to study something; and it generally is through educational institutions that governments (and other social actors) try to shape how much learning takes place in a society” (“Informal Learning,” 2009, pp. 419–420). Informal environmental education was not included in this research as it was assumed that communities were exposed to informal education through the media and other sources. These are difficult to identify and to quantify their impact on communities.

The next section discusses non-formal environmental education, which is the key focus of this research. General concepts and theories of non-formal education discussed in the next section are applicable and relevant to non-formal environmental education.

2.4.3 Non-formal environmental education

Non-formal education occurs outside the traditional formal system of schools or higher learning institutions. La Belle (1982, p. 160) has stated that non-formal education, was introduced “to signal a need for creating out-of-school responses to new and differing demands for education”. Romi and Schmida (2009, p. 260) stated that “non-formal education has developed from daily and oral practices in traditional societies into institutionalised and written practices in modern and post-modern societies”. Non-formal education is “not institutionalised, nor does it lead to formal certification”; however, “it is structured and intentional” (Bates & Lewis, 2009, p. 112). Brennan (1997, p. 185) in his paper on reconceptualising non-formal education in developing countries, highlighted that “non-formal

education policy and planning are limited”. But, he argued, non-formal education is “an integrated force which has the potential to serve developing nations to a degree perhaps equal to, if not greater, than, formal education that has attracted most of the attention and the resources in developing nations” (B. Brennan, 1997, p. 198). He believed that non-formal education should not be given less attention than formal education because of its three-pronged education force as described in the next paragraph. Based on work by Beckerman and Silberman-Keller in 2003, and Schmida and Romi in 2007, there is a lack of research on non-formal education, as it is seen as having a lower esteem than formal education (Romi & Schmida, 2009, p. 260). Although non-formal education is seen as having a lower esteem than formal education, Brennan (1997, p. 187) believed that non-formal education is “represented as reactions to the limitations or failures of formal education” and thus meant to achieve what formal education is unable to achieve within a limited formal capacity.

Brennan (1997, p. 187) identified three types of non-formal education, namely as a complement, an alternative or a supplement to formal education. Non-formal education as a complement to formal education was the first to be recognised in developing nations. It is complementary in nature because “it is required to perform functions which formal education was designed to fulfil but had not been able to achieve, partially perhaps but not totally” (B. Brennan, 1997, p. 187). Examples of its target groups are school dropouts or illiterate adults. Non-formal education as an alternative to formal education “seeks to recognise the area of indigenous or traditional education and learning” which “refers to the structures and practices that existed before colonialisation and continued to exist in some form for some features of personal and community life after colonialisation” (B. Brennan, 1997, p. 187). Finally, non-formal education as a supplement to formal education is “designed to represent the sorts of educational responses that are related to recent important stages in the development of the nation” and “required as a quick reaction to educational, social and economic needs because formal education is too slow in its response” (B. Brennan, 1997, p. 187). In relation to this research, the non-formal environmental education programme developed with local communities was most relevant to non-formal education as a supplement to formal education. This type of non-formal education was most relevant because of its character as a quick reaction to educational and environmental needs of the

local communities. This idea recognises that the community education programme on waste management can act as a supplement to formal environmental education in the local schools.

In terms of a definition, non-formal education may be based on the local context (Rogers, 2004). The definition of non-formal environmental education emphasises the elements of learner choice and flexible learning options. For example, Heimlich (1993, p. 6) defines it as an “education that is driven by the objectives of the learner who is often participating by choice, whereby learning occurs through an activity organised by an institution that constructs the learning opportunities”. Young and McElhone (1986, pp. 1–2) highlighted that “the strength of non-formal education lies in the fact that it does not operate within a given set of rules with a strict structure, curriculum and examination procedures” and that “non-formal environmental education, theoretically at least, is more capable of responding to local environmental issues which have more social meaning and usefulness to the community and is less dominated by academic requirements”. Having stated that, however, non-formal environmental education, as with other non-formal education types, faces challenges often missing in formal environmental education, such as voluntary participation whereby participants can arrive or leave at their choosing (E. W. Taylor & Caldarelli, 2004, p. 452). Based on research to investigate the teaching beliefs of non-formal environmental educators who work in state and local parks in Northeastern United States carried out by E.W. Taylor (2006, p. 297), one of the significant findings was that “learners were seen at times to be easily distracted mentally and physically, drifting in and out of the educational experience”.

A case study that highlighted the characteristics of non-formal education which are relevant to non-formal environmental education is one that was carried out by E.W. Taylor (2006, p. 294) in state and local parks that offered non-formal environmental education programmes, and home improvement self-help clinics. The most significant characteristics found to be common in the two cases were the following (E. W. Taylor, 2006, pp. 299–302):

1. Nominal level of expectation of learner participation. Since the participation was voluntary, learners came and left as they wished.

2. Learner-centred approach. This approach of teaching included consistent effort by educators to assess the interest and needs of the learners.
3. Emphasis on hands-on approach to ensure learners engage in the learning experience.
4. Educators conceptualise their role as providers of knowledge.
5. Nature and source of knowledge in a non-formal setting was either based on guidebooks or personal experience.
6. Emphasis on fun among learners by educators.

In relation to the environmental education programme in this study, these characteristics were important to consider during development of the programme to ensure participants engaged as much as possible in the learning experience.

When discussing non-formal environmental education, it is fitting to link it to free-choice environmental learning. Non-formal environmental education is a process that could provide an avenue for free-choice environmental learning to occur. Heimlich and Horr (2010, p. 2) stated that “free-choice learning is integrated with the rest of an individual’s life”. Free choice learning is driven by the interests of the learner rather than the needs of the educator, and it occurs within a variety of educational settings (Ballantyne & Packer, 2005, p. 283). This learning seems to be occurring more in informal environmental educational settings; however, to a certain extent, it occurs in non-formal environmental education as well. For example, in a non-formal environmental education activity such as a workshop, the extent to which free-choice learning occurs among the participants would depend on their interests, motivation and needs. Free-choice learning allows “visitors or participants to choose, and the choice extends to what they will take away from the experience” (Storksdieck, Ellenbogen, & Heimlich, 2005, p. 366). In research on free-choice learning for environmental participation in Greece, Skanavis, Sakellari and Petreniti (2005, p. 330) concluded that “the fundamental personal factors for successful free-choice learning relate to motivation, interest and emotion”. They based their research on Falk and Dierking’s contextual model of learning; a model that includes “three contexts – personal, socio-cultural and physical – which contribute to and influence the interactions and the experiences that the individual acquires by participating in a

free-choice learning process” (Skanavis et al., 2005, p. 324). In relation to this research, the non-formal setting and ambience were important to be considered when engaging the interest and motivation of the villagers and smallholders in improving waste management practices in their areas. It was hoped that by providing clear explanation to the villagers on the importance of improved waste management practices for their personal and family wellbeing, this could capture their interest and motivation to participate seriously in the programme. It was equally important to ensure they were physically comfortable in the programme venue.

Environment-related agencies, special interest groups or non-governmental organisations (NGOs) are the organisations that usually carry out non-formal environmental education programmes for their respective target groups. Non-formal environmental education programmes range from workshops, seminars, talks, craft-making, organised exhibitions to environmental races. The programmes can be carried out for adult groups, youths and children in nature centres or other venues.

In the context of non-formal environmental education in Malaysia, various government organisations and NGOs have been implementing programmes such as talks, exhibitions, radio shows, tree planting, workshops and seminars in all the states, and celebrating environmental-related events such as the Malaysia Environment Week, Earth Day and World Environment Day (Pudin et al., 2005, p. 5). In Sabah, due to the many organisations involved in implementing mainly non-formal environmental education, a network known as the Sabah Environmental Education Network (SEEN) was set up in 2005 to “create synergy between the various organisations, in order to build strong co-operation and co-ordination amongst the implementing agents” (Pudin et al., 2005, p. 6).

Through non-formal ways, learners are given an ambience to learn at their own pace and given the opportunity to explore deeper into their own thinking based on their environmental experiences, whether vast or limited. One of the strategies for non-formal environmental education is to create a relaxing atmosphere for learners to express themselves. For example, based on my experience as a facilitator in an environmental programme for local leaders in Sabah, Malaysia,

the learners were first given some background information on waste management issues and the importance of the environment in the State. They were then given time to discuss and share about existing environmental problems, highlighting waste management issues, in their own communities. Educators emphasised that the sharing session was not an evaluation; rather a platform to learn from one another, and that in itself provided an avenue for interactive learning. As stated by Heimlich (1993, p. 5), “instructional strategies such as removing right and wrong from the teaching vocabulary and reducing threats to the learner are vital to non-formal education processing”.

Non-formal environmental education provides an avenue for education to utilise the natural process of learning by allowing active learning and an individual process of constructing meaning (Heimlich, 1993, p. 7). The non-formal way seeks to impart environmental knowledge and skills without the formal requirements of schools or higher institutions.

The next sub-section discusses adult education, as adults were the main targets of this programme in non-formal environmental education.

2.4.3.1 Adult education

In relation to this study, the main audience of the non-formal environmental education was adults. Understanding the fundamentals of adult education could assist to facilitate and promote informed discussions and debates specifically on waste management practices with the local communities. It is therefore appropriate to set the stage by reviewing literature regarding adult education.

In this modern society, tremendous changes are occurring such as globalisation, environmental and nature challenges, and these could influence the lives of people, growth and learning, including adult education (Engesbak, Tønseth, Fragoso, & Lucio-Villegas, 2010, pp. 617–618). Engesbak et al. (2010, p. 618) further stated that “the crucial role of adult education and learning is reflected in the increasing number of adults participating in some forms of organised formal or informal adult education” and that its concept has changed with changes in society and policy from “vocational learning and general education in 1960s to a concept that

includes almost everything” at the present time. This shows that generally over time, lifelong learning through adult education has become emphasised in society. Bowl and Tobias (2012, p. 282) expressed that “in adult and community-based education both learner and teacher have personal, social, political, and economic experience and understanding to bring to the learning environment - common sense experience, which may be explained, explored, and critiqued.” In relation to this, Stevenson and Stirling (2010, p. 222) remarked that learning requires active engagement and interaction and is shaped by “the learner’s prior knowledge and personal and cultural experiences”.

Various definitions of the term adult education have been developed, but the most commonly used appears to be a definition by UNESCO (UNESCO, 1977, Annex 1, p. 4) as follows:

The term ‘adult education’ denotes the entire body of organised educational processes, whatever the content, level and method, whether formal or otherwise, whether they prolong or replace initial education in schools, colleges, and universities as well as in apprenticeship, whereby persons regarded as adult by the society to which they belong develop their abilities, enrich their knowledge, improve their technical or professional qualifications or turn them in a new direction and bring about changes in their attitudes or behaviour in the twofold perspective of full personal development and participation in balanced and independent social, economic, and cultural development; adult education, however, must not be considered as an entity itself, it is a sub-division, and an integral part of, a global scheme for lifelong education and learning.

This definition applies to this study because it is a holistic definition of adult education that is relevant to this research in environmental education.

When discussing adult education, it is also important to define the word ‘adult’ to focus on adults in the community in the context of this research. Knowles (1980, p. 24) argued that to determine who should be treated as adults educationally, two questions can be asked: “1) who behaves as an adult – who performs adult roles? and 2) whose self-concept is that of an adult?”. He further explained that firstly “a person is adult to the extent that that individual is performing social roles typically assigned by our culture to those it considers to be adults – the roles of worker, spouse, parent, responsible citizen, soldier, and the like” (1980, p. 24) and secondly “that individual perceives herself or himself to be essentially responsible

for her or his own life” (1980, p. 24). This definition is adopted in this study. Rubenson (2011, p. 6) noted that the broad sectors under adult education include adult basic education, immigrant and citizenship education, adult higher education, workplace education and training, community education, popular education and museums, radio and televisions. Community education, particularly community environmental education, is discussed further in the next section.

Andragogy, self-directed learning and transformational learning are three theories of adult learning which have become the foundations of adult education (Merriam, 2011, p. 29). Andragogy is a concept introduced by Knowles in 1968 to distinguish adult learning from children’s learning or pedagogy, and which “tells us more about the characteristics of adult learners than about the nature of learning itself” (Merriam, 2011, p. 29). Beckett (2011, p. 35) highlighted that Knowles’ andragogy “theorised adults’ learning through the explicit utilisation of experience”. However, his andragogy underwent intense scrutiny by child and adult educators, and eventually in 1980, Knowles acknowledged that the difference between pedagogy and andragogy was not as obvious as he initially thought (Merriam, 2011, p. 30). Despite the critiques, Knowles’ characteristics or assumptions about adult learners can still be used for programme planning, instruction and evaluation (Merriam, 2011, p. 30). Knowles (1980, pp. 44–45) summarised four assumptions or characteristics of adult learners as: “1) their self-concept moves from one of being a dependent personality toward being a self-directed human being; 2) they accumulate a growing reservoir of experience that becomes an increasingly rich resource for learning; 3) their readiness to learn becomes oriented increasingly to the development tasks of their social roles; and 4) their time perspective changes from one of postponed application of knowledge to immediacy of application, and accordingly, their orientation toward learning shifts from one of subject-centredness to one of performance-centredness”. These assumptions of adult learners, particularly their rich reservoir of experience and immediate application of knowledge, were useful in this research because they allowed better engagement with the villagers during data collection and programme implementation.

The second theory of adult learning as one of the foundations of adult education is self-directed learning, which follows from Knowles’ andragogy of which the first

characteristic of adult learners is self-directed learning as explained in the previous paragraph. This model of adult learning was developed from research carried out by Tough in 1971 with Canadian adult learners (Merriam, 2011, p. 30). Tough discovered that “90% of the participants in his study had engaged in an average of 100 hours of self-planned learning projects in the previous year and that this learning was deeply imbedded in their everyday lives” (Merriam, 2011, p. 30). The main goals of self-directed learning are: “1) to enhance the ability of adult learners to be self-directed in their learning; 2) to foster transformational learning as central to self-directed learning; and 3) to promote emancipatory learning and social action as an integral part of self-directed learning” (Merriam, Caffarella, & Baumgartner, 2007, p. 107). Recent research in self-directed learning has shown that its role is significant in lifelong learning, human resource development and online learning (Merriam et al., 2007, p. 124). To a certain extent, self-directed learning could be encouraged among the villagers post-programme implementation to keep abreast with current development in waste management practices.

Transformational learning is the third theory of adult learning which contributes to the field of adult education. Transformational learning is “about change – dramatic, fundamental change in the way we see ourselves and the world in which we live” (Merriam et al., 2007, p. 130). Transformative learning theory emerged in 1975 when Mezirow carried out a research study of 83 women returning to college (Cranton, 2011, p. 54). His works focus, among other things, on “the process of individual transformation, a process that is personally empowering” (Merriam, 2011, p. 31). Cranton (2011, p. 58) highlighted that “with addition of several alternative perspectives”, transformational learning “has become a holistic and integrated way of understanding how adults experience a deep shift in perspective”. Merriam (2011, p. 31) summarised that both andragogy and self-directed learning “remain dominant in the real world of practice, perhaps because of their humanistic foundations and the fact they capture what is popularly intuitively understood about adult learning”. The ultimate aim of this research was to witness a certain degree of transformation in perspective and improvement in waste management practices among the villagers at home as well as in the oil palm plantations. In relation to this research, certain elements of the three theories could be applied such as the importance of the rich reservoir of experience and

immediate application of knowledge by adult learners, and encouragement of self-directed learning to keep abreast with current developments in waste management practices, and a shift of perspective in waste management practices.

With this background of adult education, the next focus of discussion is adult environmental education. Authors such as Clover believe there is a difference between the terms “adult environmental education” and “environmental adult education”. Her argument is that environmental education and adult environmental education only focus on awareness raising and individual behaviour change (Clover, 2002, p. 2). However, if the goals of environmental education by UNESCO are referred to, they aim to “create new patterns of behaviour of individuals, groups and society as a whole towards the environment” (UNESCO, 1978, p. 26). It is clearly stated that it is beyond individual behavioural change; it covers groups and society as a whole. Therefore in this research, the term ‘adult environmental education’ is used to indicate holistic environmental education for adults. UNESCO uses the same term in its 1997 publication entitled *Adult Environmental Education* (UNESCO Institute for Education, 1997).

According to UNESCO (1997, p. 5), “adult learning is a central tool in the process of raising environmental awareness and promoting environmentally supportive action”. Van Meter (1973, p. 1) highlighted that adults “learn best when given freedom and not placed under pressure, have specific educational needs and expectations when coming to a learning situation and have a wide range of experiences which can and should be used (when appropriate) in the learning situation”. Heimlich and Horr (2010, p. 61) reiterated that “adults may participate in environmental learning activities because they perceive value or morality in the activity” and their participation is based on “their own particular interests and needed outcomes”. Approaches for specific adult groups may differ due to the different range of expectations, needs and priorities. It is appropriate to include adults when planning an environmental programme to capture their needs and for the programme to be more meaningful (Van Meter, 1973, p. 2). Heimlich and Horr (2010, p. 61) highlighted that “sometimes an adult’s predisposition to learning is more closely related to feelings of either being part of a bigger purpose or of contributing to their own self-identity”. In relation to this research, adults

were directly involved so their views, interests, expectations and needs were captured to ensure as much as possible the environmental education programme was holistic and meaningful. This was planned through discussions in a focus workshop.

For an effective environmental education programme for adults, there are factors related to adult learning that need to be considered, as highlighted by Cranton (2011, p. 53): “1) Adult learning is voluntary. Individuals choose to become involved in informal and formal activities in order to develop personally or respond to a professional or practical need; 2) Adult learning is self-directed in which people identify their learning needs, set goals, choose how to learn, gather materials, evaluate their progress; 3) Adult learning is practical or experiential in nature; 4) Adults prefer collaborative and participatory learning; 5) Adults bring rich experiences and resources to their learning, 6) Adults have a variety of learning styles and preferences”.

The synthesis of non-formal environmental education and adult education shows that both are different entities and yet overlap on certain characteristics that would enhance the understanding for a more effective implementation of environmental education programme in this research. The literature on non-formal environmental education and adult education have shown the following:

1. Although non-formal environmental education targets both children and adult audiences, it is connected to adult education through one of its target groups, the adults.
2. Both emphasise self-directed and lifelong learning, and being learner-centred.
3. Both advocate practicality and hands-on activity to reach out to adults.
4. Although adult education covers both formal and non-formal education, it is linked to non-formal environmental education through its non-formal element.

2.4.4 Summary of forms of environmental education

Non-formal environmental education was the key focus of this research. Formal, non-formal and informal education was seen as supplementing one another as

each strengthens the other in various settings. Their supplementary functions contributed overall to environmental education. In this research, the focus was only on non-formal environmental education because waste management was an issue that affected the whole community, and the learning occurs outside the formal education system. The communities also play a major role in community development, including environmental protection in their own areas. The research took a broader approach to non-formal environmental education because apart from family units, communities also included various sectors of society such as schools and religious bodies. Formal environmental education was not directly included, but could contribute through the involvement of teachers or school staff. As adults were the main audience, the non-formal setting was most appropriate in this research. In terms of informal environmental education, it was assumed that communities were exposed to informal education through the media and other sources, but it was not easy to identify and to quantify their impact on the communities.

Non-formal environmental education has the capability to respond to local environmental issues, and is more useful for communities as it is less influenced by academic requirements. The non-formal setting and ambience are important to engage villagers' interests and motivations. The ultimate aim of this research was to witness a certain transformation and improvement in the ways villagers manage waste at home and in plantations. Important elements of non-formal environmental education include taking into account the rich reservoir of experiences among the villagers, immediate application of knowledge in sustainable waste management practices and encouragement of self-directed learning.

The next section examines the relationship between community and the environment which highlights the importance of community development and community environmental education.

2.5 Community and the Environment

The relationship, interaction and association between community and the environment is one of the core elements of this research. In this section, community development and community environmental education are discussed.

2.5.1 Community development

Since this research requires the participation of local communities, it is imperative to give a background of what community development is. This provides a holistic picture of community development and a better understanding of how educators can effectively interact with communities on development issues. Participation of local communities in non-formal environmental education is vital because they have a major influence in addressing issues in their own areas.

Community can be defined as a mutually supportive web of relationships that have shared values, norms, meaning, history and identity (Etzioni, 1996, p. 127; Sarason, 1974, p. 1). Community is based on locality or relations, and can be described in three levels, namely microsystem, organisation and locality (Dalton, Elias, & Wandersman, 2001, p. 191). Locality is the traditional description of community and includes neighbourhoods, small towns or rural regions (Dalton et al., 2001, p. 191), and is the most appropriate description for this research, which focussed on the development of an environmental education programme on waste management practices with local communities.

The importance of communities is recognised in Malaysia. In the *10th Malaysia Plan*, it was stated that community-based co-operation provides an effective approach to environmental conservation (The Economic Planning Unit, Prime Minister's Department, 2010, p. 28). The *Plan* highlighted that the means to facilitate such co-operative mechanisms will be explored further by the Malaysian Government, including promoting greater participation of local communities, for example in eco-tourism (The Economic Planning Unit, Prime Minister's Department, 2010, p. 28). Although the example given was in eco-tourism, I believe it appeared to be applicable to other activities which involve participation of local communities, including waste management practices.

In a supportive and strong community, any community development programme, such as improved waste management practices, is likely to succeed due to shared aspirations and goals. Community development aims at building solidarity and including community members in problem-solving (Bhattacharyya, 2004). This is in line with the direction of this research, which is, working alongside the community. Bhattacharyya (2004, p. 24) also reiterated that “the people must have the opportunity to own the problem by feeling and defining it, and also to apply their knowledge/material resources for solving it.” The author (2004, p. 24) further added that “community development thus calls for simultaneous action at both micro and macro levels”. This research focussed mainly on the micro level because waste management was an issue that involved individuals as well as family units and other groups. However, the local authority and government departments, considered bodies at the macro level, were involved through a panel discussion.

Community participation to ensure the successful implementation of any programme is imperative. People are likely to get involved in their communities if they feel a strong sense of attachment to their communities (Dalziel, Hewitt, & Evans, 2007, p. 14). Among the motivations for participation and involvement are when they feel strongly about an issue that affects them, having the power to influence events and having something worthy to contribute (Dalziel et al., 2007, pp. 21–22).

However, on the other hand, there are also “many reasons, based on shortcomings or fears, which prevent people from participating in a community” (Skinner, 2009, p. 90). Dalziel et al. (2007, p. 25) summarised the key barriers that stop people from participating as lack of time, fear, confidence, lack of incentives and motivation to contribute. Recognising these barriers, the data collection process and development of the environmental education programme took into account these issues and designed research instruments and programmes that were “engaging and provide an enjoyable learning experience” (Skinner, 2009, p. 91) for as many participants as possible.

One approach to community development is the asset-based community development which evolved from 1970s research in Chicago communities

(Mathie & Cunningham, 2005, p. 177; Walker, 2006, p. 25). Mathie and Cunningham (2005, p. 177) explained that as a strategy, asset-based community-development is shaped by “a distinctive set of principles” and these “inform field based methods and practices” such as “interviews to elicit examples of successful community initiatives and identify hidden and unrecognised assets, ‘asset-mapping’ when the full range of assets on which the community can draw is comprehensively recorded and documented, mobilisation of a core group of community organisers, initiation of a community activity that requires no outside assistance, and a progressive ‘scaling up’ of such activities as linkages to external institutions, which are called upon to invest in community-driven development initiatives”. Walker (2006, p. 26) emphasised that in asset-based community development “people do not assess needs, or deficits, first but assets” of which one needs to “look through an asset lens to profile a community; look for strengths that can be employed for progress”. The same author (2006, p. 27) added that this approach works well “at both micro and macro levels” and a “good asset-based community development initiative will focus on the strengths and aspiration of each resident and family”. This approach also involves “techniques and organising steps” that “can be as creative and as simple or complex as people wish” (Walker, 2006, p. 27). One of the key elements to getting to know and engage with communities is developing relationships. Wheatley and Frieze (2011, pp. 3–4) emphasised that “change happens through self-organised efforts that then move across the planet through networks of relationship” and that “lasting change doesn’t start from the top of a system, but from deep inside it” indicating the importance of assets. Walker (2006, p. 27) also emphasised that those who have used the asset-based community development approach “have found that all fields can be fertile and will flourish when seeds of progress – community assets – are planted and nurtured”. In the context of this research, the key elements of asset-based community development could be useful to be applied by identifying the assets and strengths of the local communities such as their past experience, knowledge, leadership potentials, individual talents and local economy.

With this background of community development, the next section focusses on a discussion on community environmental education.

2.5.2 Community environmental education

To set the stage for a discussion on community environmental education, it is useful to highlight the general characteristics of community education.

Community education is interpreted in different perspectives and contexts (Connolly, 2011, p. 133). It may be seen as “an extension of a pragmatic education service designed to target hard-to-reach people and integrate them into the mainstream through employment” or defined as “a dimension of community development empowering powerless people to address their own educational and social needs” (Connolly, 2011, p. 133). Community education may be understood and named differently such as non-formal adult education, outreach, liberal adult education, locally-based adult education, lifelong learning and informal adult education (Connolly, 2011, p. 133). Tilbury and Wortman (2008, p. 84) stated that “as diverse as community education programmes are, most are bound by local context and directed by community knowledge and understanding, providing opportunities to raise awareness, invite participation, cultivate leadership, and encourage democratic decision-making as part of a lifelong learning process”. Despite diversity and differences in perspectives and contexts, the ownership of a community education process “remains with the participants” and is “located within the community and of the community” (Connolly, 2011, pp. 138–139). In the context of this research, for the specific environmental education programme focussing on waste management practices to be located within the community and of the community, it needed to be co-constructed with the villagers and oil palm smallholders.

With this brief background of community education, the stage is set for further discussion on community environmental education. Adult environmental education is a major component of community environmental education because adults play a big role in terms of decision-making and creating impacts in communities. To be relevant to adults, environmental education needs to address social, political and economic factors (UNESCO Institute for Education, 1997, p. 6). Tilbury and Wortman (2008, p. 83) stated that “our communities are where education programmes can most effectively engage people in participation and action” and in “cultivating an individual and collective capacity to participate in action toward a more sustainable future”.

The progress from nature conservation education and environmental education to education for sustainability has seen a shift from a focus on individuals to communities (Wals & Noorduyn, 2010, p. 59). Due to this shift, more attention is given to capacity-building and participation (Wals & Noorduyn, 2010, p. 59). Community environmental education is characterised by being local, collaborative, informed and active to be effective (Andrews & Entine, n.d.). These authors reiterated that the most effective environmental education projects are created in response to local concerns, and that which require active and consistent leadership. For any environmental-related programmes to be effectively implemented, involvement and co-operation from local authorities or other bodies is imperative. One of the examples of support is funding. Tilbury and Wortman (2008, pp. 89–90) suggested that “government agencies, particularly at federal and state levels, where most funding originates, can play a significant role in realigning community education by shifting existing funding to support more learner-centred, action-oriented, futures-focussed, and holistic programmes” as “financial support is crucial to provide more opportunities to train educators how to effectively facilitate learners along their own journeys of learning, participation, leadership, and action”. Partnerships with local governments could add value to local community education efforts such as mentoring programmes and other educational approaches (Tilbury & Wortman, 2008, p. 90).

Various efforts can be taken to enhance collaboration with other partners such as group building, capacity building, conflict management, addressing a substantive issue, developing linkages to improve groups’ effectiveness in relation to other communities, partners or resources, providing recognition and rewards, and adopting a learning organisation perspective (Andrews et al., 2002, p. 166). An informed community will be more likely to be successful in their environmental endeavours than those that are not. Actions should also be related to long-term community vision and goals (Andrews et al., 2002, p. 166). For community environmental education to be active, efforts can be taken such as training to support an initiative or reaching out to people in multiple ways (Andrews et al., 2002, p. 167).

Community environmental education is an education plan constructed through community involvement to match their interests (Andrews et al., 2002, p. 164). One of the goals of community environmental education is to lead to actual environmental improvements (Andrews et al., 2002, p. 165). People are more likely to change behaviour when they are offered behaviour choices which provide immediate consequences, are similar to what others already do, do not require a lot of training and are relatively low cost in terms of time, energy, money and materials (Andrews & Entine, n.d.). At the same time, community environmental education can be carried out successfully if government policy too can be influenced (Clover, 2002, p. 2). A government policy on environmental education acts as a guideline to the implementation of environmental education programmes and may facilitate evaluation of impacts. Peters and Matarasso (2005, p. 326) stated that “community-based environmental education is an approach designed to build ... knowledge and capacity at the local level, so that people can play an active role in conservation”.

To summarise the discussion of community development, community education and community environmental education, the following elements and characteristics are highlighted:

1. In relation to this research, the most appropriate description of community is based on locality.
2. Community development needs to look at both micro and macro levels for effective implementation. However, the emphasis depends on the purpose of the community development programmes.
3. Any community development programme is more likely to succeed if there are shared aspirations and goals.
4. Community participation and motivation are important to ensure the successful implementation of any programme.
5. Community education programmes are mostly bound by local context and encourage lifelong learning.
6. Environmental education programmes need to be located within the community and of the community.
7. Capacity building is an important element in community environmental education.

8. Community environmental education is characterised by being local, collaborative, informed and active.

The next subsection examines some studies in community environmental education.

2.5.3 Community environmental education studies

In this section, a number of studies on community environmental education are reviewed to show how they are similar or different to this study.

A two-case study - the Coast Care Bay of Plenty and the Welcome Bay Catchment Care Group - carried out in the Bay of Plenty region of New Zealand found evidence that environmental programmes guided by some key principles and practices of community environmental education could produce effective environmental outcomes (Blair, 2008, p. 45). These principles were described as public participation, adult environmental education and environmental communication, and the study found that “statutory authorities still have a role to play in empowering citizens with the appropriate skills, values, knowledge, and awareness to take responsibility and action over environmental issues” (Blair, 2008, pp. 45–50). The author stated that the principles and practices of public participation provide a catalyst for collaborative efforts between local communities and various organisations. The Coast Care Bay of Plenty programme has successfully used the elements and characteristics of community development, community education and community-based environmental education, such as local participation and collaboration, to produce effective outcomes of their environmental programmes. This programme was administered by two full-time facilitators who had the expertise in issues pertaining to management of coastal reserve land. A wide range of successful communication strategies were also used to target the wider community such as print media, displays, signage and other educational resources. The study was similar to this research in ways that it collaborated with the local communities and emphasised the importance of participation and collaboration. These key principles were applicable to this research. The Welcome Bay Catchment Care Group project encountered challenges in terms of an initial lack of support from all major stakeholders and the absence of a framework of community environmental education. In relation to

this research, a framework of community environmental education was put in place from the beginning to guide the development of the programme.

The importance of community environmental education is also indicated in research carried out in Tuticorin situated in the southern part of the Gulf of Mannar Marine National Park on the Southeastern Indian coast (Patterson, Linden, Edward, Wilhelmsson, & Lofgren, 2009). Destructive fishing methods have caused considerable damage to the coral reefs and seagrass beds, threatening the reef fisheries in the region. The researchers introduced adult and environmental education, conservation of natural resources, and various other practices to five coastal villages. A campaign carried out in 2008 during the International Year of the Reef has helped to create awareness about the importance of corals and other marine resources among many people in the villages. Through the environmental education programmes, the participants were “well informed about the importance of corals, their ecological and economic role and need for conservation; about global warming and its effects in particular on rising sea levels, impacts to marine resources such as corals and fisheries; and about effects of industrial and domestic pollution on the marine environment” (Patterson et al., 2009, pp. 389–388). The researchers (2009, p. 390) also believed that “any conservation initiative depends on how we genuinely enhance levels of literacy and awareness among the community”. That research highlighted the need to inform the communities about the importance of the environment, and in relation to this study, the focus was particularly on waste management practices, developing their waste management literacy and awareness. Based on the elements and characteristics of community development, community education and community-based environmental education, the research in Tuticorin has emphasised the importance of having an informed community in order to initiate change. Similarly in this study, developing the environmental education programme was focused on informing the community to initiate changes in waste management practices.

The Tambuyog Development Centre in the Philippines developed an environmental education and training programme for coastal communities to enable the fishermen and women to improve their knowledge about marine ecosystem destruction, as well as providing resource management training (UNESCO Institute for Education, 1997, p. 8). One of the lessons learned from

the programme was that awareness-raising and training must be carried out together to achieve sustained change. This particular programme emphasised the elements of an informed community and capacity building. The key principles of awareness, informed community and capacity building in this programme were also applicable to this study as it was concerned with improving environmental awareness among the local communities as well as providing relevant training.

At the Vietnam University of Forestry, a training programme was developed to increase the effectiveness of conservation programmes through community environmental education because local people were seen to be important as managers and direct users of natural resources (Peters & Matarasso, 2005, p. 326). The curriculum's aims for community were to build capacity among the communities in order make conservation and environmentally-conscious decisions, and to increase participation in local environmental and conservation activities (Peters & Matarasso, 2005, p. 329). The authors (2005, p. 336) concluded that "the project has helped to increase the immediate and long-term capacity of the government to incorporate community environmental education training into mainstream training institutions like Vietnam University of Forestry". Based on the elements and characteristics of community development, community education and community-based environmental education, the programme emphasised the elements of an informed community, capacity building and community participation. These key characteristics of the programme were also applicable to this research. However, the approach of this research was different in that the focus was not to incorporate community environmental education training into mainstream training institutions, but to develop an environmental education programme on waste management together with the local communities.

In another study on the use of education for sustainability websites for community education in Chile, it was concluded that "a key aspect of the successful use of Education for Sustainability websites for community education is to achieve meaningfulness and relevance through the website on local community members" (Aguayo, 2014, p. iv). One of the ways was to incorporate various types and sources of information that were of interest to the local communities in the websites (Aguayo, 2014, p. 397). In relation to this research, understanding the perceptions and needs of local communities in terms of waste management was

important to inform the development of the community environmental education programme. However, the use of websites for community environmental education in this research was not planned as part of the programme development. This was mainly due to limited access to the internet in these communities, and the costs of web-based infrastructure. Although some community members had mobile phones, it is unlikely they were using them to access the internet.

For a community development programme to be effective, consultation must first be carried out with community leaders to gauge their opinions, knowledge and priorities. Pre-packaged programmes can still be generally accepted but a better outcome may be obtained if the programme is co-constructed with the community leaders because their opinions, interests and priorities are important to ensure the programme is meaningful, and to create for them a sense of belonging. In the context of this research, community leaders are head villagers and chairmen of Village Development and Safety Committees within the study area.

It is also important to highlight the significance of traditional knowledge when it comes to planning community environmental education. The UNESCO Institute for Education (1997, p. 11) highlighted that “environmental education explicitly draws from the knowledge of the indigenous people and those who are closest to the land. Indigenous communities often possess immensely valuable knowledge and mechanisms for coping with harsh environments.” Chapter 26 of *Agenda 21* promotes the recognition and strengthening of the role of indigenous people and their communities in promoting sustainable development as they have developed holistic traditional knowledge of their lands (United Nations, 1992). Beckford, Jacobs, Williams and Nahdee (2010, pp. 246–247) stated that “aboriginal ecological philosophy may also be used to teach about attitudes towards the environment, responsible stewardship and sustainable lifestyles”; for example “taking as much resource as you can use and minimising waste”. The importance of traditional knowledge in the context of waste management practices was explored during the data collection stage.

2.5.4 Summary of community and environment

The relationship, interaction and association between community and the environment has been discussed because it is one of the core elements of this

research. Community development needs to look at both micro and macro levels for effective implementation. Any community development programme is more likely to succeed if there are shared aspirations and goals. Community participation and motivation are important to ensure the successful implementation of any programme. Community education programmes are mostly bound by local context and encourage lifelong learning. Environmental education programmes need to be located within the community and of the community. Community environmental education is characterised by being local, collaborative, informed, active and emphasises on capacity building. In any community, the presence of strong leadership is vital. For a community development programme to be effective, consultation must first be carried out with community leaders to gauge their opinions, knowledge and priorities. It is also important to highlight the significance of traditional knowledge when it comes to planning community environmental education. The development of the environmental education programme focussing on waste management practices in this research took into account the principles, elements and characteristics of the relationship, interaction and association between community and the environment.

Following the discussion on community and the environment, the next section of this literature review discusses the relevance of community and environmental psychology in this research.

2.6 Community and Environmental Psychology

Since this research requires, to a certain extent, a change of behaviour among the communities in improving waste management practices, it is important to discuss community and environmental psychology, pro-environmental behaviour and environmentally responsible behaviour.

There are numerous definitions of community psychology and one that is relevant to this research is as defined by Nelson and Prilleltensky (2010, p. 23) as “a sub-discipline of psychology that is concerned with understanding people in the context of their communities, the prevention of problems in living, the celebration of human diversity and the pursuit of social justice through social action”. In community psychology, there is a “more holistic, ecological analysis of the person

within multiple social systems, ranging from micro-systems (e.g. the family) to macro-sociopolitical structures” (Nelson & Prilleltensky, 2010, p. 5). Some of the core principles of community psychology as highlighted by Gibson and Swartz (2008, p. 60) include “the value of understanding people within their social context and recognition of the way in which the political world helps to create so-called individual problems”. Aubry, Sylvestre and Ecker (2010, pp. 89–90) highlighted that community psychology is “concerned with an understanding of the relationships among people, groups, communities, social contexts, and social institutions” and has a primary characteristic “of adopting an ecological analysis of disability, dysfunction, and disadvantage in terms of person-environment fit, rather than focussing narrowly on individual-level deficits”. In evaluating the effect of any interventions (such as a waste management programme), one can view experience “through the lens of that intervention” (Riger, 2001, p. 71). One can “look at the extent to which that programme has achieved its stated objectives”, ask the people involved in the programme and “see what the programme looks like from their point of view” (Riger, 2001, p. 71). It is also better to ask “how the person changes, not simply whether the programme was successful” (Riger, 2001, p. 71). In relation to this research, when evaluating the environmental education programme, it is important to note the views of the local communities concerning any change that may have occurred in their daily waste management practices.

In relation to environmental issues, Riemer (2010, p. 500) noted that two values closely linked to community psychology are “the concern for individual, relational and collective well-being, and the fight for social justice”. The association between the environment and the well-being of individuals and groups is twofold, whereby on the one hand, negative impacts of environmental problems such as pollution can change the well-being of people, on the other hand, exposure to nature has positive effects on general happiness (Riemer, 2010, p. 500). Seeking social justice is one of the core values for communities and this is extended to environmental justice because there is an urgent concern of amplified disparities between industrialised and developing nations due to environmental problems such as climate change (Riemer, 2010, p. 502). Riemer (2010, p. 513) argued that “community psychology should be part of the transformative change process that is needed to effectively deal with environmental degradation” by

“helping the environmental movement make the needed transition from ameliorative to transformative change, creating a vision of a good society and building strong collaborative networks”. Combating environmental problems needs bold initiatives that will require community psychology to confront the tensions as a result of disputes (Culley & Angelique, 2011, p. 424). Riemer and Reich (2011, p. 350) argued that “there are strong connections between community psychology’s theoretical perspectives and the changing environment”, for example, “ecological models are needed to address the current crisis and find innovative and sustainable alternatives to our current way of living”. They pointed out that “in the spirit of Einstein’s notion that the problems that exist in the world today cannot be solved by the level of thinking that created them, it is important to recognise the interdependence among the multiple levels of the ecological system and carefully evaluate possible unanticipated consequences of our actions and technological inventions at these different system levels” (Riemer & Reich, 2011, p. 350). In relation to this research on improving waste management practices among villagers and the oil palm smallholders, the programme developed focussed on improving collective well-being in the communities.

There are various definitions of environmental psychology in the literature and one that is relevant to this research is a definition by Steg, van den Berg and de Groot (2013, p. 2) stating that environmental psychology as “the discipline that studies the interplay between individuals and their built and natural environment” in which it “examines the influence of the environment on human experiences, behaviour and well-being, as well as the influence of individuals on the environment”. Egon Brunswik (1903-1955) was one of the “first psychologists who argued that psychology should give as much attention to the properties of the organism’s environment as it does to the organism itself” and that “the physical environment can affect psychological processes subconsciously” (Steg et al., 2013, p. 3). Steg et al. (2013, p. 4) also highlighted that the “continuing and growing concern of environmental psychology is to find ways to change people’s behaviour to reverse environmental problems, while at the same time preserving human well-being and quality of life” . They describe four main features of environmental psychology, namely, human-environment interactions, an interdisciplinary approach, an applied or problem-focus approach, and the use of a diversity of methods (Steg et al., 2013, p. 4). The first of these features focusses

on “the interaction between humans and the built and natural environment” and “how the environment influences behaviour as well as how behaviour results in changes in the environment” (p. 5). The second feature advocates an interdisciplinary approach, whereby environmental psychologists collaborate closely with others in different disciplines because “each discipline provides a different view on the phenomenon under study, while in combination, they provide a comprehensive picture on the problem at stake” (p. 5). The third feature is concerned with both theories and solving real-life problems in order to understand and explain human-environment interactions (p. 5). The fourth feature describes how in terms of research methods, “environmental psychologists try to replicate findings on the same phenomenon using different research methods” so “weaknesses of one research method may be compensated by the strengths of another” (p. 6). Gatersleben (2013, p. 132) emphasised that “the goal of much environmental psychology research is to help understand and change environmental behaviour”. In this research, environmentally responsible behaviour is vital because it is directly linked to potential changes of behaviours among villagers and oil palm smallholders towards better waste management practices. Both community and environmental psychologies have overlapping and common goals contributing towards environmental improvement. These were relevant in this research because by studying the relationship between individuals and their environment, and understanding people in the context of their communities, it gave a holistic and clearer perspective on the potential changes that could occur in relation to waste management practices. Since the study of psychology is about mental functions and behaviours, the next discussion focusses on attitudes and attitude change and subsequently on pro-environmental behaviour and environmentally responsible behaviour.

2.6.1 Attitudes and behavioural change

A further discussion between how attitudes are created, changed and eventually come to influence behaviours is important in this research. Crano, Cooper and Forgas (2010, p. 3) have highlighted that despite decades of research in the field of attitudes, attitude change and their influence on behaviours, these topics remain as fascinating as ever. According to Hungerford and Volk (2001, p. 290), the traditional thinking in environmental education is linked to the assumption that if

people are more knowledgeable, awareness will increase and thus they would be motivated to take actions and change behaviours. However, they added that “research into environmental behaviour, unfortunately, does not bear out the validity of these linear models for changing behaviour” and that “many studies have looked at only one variable at a time, and numerous of these have been correlational studies that cannot claim cause and effect relationship” (Hungerford & Volk, 2001, p. 290). Kollmuss and Agyeman (2002, p. 241) emphasised that the linear “rationalist models assumed that educating people about environmental issues would automatically result in more pro-environmental behaviour”; however, this was not always the case. The models from the early 1970s revealed some flaws as education did not necessarily lead to pro-environmental behaviour (Kollmuss & Agyeman, 2002, p. 241). In terms of making changes at a macro level, Roseland (2012, p. 307) highlighted that “sustainable communities will not come easily” because “they require significant change in our structures, attitudes and values”. On the issue of growing sustainable communities, Brennan and Fien (2013, p. 263) emphasised that “it takes a long time to make a difference” and that persistence is important.

The complexity of changing behaviours was illustrated in a meta-analysis on responsible environmental behaviour conducted by Hines, Hungerford and Tomera. The study resulted in a formulation of an environmental behaviour model that involved numerous variables, “none of which were likely to operate without interacting with others” (Hines, Hungerford, & Tomera, 1987, p. 6). The authors found that a number of variables namely knowledge of issues, knowledge of action strategies, locus of control, attitudes, verbal commitment and individual’s sense of responsibility, were associated with responsible environmental behaviours (Hines et al., 1987, p. 1). They explained that a person who expresses an intention to act would likely engage in action; however, that intention to act appeared to be a result of a combination of variables such as cognitive knowledge, cognitive skills and personality factors (Hines et al., 1987, p. 6). The person must also be aware of the existing environmental issues as well as the knowledge of the available course of action in a given situation (Hines et al., 1987, p. 6). The same authors (1987, p. 7) also highlighted that a person with “an internal locus of control, positive attitudes towards the environment and toward taking action, and with a sense of obligation toward the environment will likely develop a desire to

take action”; however, situational factors such as economic constraints, opportunities to choose different actions or social pressures could either encourage or discourage environmental actions. Kollmuss and Agyeman (2002, p. 240) defined pro-environmental behaviour as “behaviour that consciously seeks to minimise negative impact of one’s actions on the natural and built world (e.g. minimise resource and energy consumption, use of non-toxic substances, reduce waste production)”. Based on the model of pro-environmental behaviour by Kollmuss and Agyeman (2002, p. 257), the possible barriers to positive influence are lack of knowledge, emotional blocking of new knowledge, existing values preventing learning, lack of internal incentives, lack of external possibilities and incentives, lack of environmental consciousness and old habits. In another study on environmental free choice learning, Ballantyne and Packer (2011, p. 201) highlighted that “visitors often leave such experiences with a heightened awareness of conservation issues and intentions to adopt environmentally responsible behaviours” but “only a minority translate these intentions into real actions”. Therefore, they suggested that post-visit action resources were important to remind visitors of their intentions. In relation to this research, this could also be useful for the villagers.

One of the alternatives to reduce this attitude-behaviour gap is through community-based social marketing. McKenzie-Mohr (2011, p. 8) stated that “community-based social marketing has been shown to be very effective at bringing about behaviour change” and it involves “carefully selecting the behaviour to be promoted, identifying the barriers and benefits associated with the selected behaviour, designing a strategy that utilises behaviour-change tools to address these barriers and benefits; piloting the strategy with a small segment of the community, and finally evaluating the impact of the programme once it has been implemented broadly.” Some of the behaviour change tools highlighted by McKenzie-Mohr are the use of commitment, social norms, prompts or incentives (McKenzie-Mohr, 2011, p. 44). For example, using norms such as composting or not burning rubbish to “encourage people to engage in positive behaviours, rather than only avoiding environmentally harmful actions” (McKenzie-Mohr, 2011, p. 70). Using social norms within a community could be effective to encourage other villagers to manage their household or plantation waste better.

Jensen (2002, p. 332) highlighted that “environmental issues in societies are influenced by living conditions as well as lifestyle choices”. Any actions would depend on one’s conscious decision to act and “should be directed at solving a problem”, “decided upon by those preparing to carry out the action” and one also has to be responsible for the actions taken (Jensen, 2002, p. 326; Jensen & Schnack, 2006, p. 483). Jensen (2002, p. 329) emphasised that “knowledge should still be acknowledged as one – among many – important preconditions for the development of competence leading to action and behavioural adjustments in relation to the environment”. Jensen and Schnack (2006, p. 485) also highlighted that “actions and experiences are closed linked” and that “experiences are formed in continuation of actions and actions are performed among other things on the basis of previous experiences”. In the context of this research, in order to change, individuals or groups within a local community need to be able to make a conscious decision to improve waste management in their village and be responsible for actions taken.

Acknowledging the influence of values and culture to encourage action is important. Kahan (2010, p. 297) suggested that one needs to “present information in a manner that affirms rather than threatens people’s values” as well as “to ensure that sound information is vouched for by a diverse set of experts”. The same author (2010, p. 296) emphasised that “people endorse whichever position reinforces their connection to others with whom they share important commitments”. Crompton (2010, pp. 8–9) highlighted that people make decisions based on either the intrinsic or extrinsic values they hold, of which some values are more significant than others at motivating people to engage with bigger-than-self problems, such as global poverty or climate change. He described intrinsic values as “values placed on a sense of community, affiliation to friends and family” and extrinsic values as “values that are contingent upon the perceptions of others – they relate to envy or ‘higher’ social strata, admiration of material wealth, or power” (Crompton, 2010, p. 10). He also emphasised the importance of “bolder leadership from both political and business leaders” as well as “active public engagement” when dealing with problems (Crompton, 2010, p. 8). In the context of this research, it would be meaningful to identify and acknowledge the values that the community members hold within their families or together as a

community. By understanding their values, it could provide an avenue for a deeper engagement with them to deal with issues such as waste management.

2.6.2 Pro-environmental behaviour

This section focusses further on pro-environmental behaviour and environmentally responsible behaviour. Steg and Vlek (2009, p. 309) defined pro-environmental behaviour as “behaviour that harms the environment as little as possible, or even benefits the environment”. Gatersleben (2013, p. 133) explained that pro-environmental behaviour is “beneficial for the environment but is not necessarily motivated by environmental goals” in which “people can act pro-environmentally without any intention to do so, for instance, because the behaviour is habitual (e.g. you always turn the tap off when brushing your teeth) or because the behaviour is motivated by other goals (e.g. not driving to work because cycling is cheaper and healthier)”. Environmentally responsible behaviour is described as behaviours, such as recycling, carpooling and conserving energy, that improve environmental quality and reduce or prevent negative impacts towards the environment (Price, Vining, & Saunders, 2009, p. 362). Precursors to environmentally responsible behaviour include caring, connection, awareness and appreciation for the environment (Price et al., 2009, p. 362). Based on these definitions, the thin line differentiating the terms pro-environmental behaviour and environmentally responsible behaviour rested in the motivation and pre-cursor to the actions. Pro-environmental behaviour is defined from different perspectives by Steg and Vlek (2009), Gatersleben (2013) and Kollmuss and Agyeman (2002). The definitions by Steg and Vlek, and Kollmuss and Agyeman are similar in that they focussed on minimising negative impacts or harm on the environment. Gatersleben, on the other hand, focussed on the benefits for the environment, and further highlighted the motivation or pre-cursor to the actions. In this research, pro-environmental behaviour as defined by Gatersleben (2013, p. 133) is used to examine the reported behavioural responses of the villagers as this helped to determine whether their environmental actions were environmentally-motivated or otherwise.

In promoting behaviour change, Steg and Vlek (2009, p. 309) argued that change is more effective when 1) behaviours to be changed are selected carefully to

improve environmental quality; 2) factors causing those behaviours are assessed; 3) well-tuned interventions are applied to change relevant behaviours and 4) effects of interventions are examined systematically. Cooke and Fielding (2010, p. 156) argued that “for pro-environmental behaviours to be effective at lowering our impact on the environment,[...] it will be essential that the pro-environmental behaviours adopted have high environmental impact, are maintained, and are generalised across multiple target behaviours”. They further argued that “actions that are more sustainable (i.e. easier to maintain) are those that do not need forcing, but rather, is seen as important to who we are, or are enjoyable or satisfying in and of themselves” and “self-determination in motivation could be a key variable for generalisation and maintenance of environmental behaviour” (Cooke & Fielding, 2010, p. 156). These authors proposed that “an emphasis on positive emotions in environmental action (and fun) and a move away from negative emotions (such as guilt), thus satisfying the need for satisfaction and enjoyment, will also enhance autonomous motivation and lead to more effective environmental behaviour” (Cooke & Fielding, 2010, p. 160). In terms of promoting environmental behaviours in workplaces, “organisations are responding to the need to reduce their environmental impact by implementing policies and targets, employing specialist staff, investing in new technologies and working methods, and encouraging employees to change their behaviour through the provision of facilities and training” (Smith & O’Sullivan, 2012, p. 470). However, there are challenges in promoting environmental behaviours in workplaces, such as “a general lack of organisational support including lack of environmental leadership or access to decision makers; organisational cultures and norms where waste is considered to be acceptable; lack of priority of environmental issues; and failure to communicate the organisation’s policy and objectives” (Smith & O’Sullivan, 2012, p. 484). Smith and O’Sullivan (2012, p. 484) further argued that “employees perceive that they are doing what they can, but this is not reflected by either organisational policy or leadership from senior management” and “they highlight the need for cultural change as a top-down priority to influence the behaviour of colleagues and the allocation of resources”. In relation to this research, it was hoped that the environmental education programme could instil the positive emotions and fun to sustain better waste management practices at home, and in workplaces such as the oil palm plantations.

2.6.3 Summary of community and environmental psychology

It is important to understand people in the context of their communities when developing any community development programmes. Both community and environmental psychologies have overlapping and common goals contributing towards environmental improvement, in the case of this research, development of an environmental education programme focussing on waste management practices. Studying the relationship between individuals and their environment, understanding people in the context of their communities, and the complexity of attitude and behavioural changes could give a holistic and clearer perspective on the potential changes that could occur in relation to their waste management practices. The desired outcome of this research was for villagers to have environmentally responsible behaviours related to waste management.

2.7 Chapter Summary

Key ideas are presented in this section as a summary of this chapter on Environmental Education with Local Communities.

A number of critical events in environmental history, especially at the international level, have shaped the form of contemporary environmental education today. In particular, the 1977 Conference in Tbilisi which was a significant event attended by many heads of governments which developed clearly the goals and objectives of environmental education that are still referred to by environmental educators even today. Agenda 21 published in 1992, which contains 40 chapters of holistic blueprint for actions on sustainable development, is still very relevant and continues to guide environmental education in many countries.

In the context of this research and based on the various definitions in the literature, environmental education was defined as a process to impart and instil knowledge, skills, attitudes, motivations and commitment among the population to work towards environmental solutions, problem prevention and to live sustainably. This definition fits well with the objective of the research to work with local communities to improve waste management practices by imparting and instilling relevant knowledge and skills. A desired outcome of this research was that

positive attitudes and motivations could be fostered to develop a long-term commitment towards improved waste management practices.

The synthesis of non-formal environmental education and adult education showed that both are different entities and yet overlap on certain characteristics that would enhance the understanding for a more effective implementation of environmental education programme in my research. Although non-formal environmental education targets both children and adult audiences, it is connected to adult education through one of its target groups, the adults. Both emphasise self-directed and lifelong learning, and being learner-centred. Both advocate practicality and hands-on activity to reach out to adults. Although adult education covers both formal and non-formal, it is linked to non-formal environmental education through its non-formal element.

The key focus of this research was non-formal environmental education. Formal, non-formal and informal education were seen as supplementing one another as each strengthens the other in various settings. This research took a broader approach on non-formal environmental education because waste management was an issue that affected the whole communities. Formal environmental education was not directly included, but could contribute through the involvement of teachers or school staff within the local communities. As adults were the main audience, the non-formal setting was most appropriate in this research. Informal environmental education was not included because it was difficult to identify and to quantify its impact on the communities. Non-formal environmental education has the capability to respond to local environmental issues, and is more useful for communities as it is less influenced by academic requirements. The non-formal setting and ambience were important to engage villagers' interests and motivations. The ultimate aim of this research was to witness transformation and improvement in the ways villagers manage waste at home and in plantations. Important elements of non-formal environmental education included taking into account the rich reservoir of experiences among the villagers, immediate application of knowledge in sustainable waste management practices and encouragement of self-directed learning.

The likelihood that any community development could be successful and could contribute to behavioural change is dependent on various elements such as: shared aspirations and goals, community participation, attitude, motivation, being bound by the local context and located within the community, involve lifelong learning, being learner-centred, collaborative, and informed through awareness and knowledge, with consistent leadership and emphasis on capacity building.

This research was an opportunity to examine, among others, the response of the villagers to determine whether their environmental actions were environmentally-motivated. The desired outcome of the research was for villagers to have environmentally responsible behaviours in waste management.

The key ideas in this chapter and those in the next one on waste management practices provide a foundation for this research and a framework for the design of research instruments - questionnaire, interview questions and focus workshop questions.

2.8 Theoretical Framework of Community

Environmental Education

This research dealt with adults within communities. Therefore, key principles of adult education were incorporated within community education. One of the goals of environmental education is “to create new patterns of behaviour of individuals, groups and society as a whole towards the environment” (UNESCO, 1978, p. 26); therefore, the principles of environmental education are combined with community education to theorise the environmental education programme with and for the communities in this research as shown in the theoretical framework below. Therefore, in this research, the term community environmental education is defined as a process to empower communities, to impart and instil knowledge, skills, attitudes, motivations and commitment among the communities to work towards environmental solutions, problem prevention and to live sustainably.

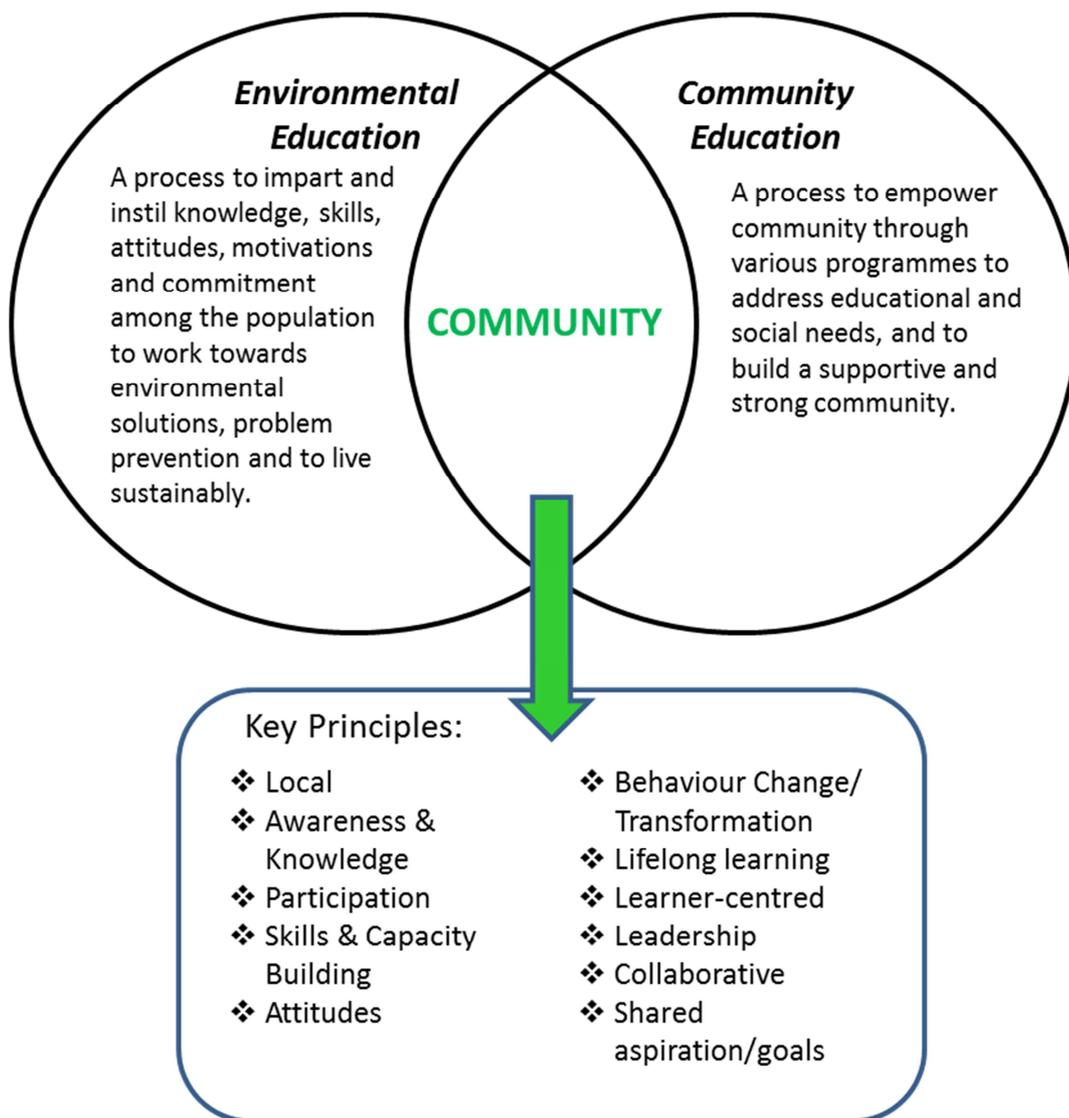


Figure 2.1 Theoretical framework of community environmental education

The key principles from the framework are now discussed.

1. **Local:** Any environmental education programme for communities should be bound by local context and located within the community and developed by the community. Community environmental education programmes, being local, are capable of responding to local environmental issues such as waste management. Therefore, in this research, the environmental education programme needed to be co-constructed with the villagers and independent oil palm smallholders.
2. **Awareness and Knowledge:** Any environmental education programme for communities should help the people to acquire awareness and knowledge of the total environment and its associated problems. In relation to this research, the avenue for creating awareness was during the focus

workshop and the administration of questionnaires. Prior knowledge and rich experiences of communities including traditional knowledge, if any, were also utilised in developing the environmental education programme focussing on waste management practices.

3. Participation: Any environmental education programme for communities should provide the people with an opportunity to participate actively towards environmental protection. In relation to this research, the participation of villagers in the programme implementation was gauged during the focus workshop.
4. Skills and capacity building: Any environmental education programme for communities should help the people acquire skills towards solving environmental problems. Through the implementation of the environmental education programme, it was hoped that it would, to a certain extent, build capacity and skills of villagers to improve their waste management practices. There was a need to capture attention of the villagers and engage them in the learning experience.
5. Attitudes: Any environmental education programme for communities should help the people to acquire attitudes and motivation to actively participate in environmental protection. For the environmental education programme to be sustainable, even after the research was completed, villagers and their leaders needed to continuously be active and motivated in improving their waste management practices.
6. Behaviour Change/Transformation: Any environmental education programme for communities should aim towards positive behavioural change and transformation of perspective; in this research, better waste management practices. However, as there is a lack of linear link between awareness, attitude and behavioural change, one needs to consider other factors that could reduce the attitude-behaviour gaps, such as acknowledging the role of values and social norms.
7. Lifelong learning: Any environmental education programme for communities should emphasise lifelong learning because people can continuously learn throughout their lives. Environmental education can be seen as a process of a series of actions over a period of time. In relation to this research, communities can be seen to continuously improve their practices to reduce disposal and focus more on waste minimisation.

8. Learner-centred: Any environmental education programme for communities should focus on learner-centred or self-directed learning. In relation to the development of the environmental education programme, to a certain extent, the villagers chose how they could improve and set goals in their waste management practices through the focus workshop. After programme implementation, the villagers were encouraged to keep abreast with current development in waste management for communities through the media or internet.
9. Leadership: Any environmental education programme for communities should focus on consistent leadership because it is critical to guide and motivate the people. In this research, leaders were chairman of the Village Development and Safety Committee and heads of villagers. After the environmental education programme was implemented, it was hoped these leaders could continue consistently to guide the villagers on their waste management practices.
10. Collaborative: Any environmental education programme for communities should focus on collaboration. Apart from collaborating among themselves, villagers could improve their waste management practices by collaborating with other organisations in terms of gaining technical advice. Collaboration may already exist between villagers and other organisations, but in terms of environmental issues on waste management, it could be enhanced through the educational programme.
11. Shared aspirations and goals: Any environmental education programme for communities should have shared aspirations or goals to enable the people to work better together to achieve their goals. In relation to this research, the villagers' shared aspirations or goals needed to be determined early in the intervention.

Each of the principles highlighted above have complexities that were explored in the study to a certain extent, including how relevant they were in the context of this research. Throughout the thesis, the connections to these principles are emphasised, for example, in the development of the items in the questionnaire, and how the key ideas in the programme were linked to the principles. The next chapter discusses the literature related to waste management in local communities.

Chapter Three: Waste Management in Local Communities

3.1 Chapter Overview

The literature reviewed in this chapter revolves around waste management in local communities. The chapter discusses the background of waste management, its pertinent issues, waste management regulations and practices, agricultural waste management and waste management perceptions and practices in communities.

A brief history of waste is highlighted in this research as it gives a snapshot of how waste management has developed over time. The components of waste management are discussed, namely waste minimisation/source reduction, recovery, and disposal. A myriad of waste issues related to environmental and public health, wildlife, odour problems and poor aesthetics are discussed. Waste management regulations and practices in residential areas and agricultural activities are highlighted. Agricultural waste management and existing waste management practices in communities are discussed and elaborated.

3.2 Background of Waste Management

This section looks broadly at the background of waste management, highlighting a brief history of waste, some definitions, and its components.

Literature, historical report and research on waste are limited, as O'Brien (2008, p. 11) reported that "there are hardly any detailed, historically sensitive studies of how societies have dealt with their waste and, conversely, the role that those waste have played in historical development and social change". However, there are some records of historical waste disposal in Europe and the United States. For example, in medieval London, "the Fleet and Thames rivers were choked with refuse and sewage, and the town ditch, a defensive moat completed in 1213, regularly overflowed with accumulated detritus" (O'Brien, 2008, p. 13). Withgott and Brennan (2011, p. 620) gave an example that "until the mid-19th century, New York City's official method of garbage disposal was to dump it off piers into the East River". During the first Industrial Revolution in the United States, from

the mid-18th until mid-19th century, “factories were located near rivers because the water provided a number of benefits, including easy transport of materials by boat, enough water for processing and cooling, and easy disposal of waste into the river” (Botkin & Keller, 2011, p. 529). However, “starting in the middle of the 19th century, as cholera and other infectious diseases reached the cities of Europe and North America, legislation was gradually introduced to address the problem of poor sanitation conditions” of which “this legislation both established strong municipal authorities and charged them with increasing responsibility for removing solid waste and keeping streets clean and litter free” (United Nations Human Settlements Programme, 2010, p. 19).

As countries become richer, more solid waste is produced especially in the growing cities throughout the world (Porter, 2002, p. 2). The rise of imported and cheap consumer goods has also seen an increase in waste (Schofield, 2010, p. 224). Garbage, refuse, trash, litter or waste are terms used to describe any material or substance that results from a human activity or process that is thrown away, discarded or unwanted (Chhatwal, 1997, p. 1; Nathanson, 1997, p. 273; Withgott & Brennan, 2011, p. 618). Chhatwal (1997, p. 7) defined solid waste as “non-liquid waste materials arising from domestic, trade, commercial, industrial, agriculture and mining activities, and from the public services” and comprises of materials such as “dust, food waste, packaging in the form of paper, metals, plastics or glass, discarded clothing and furnishings, garden waste, and hazardous and radioactive waste”. Household or domestic waste consists of things that are discarded, including those still usable or recyclable, such as waste food, papers and newspapers, packaging, bottles and clothing (Hill, 2010, p. 313). In the context of this research, the terms ‘waste’, ‘garbage’ and “litter” were used interchangeably to indicate domestic waste from homes, and where appropriate, the term ‘agricultural waste’ is used to define waste from agricultural activities.

In nature, waste is not found, simply because nature has the ability to recycle all components in the ecosystem; however, waste exists due to urbanisation and population growth (Periathamby, 2011, p. 109). Jambeck et al. (2015, p. 770) also highlighted that “historically, waste management by burying or burning waste was sufficient for inert or biodegradable waste, but the rapid growth of synthetic plastics in the waste stream requires a paradigm shift”. In this modern era, waste

disposal seems to be a common and simple problem, but its effects transcend all environmental boundaries that contribute to water, air and land pollution (Chhatwal, 1997, p. 6; Nathanson, 1997, p. 273). With the rising human population, now standing at seven billion, more material goods are produced and consumed, resulting in more waste generation (Withgott & Brennan, 2011, p. 618). The tendency of people to “discard what is not needed creates the need for waste management” (Agamuthu, Khidzir, & Hamid, 2009, p. 626). Hence, the urgency to improve the effectiveness of waste management is also increasing. Fauziah and Agamuthu (2012, p. 656) stated that “waste management has become an issue of concern ever since humans began to build communities within a concentrated area” and that disposal of waste was “solely to remove food and breeding media for flies and rats and to remove “waste from near living spaces”. However, the same authors (2012, p. 656) further highlighted that disposal dumps have become major sources of regional environmental pollution due to emission of leachate and gas into groundwater as well as surface water. In relation to this research, one of the strategies was to create awareness and to inform the communities about existing waste management problems and their effects on water, air and land.

3.2.1 Components of waste management

There are various ways the elements and components of waste management are presented in the literature. Although most elements are similar, they are presented with different perspectives. In this research, the three main components of waste management referred to were those according to Withgott and Brennan (2011, p. 618), namely “1) minimising the amount of waste we generate, 2) recovering waste materials and finding ways to recycle them and 3) disposing of waste safely and effectively”.

Waste minimisation or source reduction is the preferred approach in waste management. Among the ways to reduce the amount of materials entering the waste stream are: 1) consumers purchase less goods or goods with minimal packaging, 2) use durable products (choose vehicles, light bulbs or furniture that will last longer), 3) purchasing used items, 4) donating old items, 5) manufacturers to make industrial practices more efficient, 6) reduce consumption 7) purchase products made from recycled materials, and 8) purchase products designed for ease in recycling (Botkin & Keller, 2011, p. 537; Buckingham &

Turner, 2008, p. 158; Withgott & Brennan, 2011, p. 618). Waste recovery is defined as “the use of a material not necessarily in its original form” (Buckingham & Turner, 2008, p. 162) which involves “removing waste from the waste stream” (Withgott & Brennan, 2011, p. 618). Recycling and composting are both categorised under recovery (Withgott & Brennan, 2011, p. 618). Recycling, a process of “collecting used goods and sending them to facilities that extract and reprocess raw materials that can then be used to manufacture new goods” (Withgott & Brennan, 2011, p. 618), offers many advantages. Among the advantages are “conservation of natural resources, reducing the demand for incineration and landfill space, reducing the demand for both energy and virgin raw materials” as well as “giving people who recycle an individual sense of responsibility concerning the waste they produce” (Buckingham & Turner, 2008, p. 162). However, Buckingham and Turner (2008, p. 162) cautioned that it could “divert people from minimising their waste by making them feel that they are already making their contribution to waste minimisation” and becoming more complacent. Composting is “a biochemical process in which organic materials, such as lawn clippings and kitchen scraps, decompose to a rich, soil-like material” of which it “involves rapid partial decomposition of moist solid organic waste by aerobic organisms” (Botkin & Keller, 2011, p. 532). To do composting, it is necessary to separate organic material from other types of waste (Botkin & Keller, 2011, p. 533). Once the compost matures, it can then be used for gardening purposes. However, one of the drawbacks of composting is that soil or “composting plant debris previously treated with herbicides may produce a compost toxic to some plants” (Botkin & Keller, 2011, p. 533).

At present time, disposal of waste is inevitable regardless of how “effectively we reduce our waste stream through source reduction and recovery” (Withgott & Brennan, 2011, p. 618). Disposal methods used are open dumps (less desirable option), sanitary landfills and incineration. Open dumps, where waste is piled and left uncovered, are still being used worldwide, although many developed countries, including the United States, have reportedly stopped using this method (Botkin & Keller, 2011, p. 533). In contrast to open dumps, a sanitary landfill is “designed to concentrate and contain refuse without creating a nuisance or hazard to public health or safety” in which the idea is “to confine the waste to the smallest practical area, reduce it to the smallest practical volume, and cover it with a layer

of compacted soil at the end of each day of operation, or more frequently, if necessary” (Botkin & Keller, 2011, p. 533). The bottoms and sides of a sanitary landfill are lined with heavy-duty plastic and impermeable clay to help prevent contamination of aquifers (Withgott & Brennan, 2011, p. 622). A sanitary landfill also has “systems of pipes, collection ponds, and treatment to collect and treat leachate, liquid that results when substances from the trash dissolve in water as rainwater percolates downwards” (Withgott & Brennan, 2011, p. 622). However, if poorly managed, leachate can be the most significant hazard from a sanitary landfill as it is capable “of transporting bacterial pollutants” (Botkin & Keller, 2011, p. 533). Potential pollutants from a sanitary landfill can enter into the environment through various paths. Those paths as described by Botkin and Keller (2011, p. 534) are:

1. Methane, ammonia, hydrogen sulphide, and nitrogen gases can be produced from compounds in the waste and the soil and can enter the atmosphere;
2. Heavy metals, such as lead, chromium, and iron, can be retained in the soil;
3. Soluble materials, such as chloride, nitrate and sulphate can readily pass through the waste and soil to the groundwater system;
4. Overland runoff can pick up leachate and transport it into streams and rivers;
5. Some plants (including crops) growing in the disposal area can selectively take up heavy metals and other toxic materials. These materials are then passed up the food chain as people and animals eat the plants;
6. If plant residue from crops left in fields contains toxic substances, these substances return to the soil;
7. Streams and river may become contaminated by waste from groundwater seeping into the channel or by surface runoff; and
8. Wind can transport toxic materials to other areas.

Christensen (2011, p. 13) highlighted that “worldwide, a lot of municipal waste is not managed in an organised way but is still being dumped, and landfill is definitely still the predominant waste management technology”. Incineration is a process that “burns combustible waste at temperatures high enough (900°-1000°C)

to consume all combustible material, leaving only ash and non-combustibles to dispose of in a landfill” (Botkin & Keller, 2011, p. 533). Incineration reduces waste weight “by up to 75% and its volume by up to 90%” (Withgott & Brennan, 2011, p. 623); however, the remaining ash contains toxic components and must be disposed of in special hazardous waste landfills. As mentioned earlier, these landfills may also produce toxic gas such as methane or ammonia in the air (Botkin & Keller, 2011, p. 534).

Managing solid waste in affordable and sustainable ways is one of the key challenges faced by many countries. Periathamby (2011, p. 110) stated that challenges related to poor waste management included “inadequate waste collection system, low recycling rate, poor treatment or no treatment, uncontrolled disposal, inadequate technology and low awareness of health risks”. Christensen (2011, p. 13) highlighted that “although the criteria for waste management are developing, the management of waste varies significantly among countries” and is “due to differences in the waste, availability of land, possibilities for using the materials and energy held in the waste, costs, political focus and national preferences”. The United Nations Human Settlements Programme or UN-Habitat highlighted in its publication *Solid Waste Management in the World Cities* that “there are no perfect solutions, but also no absolute failure: the specific technical and economic approaches that work in, say, Denmark or Canada or Japan may not work” in one’s country and that there is a need to “identify, capitalise on, nurture and improve the indigenous processes that are already working well” (United Nations Human Settlements Programme, 2010, p. xix). Therefore, in relation to this research, the environmental education programme focussing on waste management practices had to be appropriate to the community’s circumstances and needs, and located within the community and of the community.

3.2.2 Summary of background of waste management

As a summary of this section on the background of waste management, key ideas are outlined. A brief history of waste was highlighted in this research to give a snapshot of how waste management developed over time. In the context of this research, the terms ‘waste’, ‘garbage’ and ‘litter’ were being used interchangeably to indicate domestic waste from homes, and where appropriate, the term ‘agricultural waste’ was used to define waste from agricultural activities. One of

the strategies in this research was to create awareness among the communities and inform them about waste management issues and challenges and their impacts on water, air and land. The components of waste management discussed were minimisation, recovery and disposal. The environmental education programme focussing on waste management practices in this research would be developed based on the needs to be appropriate to the community's circumstances, and was located within the community and of the community.

The next section focusses on pertinent issues as consequences of poor waste management.

3.3 Waste Management Issues

Humans have been struggling in managing waste since they began living in concentrated groups, as highlighted in the earlier section. Hill (2010, p. 343) highlighted that countries with few resources to deal with the waste which causes filthy streets or diseases face a doubling effect of the waste problem within 20 years. Human health and the environment are negatively affected by waste through degradation of water quality, soil quality and air quality (Withgott & Brennan, 2011, p. 618). Escalating production and consumption of manufactured goods due to economic transformations has led to the massive production of waste (MacRae, 2012, p. 72). It had been estimated that "more than a billion people worldwide live in slums in cities such as Bombay, Bogata, Cairo or Manila" (Hill, 2010, p. 343). Improper waste management in these places has led to a myriad of issues related to environmental and public health, odour problem and poor aesthetics.

Issues related to waste management are now discussed.

3.3.1 Environmental and public health

When waste is not disposed of appropriately, it can harbour rodents and insects that are vectors of infectious diseases (Nathanson, 1997, p. 273). UN-Habitat argued that because of the importance of public health, authorities should choose to invest in a waste system, although such investment is expensive and that there is a competition for resources with critical systems such as hospitals and schools

(United Nations Human Settlements Programme, 2010, pp. 21–22). Christensen (2011, p. 8) highlighted that “accumulated waste easily accessible by insects, animals and humans, in particular children, may constitute health issues” of which “pathogens in the waste may spread by direct or indirect contact (water, air, insects, small rodents) or the waste may enhance the survival and spreading of infected vectors such as rats, seagulls, etc. that feed or nest in the waste”. On the same note, McKenzie, Pinger and Kotecki (2008, p. 451) stated that solid waste that is not managed properly could be “a focal point where hosts, prey parasites, food and disease agents and vectors combine to produce a human-made environmental health hazard”. Small island nations, as highlighted by Agamuthu and Herat (2014, p. 681), experienced various impacts due to poor waste management such as accumulation of harmful substances and spreading of infections.

3.3.1.1 Water pollution

Fresh water is essential to life, and people are dependent on clean water for health and survival (McKenzie et al., 2008, p. 473). However, in many parts of the world such as Asia and Africa, there is a lack of supply of clean water, and people are left with no choice but to consume polluted water (McKenzie et al., 2008, p. 473). As reported by UN-Habitat (2010, p. 22), “uncollected solid waste clogs drains and causes flooding and subsequent spreading of water-borne diseases”. For example, blocked drains due to uncollected waste was the cause of a serious flood in Surat, India in 1994 that affected 1000 victims (United Nations Human Settlements Programme, 2010, p. xx).

There are two main types of water pollution, namely point source and non-point source. Point sources come from big and easily identifiable facilities such as pipe, drains, factory or culvert, while non-point sources are harder to identify such as streets, roofs, agricultural areas, logging, mining sites and leachate from landfills (Hill, 2010, pp. 239–240; McKenzie et al., 2008, pp. 473–474). Biological and chemical pollutants from both point and non-point sources are of concern to communities due to health risks as well as impacts on wildlife. Biological pollutants such as bacteria, parasites and viruses enter the water bodies through various ways including poor sanitation and management of solid waste. Chemical

pollutants include pesticides, dioxin and more recently detected pollutants such as pharmaceutical and personal care products that could enter into water bodies (McKenzie et al., 2008, p. 475).

3.3.1.2 Marine pollution

With the increasing amount of waste generated in all countries, it is unfortunate that many coastlines – even on isolated Arctic beaches – are strewn with waste, including plastic debris (Hill, 2010, p. 257). Hill (2010, p. 257) highlighted that various types of waste including plastic bags, bottle tops, polystyrene from coffee cups have been discovered in the stomachs of dead birds, sea turtles, dolphins and sea lions. Islands have also been observed to have an increasing trend in waste generation especially in places where tourism is flourishing (Periathamby, 2011, p. 116). The same author (2011, p. 118) highlighted that among the issues of waste management identified on islands were marine pollution from land-based sources and agricultural run-off, ineffective regulation and lack of waste disposal sites. Agamuthu and Herat (2014, p. 681) stated that apart from health impacts to the people caused by poor waste management, small island nations experienced increased nutrients in coastal waters and groundwater, blocking of waterways and marine debris.

In a recent article published in the journal *Science*, a group of researchers calculated that 275 million metric tons (MT) of plastic waste was generated in 192 coastal countries in 2010, with 4.8 to 12.7 million MT entering the ocean (Jambeck et al., 2015, p. 768) . This research linked worldwide data on solid waste, population density, and economic status to estimate the mass of land-based plastic waste that entered the ocean. The researchers warned that “without waste management, infrastructure developments, the cumulative quantity of plastic waste available to enter the ocean from land is predicted to increase by an order of magnitude by 2025” (Jambeck et al., 2015, p. 768).

3.3.1.3 Air pollution

While air pollution could still be attributed to natural phenomena such as forest fires or volcanic eruptions, a greater threat to air quality and health is waste products created by modern industrialised civilisation (McKenzie et al., 2008, p.

463). It has been well-documented that air pollution could cause burning sensation to eyes and nose, irritated throat and breathing problems, while some chemicals found in polluted air could cause more serious conditions such as cancer or nerve damage (McKenzie et al., 2008, p. 463). Based on UN-Habitat's data, it showed that there have been "significant increases in the incidence of sickness among children living in households where garbage is dumped or burned in the yard" (United Nations Human Settlements Programme, 2010, p. 22). Hill (2010, p. 343) highlighted that residents in places without waste collection services sometimes burn waste to reduce volume, which in turn emits noxious smoke. Vallero (2011, p. 245) highlighted that the "predominant concern with atmospheric waste is chemical contamination, which presents a hazard to human health" as well as ecosystems and non-living systems. Agamuthu and Herat (2014, p. 681) stated that:

open burning of municipal waste [in small island nations] is also quite common despite laws to the contrary, and towns and cities have been continuously exposed to destructive effects, such as carcinogenic toxins from uncontrolled burning and other impacts of poor waste management.

3.3.2 Poor aesthetics and odour problem

Unmanaged waste could also be a source of nuisance. Christensen (2011, p. 8) stated that "where waste accumulates over time because of ineffective waste collection and public cleansing, nuisances such as odours, flies, blowing litter, etc. may develop and become a problem for neighbours and an aesthetic problem for the community". As Drackner (2005, p. 178) stated "flies are perceived as disgusting and revolting creatures" and are connected to "the spread of diseases". The same author (2005, p. 178) highlighted that "waste in the streets can also be perceived as social contagion, an artefact of negative aesthetics".

When dealing with waste management in local communities, they can be clearly informed about issues related to improper waste management. In relation to this research, the development of an environmental education programme focussing on waste management practices included awareness on issues related to poor waste management and their impacts on people and their surroundings.

The next section discusses waste management regulations and practices.

3.4 Waste Management Policies, Regulations and Practices

Each country has its own policies, regulations and practices to deal with various types of waste. In most countries, management of waste is under the purview of local authorities or municipal councils. Herat (2015, p. 1) highlighted that in developing countries, “local authorities are experiencing major resource limitations to provide proper waste management to their citizens” and only a small fraction of their budget is for solid waste management. Therefore, “waste collection rates remain low and the transport of waste, inefficient” (Herat, 2015, p. 1).

In the context of this research, the terms ‘policies’, ‘regulations’ and ‘law’ were used interchangeably to describe official or formal documents pertaining to the management of waste.

The next section presents examples of waste management regulations and practices in Malaysia and New Zealand.

3.4.1 Waste management policies and practices in Malaysia

This sub-section discusses waste management regulations and practices in residential areas as well as for agricultural activities in Malaysia, particularly in Sabah.

In Malaysia, not all residential or commercial areas receive waste management services. Only residents within the rated area will receive public services such as waste collection. Those living within the rated area are required to pay assessment tax annually to the local authority to finance, among others, maintenance of public amenities and waste management. Most rural areas in Malaysia are outside the rated area and face significant challenges to dispose of waste appropriately. According to a report prepared by Chemsain Konsultant (2007c, p. 12), “collection of solid waste is limited by the distinction between rated and unrated areas” in Sabah and this is due to challenges faced by local authorities such as lack of manpower and transportation facilities. The *10th Malaysia Plan* has highlighted the importance to strengthen the provision of essential public utilities

in terms of quality of service and coverage, of which one of the priority areas is restructuring solid waste management (The Economic Planning Unit, Prime Minister's Department, 2010, p. 281). At the time of planning for data collection in early 2013, the area chosen for this research was still located outside the rated area of Beaufort District Council. In this research, the perspective of environmental education was taken as one of the ways to improve waste management practices among the communities.

At present, well-established and holistic regulations, practices or guidelines on waste management seemed to be difficult to find. Most developing countries still struggle to improve their waste management systems. In Malaysia, it was reported that “the legislation on solid waste management does not address all the needs of solid waste management” and “no federal or state legislation covers all aspects of solid waste management” (Chemsain Konsultant, 2007b, pp. 2–1). Various federal legislation that do exist, such as the Local Government Act (1976), the Environment Quality Act (1974) and the Town and Country Planning Act (1976), are claimed to be not sufficient for effective solid waste management (Chemsain Konsultant, 2007b, pp. 2–1).

In Sabah, there are a number of state laws and official documents with relevance to solid waste management, such as the Environment Protection Enactment 2002, Town and Country Planning Ordinance 1950/Town and Country Planning (Amendment) Enactment 2002, Public Health Ordinance 1960 and the Uniform (Anti-Litter) By-Laws 2010 (Chemsain Konsultant, 2007b, pp. 2–23). The Uniform (Anti-Litter) By-Laws 2010 is enforced under the jurisdiction of local authorities. The by-laws cover issues on abandoned vehicles, building, garden refuse and litter (Ministry of Local Government and Housing, 2010, p. 1).

It was also reported that at present “there are no clearly documented solid waste management policies at the state or local government level” but there are initiatives taken by state governments to produce waste management plans; an example of such is the Solid Waste Management Master Plan Study in Sabah (2007, p. 2–2). This master plan “covers a long-term solid waste management plan programme of over a period of 30 years from 2007 to 2036” and consists of “a comprehensive study of the problems and practical solutions for the whole

Study area which comprises of 22 local authorities in Sabah” (Chemsain Konsultant, 2007c, p. 1). The plan was prepared and reported in three volumes by Chemsain Konsultant for the Ministry of Local Government and Housing Sabah. The master plan’s policy framework contains four thrusts namely “establish legal and institutional framework; awareness and public participation; privatisation of solid waste management services; and technologies that are safe, proven, cost-effective, environmentally-friendly and that incorporate waste reduction through 3R” (Chemsain Konsultant, 2007c, p. 41).

A recent initiative announced by the National Solid Waste Management Department Malaysia stated that households will have to separate dry and wet waste beginning September 2015 in Kuala Lumpur, Putrajaya, Negeri Sembilan, Malacca, Johor, Pahang, Kedah and Perlis (New Strait Times, 2014). It was reported by New Strait Times (2014) that the government hoped “to reduce by 20% the amount of waste dumped in landfills”. As indicated, this initiative does not include Sabah.

In terms of agriculture-related guidelines for oil palm plantations, one of the international documents available is a generic guidance called the *RSPO Principles and Criteria for Sustainable Palm Oil Production: Guidance for Independent Smallholders under Group Certification* prepared by the Roundtable for Sustainable Palm Oil (RSPO) in 2010. At least two criteria listed were related to waste management. Criterion 5.3 stated that “waste is reduced, recycled, re-used and disposed of in an environmentally and socially responsible manner” and the group manager is required to do the following (RSPO, 2010, p. 32):

Group Managers shall ensure that group members are made aware of the need to identify all waste and dispose of it in a responsible manner. This is monitored and overseen by the Group Manager. There should be appropriate disposal of hazardous chemicals and their containers. Surplus chemical containers should be disposed of such that there is no risk of contamination of water sources or to human health. The disposal instructions on manufacturer’s labels should be adhered to.

Criterion 5.5 of the document stated that “use of fire for waste disposal and for preparing land for replanting is avoided except in specific situations, as identified in the ASEAN guidelines or other regional best practice” (RSPO, 2010, p. 33).

Under the Malaysian Palm Oil Board (MPOB), a *Code of Good Agricultural Practice for Oil Palm Estates and Smallholdings* was developed as a guideline. According to MPOB (2008, p. 1), the code's objective is to "ensure that sustainable palm oil is produced to meet requirements of food safety, quality of palm oil, environmental protection, biodiversity enhancement and reduction of greenhouse gas emissions". Section 4.13.1 of the guidelines (Malaysian Palm Oil Board (MPOB), 2008, p. 10) emphasised that:

crop producers should conform to the Environmental Quality Act 1974 (Act 127) and Regulations which covers the concerns of air, water, soil and other environmental issues, such as the practice of zero burn, replanting, protection of watercourses through maintenance of riparian buffer zones and avoidance of adverse impacts on downstream users.

In the document, there are also provisions for managing waste in plantations, namely section 4.8.11 on proper disposal of empty pesticide container, section 4.9.2.4 on fronds and section 4.11 on by-products, waste and pollution management (Malaysian Palm Oil Board (MPOB), 2008, pp. 8–9). Section 4.8.11 of the guidelines (Malaysian Palm Oil Board (MPOB), 2008, p. 8) highlighted that:

empty pesticide containers should not be re-used and their disposal shall be in a manner that avoids exposure to humans and contaminants of the environment; official collection and disposal systems should be used if available and empty containers should be rinsed at least three times with water and the washings returned to the spray tank.

It also highlighted that rinsed containers had to be pierced to prevent reuse unless the smallholders participate in established recycling programmes or with permission from relevant authorities (Malaysian Palm Oil Board (MPOB), 2008, p. 8). If the containers are to be disposed of, they needed to be secured and disposed in accordance with the Pesticide Act 1974 or other relevant regulations. Section 4.9.2.4 stated that "pruned fronds should be staked in designated piles", while section 4.11 emphasised that 'all possible by-products, waste and sources of pollution should be identified in all areas of oil palm production' and "having identified waste and pollutants, an operational plan should be developed and implemented to avoid or reduce waste and pollution" (Malaysian Palm Oil Board (MPOB), 2008, p. 9). Pruned fronds and biomass at felling should be mulched in the field and dumping of external waste by estate and smallholding is not allowed in their property (Malaysian Palm Oil Board (MPOB), 2008, p. 9).

In 2013, a Malaysian standard providing general principles for independent smallholders was formulated. The *Malaysian Sustainable Palm Oil (MSPO) Part 2: General principles for independent smallholders* standard covers “areas of operations of the independent smallholders sector of the oil palm industry, comprising sustainable palm oil clusters and other management systems and operations” (Department of Standards Malaysia, 2013, p. 1). It stated that this standard is applied with reference to, among others, the code of good agricultural practice for oil palm estates and smallholdings described previously (Department of Standards Malaysia, 2013, p. 1). In section 4.5.3 of this document, it was stated that “all waste products and sources of pollution shall be identified” and “independent smallholders shall ensure that waste from their smallholdings is disposed of appropriately” and that they “shall adopt local and national legislation to dispose of hazardous chemicals and their containers” (Department of Standards Malaysia, 2013, p. 5). Section 4.5.6 of the document also highlighted that open burning should not be carried out by the smallholders unless they obtain permission from relevant authorities (Department of Standards Malaysia, 2013, p. 5).

In relation to this research, more information on the actual practices as reported by independent oil palm smallholders were obtained through the data collection.

The next section highlights waste management regulations and practices in New Zealand to give a snapshot of how waste management in both a developing and a developed country faced limitations, in this case, in Malaysia and New Zealand.

3.4.2 Waste management policies and practices in New Zealand

This sub-section discusses briefly the waste management regulations and practices in New Zealand.

In New Zealand, the Ministry of the Environment is the main government body that administers waste management law under the Environment Act 1986 (Schofield, 2010, p. 230). A document, namely the New Zealand Waste Strategy, was produced by the Ministry in 2002 that sought “to cover solid, liquid and gaseous waste as part of achieving zero waste and sustainability” (Schofield, 2010,

p. 230). Davies (2009, p. 173) highlighted that in the beginning, the focus of New Zealand's waste management was on "improving established mechanisms for disposing of waste and managing the effects of waste facilities"; however, now the focus has shifted to waste minimisation. The Waste Minimisation Act 2008 was formulated to "encourage the minimisation of waste and decrease waste disposal in order to protect the environment from harm while providing environmental, social, economic and cultural benefits" (Schofield, 2010, p. 231). Based on the research carried out by Davies (2009, p. 173), there were concerns by people from the public, private and civil society on waste management in New Zealand, especially on underdevelopment of waste prevention and minimisation, uneven focus on waste reduction and recycling among local councils, as well as the uneven levels of information, knowledge and expertise throughout the country.

Despite the challenges, apart from government efforts, there have been various works carried out by non-governmental organisations towards better waste management in the country. For example, the Zero Waste New Zealand Trust is a charitable organisation "designed to achieve zero waste through sustainability" (Schofield, 2010, p. 231) with a focus on creativity and resourcefulness. Various community groups as well as businesses also provide waste services to the communities (Schofield, 2010, p. 231). The most significant role in waste management laws rest mainly on the territorial authorities of which they need to adopt a waste management and minimisation plan as well as provide educational activities and grant (Schofield, 2010, p. 232).

As mentioned earlier, the brief scenarios in Malaysia and New Zealand gave an indication that waste management in either a developing or developed country face limitations and that as long as there are people, various types of waste would be generated. The next section discusses agricultural waste management specifically related to oil palm plantations.

3.5 Agricultural Waste Management

In this research, villagers and independent oil palm smallholders were defined as the local communities. This section discusses agricultural waste management while the next focusses on waste management in residential areas.

Among the numerous definitions of agriculture in the literature, the definition by the International Labour Office (1999, p. 77) is used in this research, of which it defines agriculture as “all forms of activities connected with growing, harvesting and primary processing of all types of crops, with the breeding, raising and caring for animals, and with tending gardens and nurseries”. As with other activities, waste are inevitably produced in the agriculture sector, and therefore require proper management. The United Nations (1997, p. 3) defines agricultural waste as:

waste produced as a result of various agricultural operations. It includes manure and other waste from farms, poultry houses and slaughterhouses; harvest waste; fertiliser run-off from fields; pesticides that enter into water, air and soils; and salt and silt drained from fields.

Agricultural pollution is defined as “liquid and solid waste from all types of farming activities, including run-off from pesticide and fertiliser use, and from feedlots; erosion and dust from ploughing; animal manure and carcasses; and crop residues and debris” (United Nations, 1997, p. 2). However, Boyd (1994, p. 7) also stated that agricultural waste “may be used as a source of energy, bedding, animal feed, mulch, organic matter or plant nutrients”. It was highlighted by Nagendran (2011, p. 343) that agriculture uses a global average of 70% of surface water supplies and also causes a significant degradation of surface and groundwater resources. One of the main causes of water pollution due to agricultural activities is “post-precipitation run-off of chemicals used in fertiliser and pesticide formulations” (Nagendran, 2011, p. 343). One of the key constraints faced in agricultural waste management is the “lack of data pertaining to different geographical regions” and only “scattered information on current and futuristic options for managing agro waste is available” (Nagendran, 2011, p. 349).

3.5.1 The oil palm industry

The oil palm industry is one of the major agricultural activities in many tropical countries. In Malaysia, Yusoff (2006, p. 88) highlighted that the palm oil industry

“has grown to become a very important agriculture-based industry”. The uses of oil palm by-products from the mills are increasingly being documented and research in this area is expanding. Oil palm by-products such as empty fruit bunches, palm oil mill effluent (POME), steriliser condensate, palm fibre and palm kernel shell are increasingly being re-used for various purposes in Malaysia (Sheil et al., 2009, p. 12; Yusoff, 2006, p. 88). Yusoff (2006, p. 88) highlighted that empty fruit bunches and mill effluent “have been used extensively as mulch and organic fertiliser in oil palm areas, while fibre and shell are used as fuels, making the palm oil mill self-sufficient in energy”. Having stated this, however, Yusoff (2006, p. 89) also raised concerns that “there were still many environmental pollution issues that need to be addressed on a dynamic basis even though the existence of environmental laws and regulations ... to govern the management of crude palm oil mills has helped to facilitate the overall environmental pollution problems in the country”. Organisations such as Friends of the Earth claimed that there are still waste management issues in mills that warrant serious attention, such as the release of untreated POME, a mixture of water, crushed shells and fat residues, and its potential contamination in rivers (Friends of the Earth, 2004, p. 15). This organisation (Friends of the Earth, 2004, p. 15) also stated that although there are “responsible mills that store POME waste in basins in the hope of detoxifying it, the basins often overflow during bouts of heavy rain or intensive production”. With regards to waste management practices by independent oil palm smallholders, little is known at present. Most of the literature reviewed up to now has focussed more on production processes, land ownership status, technical assistance and crop pricing issues (Vermeulen & Goad, 2006, pp. 5–6).

The next section discusses waste management in residential areas, highlighting examples of environmental education programmes on waste management practices.

3.6 Waste Management in Residential Areas

Any environmental education programme focussing on waste management practices has to be appropriate to the community’s circumstances and needs, and located within the community and of the community. The US Environment

Protection Agency (1995, pp. 3–2) suggested that “developing a successful waste management programme requires accurate up-to-date information about the community’s waste profile”, for example, the types of waste generated. Agamuthu et al. (2009, p. 626) emphasised that “better education on the ways to reduce or reuse waste reduces the burden of managing waste”.

Based on the literature on waste management from different countries such as Thailand, Peru, Cameroon, Malaysia, Sweden, Brazil and Poland, waste management is still a major issue in urban and rural areas. MacRae (2012, p. 78) expressed that “everyone has it (the problem of solid waste), everyone is looking for solutions, but nobody seems to have got it entirely right yet, let alone has a standard model emerged”. The author further added that interactions of social and cultural factors with technical and economic ones are vital to further aid the success of waste management models (MacRae, 2012, p. 79). This section reviews reports on how communities in different countries manage their household waste and challenges encountered.

In Thailand, a study to investigate the conditions of waste management in an urban-rural fringe area of the Nonthaburi Province was conducted in 2006-2007. Hiramatsu, Hara, Sekiyama, Honda and Chiemchaisri (2009, p. 959) found that the municipal solid waste flow in the area was complicated as many parties were involved in waste-related services, and that some households did not receive waste collection services. The authors (2009, p. 959) further reported that “80% of the surveyed households separated waste materials to sell valuable materials, but most residents were not aware of the waste problem and were not knowledgeable about waste treatment” and “in all household types, except temporary houses, more than 70% of waste was organic which was underutilised”. This particular study showed residents were not aware of the issues related to improper waste management, although recycling was practised to gain monetary returns as indicated in the findings. Relating the outcome of the study to this research, it indicated the importance of creating awareness on basic waste issues and the importance of the waste management components.

There are different ways in how people perceive waste and manage it. Hence, understanding their perception would aid to the construction of countermeasures

to the problems related to their behaviours and increase the effectiveness of waste management campaigns (Drackner, 2005, pp. 175, 180). A field study was conducted in Tacna, Peru in 2003 to find out more about people's perceptions on waste. The study found that waste was seen as a risk to public health and the environment or an aesthetic inconvenience, as well as a source of income (Drackner, 2005, p. 175). For some residents in the area, waste such as pieces of junk or recyclable goods were turned into a source of income when they sold them to interested buyers (Drackner, 2005, p. 179). A study conducted in Cameroon to assess public attitudes and behaviour to household waste management showed that there was "a strong concern for a clean environment and the belief that learning, information and awareness campaigns are important drivers to behaviour change" (Mbeng, Probert, Phillips, & Fairweather, 2009, p. 569). Linking these studies to this research, understanding the communities' perceptions of waste management in their areas and practices would be important and hence, were obtained through the data collection.

A study to determine factors that were significantly influencing environmental behaviours of the urban poor concerning solid waste management was conducted in Kuala Lumpur, Malaysia in 2005-2006. Murad and Siwar (2007, p. 12) highlighted that "low-income groups usually generated much lower amounts of waste per person than middle and upper income groups" and that the same group "had a very proactive role in the context of an environmentally friendly solid waste management, as they were the main re-users, recyclers and source-reducers of solid waste". The study also suggested the formulation of policies to promote knowledge and skills as well as measures to empower the urban poor (Murad & Siwar, 2007, p. 13). Formulation of policies on sustainable living could improve their quality of life and well-being. In relation to this research, although it was not a policy that was formulated, an environmental education programme was developed together with the local communities taking into consideration existing perceptions and practices.

Another study carried out in Malaysia in the city of Kota Kinabalu on public participation in waste management found that residents in the study area were not satisfied about the services provided by the local authority, and it seemed they were not keen to engage actively in recycling activities (Mapa, 2011, p. 57). The

reasons given were lack of motivation and awareness of the environmental waste issues. Mapa (2011, p. 57) suggested that adequate waste management infrastructure should be provided to the community. In relation to this research, improving awareness and knowledge of environmental impacts of waste was a key activity in the environmental education programme. Collaboration with the local authority was also another important factor taken into account.

In 1994, a study focussing on the determinants of household waste disposal, recycling and composting in Sweden was carried out. It was found that the most important determinants of individual household waste were composting of kitchen waste, living area, age and attitudes on the difficulty of recycling various materials (Bartelings & Sterner, 1999, p. 473). The authors (1999, p. 473) concluded that “with proper infrastructure that facilitates recycling, people are willing to invest more time than can be motivated purely by savings on their waste management bill”. Provision of proper infrastructure for recycling could be one of the ways to encourage people to recycle more. However, at the same time, they needed to be reminded of the first component of waste management – waste minimisation. In relation to this research, the component of waste minimisation was prioritised first, then recovery and finally, disposal.

A study on the effects of citizen participation on integrated solid waste management was conducted between 2005 and 2006 in Porto Alegre City in Brazil. The importance of education was highlighted in the results of this study as it was found that public campaigns changed the perceptions and practices of most of the city’s citizens towards solid waste management (Bortoleto & Hanaki, 2007, p. 276). However, the authors (2007, p. 276) also found that more education on the waste problem was required for the citizens to increase their participation. People needed to be informed about the components, issues and impacts of waste management.

A study in Poland on waste management in two Polish provinces concluded that there was a need to “further educate people about municipal solid waste management, and to encourage the teaching of pro-environmental attitudes” (Grodzinska-Jurczak, 2003, p. 2). It was a cause for concern that “informal education (demonstration projects for citizens organised by local communities)

still cover a significantly small proportion of citizens” and that there was “no legal regulation on the need of information campaigns towards municipal solid waste management” (Grodzinska-Jurczak, 2003, p. 16). This finding reinforced the focus on education on waste management in this current study.

Involvement and participation of local communities have been imperative in improving the ways they manage waste in their own area. Anschutz (1996, p. 17) highlighted that “community members and local leaders ... play different roles in solid waste management. These roles correspond to different levels of community participation”. The author (1996, p. 17) further added that members can contribute through practising proper sanitation behaviour or participating in management of solid waste services.

This research focussed on the process of developing and implementing an environmental education programme on sustainable waste management practices with villagers and independent oil palm smallholders in local communities to address the issue of solid and agricultural waste being a significant environmental problem in Sabah. Maser (1997, p. 214) stated that “there are many novel ideas waiting to be discovered by imaginative people working to make their communities sustainable, and there are many ingenious ideas already available.” In terms of waste management, examples of existing practices are recycling, composting, and reusing wastewater. It was in the interest of this research to look into waste management within communities outside a rated area in Sabah and attempt to develop practices that were acceptable to the communities and beneficial to the environment.

3.6.1 Summary of waste management in residential areas

As a summary of this section, the main factors that could enable community waste management to be more effective are to understand people’s perception on waste, to provide awareness on basic waste issues, provide availability of customised environmental education programmes focussing on specific target groups, as well as sufficient infrastructure and facilities.

Although environmental education programmes focussing specifically on waste management have been developed and implemented in various parts of the world,

the urgent need for such programmes is still obvious in Sabah. At present, the availability and implementation of programmes are still lacking and challenges for a better management for waste remain. Hasan (2004, p. 491) highlighted that “citizens must be made aware of the problems associated with mismanagement of waste...” and “education, at all levels, is the proven way of bringing about such awareness”. He reiterated the paramount importance of environmentally-aware citizens along with determined leadership in the government (Hasan, 2004, p. 491).

3.7 Chapter Summary

Key ideas are presented in this section as a summary of this chapter on waste management in local communities.

A brief history of waste as a snapshot of how waste management developed over time was discussed. In the context of this research, the terms ‘waste’, ‘garbage’ and ‘litter’ were used interchangeably throughout the thesis to indicate domestic waste from homes, and where appropriate, the term ‘agricultural waste’ was used to define waste from agricultural activities. Creating awareness and informing the communities on existing waste management problems and their impacts on water, air and land were among the key priorities.

The components of waste management discussed were minimisation, recovery and disposal. These components served as part of the key principles to develop the environmental education programme focussing on waste management practices.

In this research, the perspective of environmental education was taken to improve waste management practices among the communities, although other ways could be carried out, such as through regulations and enforcement. Accepting that there is no one-size-fits-all solution to waste management challenges, it was recognised that the programme would need to be designed according to its appropriateness to the community’s circumstances and needs, and located within the community and of the community.

There was limited literature found on waste management among the independent oil palm smallholders of Malaysia, indicating that data collected in this study could be useful.

The main factors that could enable community waste management to be more effective were understanding people's perception on waste, giving awareness about basic waste issues, customising environmental education programmes focussing on specific target groups, as well as providing sufficient infrastructure and facilities.

Although various environmental education programmes on waste management have been developed and implemented in many parts of the world, the urgent need for such programmes is still obvious in Sabah. At present, the availability and implementation of programmes are still lacking and challenges for better management of waste remain.

3.8 Theoretical Framework of Research

Based on the theoretical framework of environmental education and community education in Chapter Two, the overall model of environmental education on waste management practices with local communities is presented in Figure 3.1.

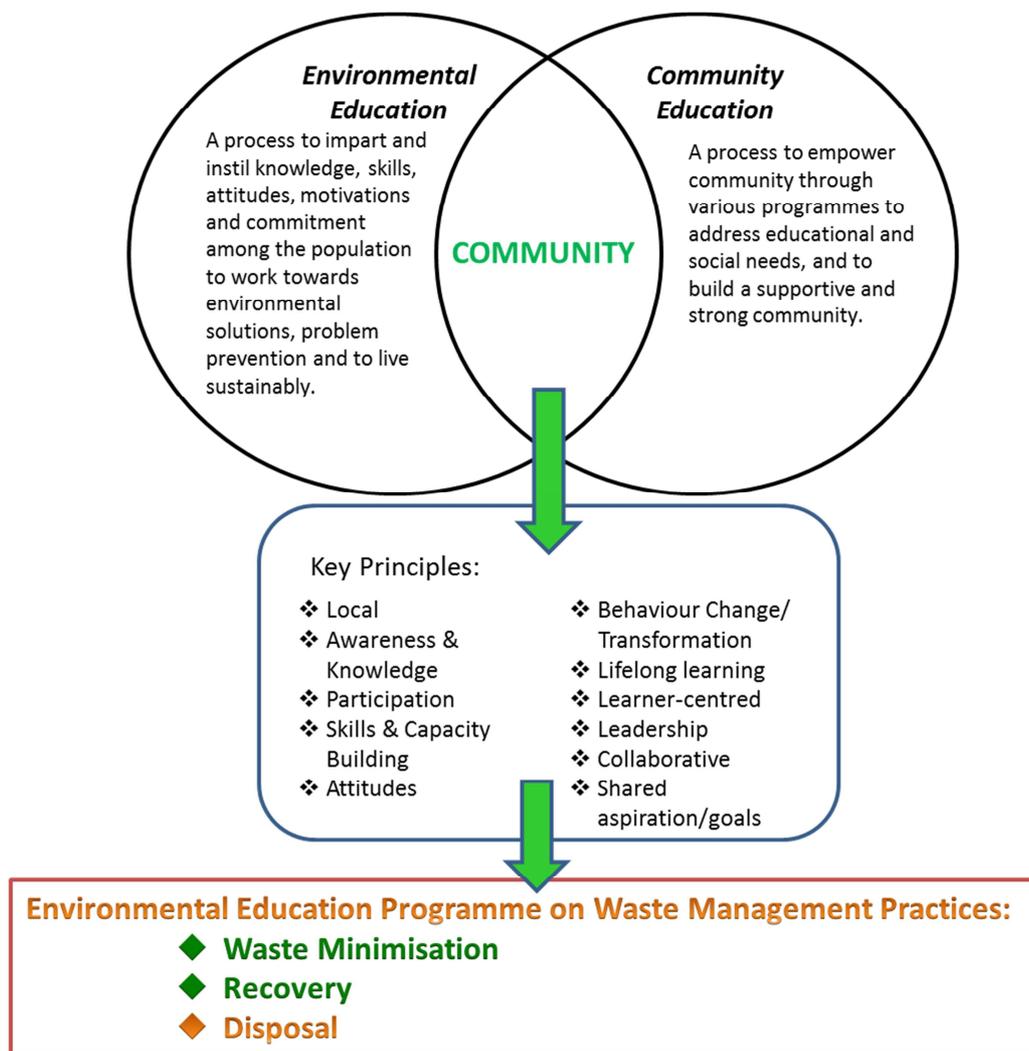


Figure 3.1 Overall model of environmental education on waste management practices with local communities

The key principles of environmental education for communities as elaborated in Chapter Two gave the foundation for the development of the programme on waste management practices. The components of waste management emphasised in the programme were waste minimisation and recovery although disposal issues were also highlighted.

The next chapter presents the methodology and methods used in this research.

Chapter Four: Methodology

4.1 Chapter Overview

This chapter presents the methodology and methods used in this research. It begins with the research questions and a discussion on three major paradigms of research, namely positivism, interpretivism and the critical theory paradigm. The methodology chosen for the research, followed by the background of community research is discussed. The research design that included methods and stages of data collection is detailed. Data analysis, validity and trustworthiness are discussed, followed by the ethical considerations.

4.2 Research Questions

Research questions “state the major aim of the research in question form, specifying the key idea that the research seeks to investigate and/or explain, it also identifies the key concepts of the research” (Walter, 2013b, p. 10). Natalier (2013, pp. 26–27) stated that a study is driven by the research questions and that they shape “every other component of the project”, place “boundaries on a project, giving it coherence and direction” and keep the researcher focussed.

The objective of this research was to develop an environmental education programme together with local communities and the independent oil palm smallholders in Beaufort, Sabah, Malaysia focussing on sustainable waste management practices. The main research question, and its subsidiary questions, were therefore, as follows:

How can an environmental education programme on waste management practices be developed with local communities in Sabah?

1. What are the current policies in place for community waste management?
2. What are the perceptions of local communities about the policies, processes and practices of waste management in their area?
3. What education programme can be designed and developed for sustainable waste management in local communities?

4. How do local communities respond to the implementation of a co-constructed waste education programme?

4.3 Methodology in this Research

This section discusses the main paradigms of education research and the methodology chosen for the research.

4.3.1 Paradigms

In any research, the choice of suitable and relevant methods and methodology is imperative. Research methodology and methods are different ideas, of which methodology is about the collection of research tools to be used according to specific research rules, while methods are the tools such as questionnaires, observations or statistical analysis (Newby, 2013, p. 51). The aim of methodology, according to Kaplan (1973) as cited by Cohen et al. (2007, p. 47) is “to describe approaches to, kinds and paradigms, of research” and “to help us understand, in the broadest possible terms, not the products of scientific enquiry but the process itself”.

A paradigm is a set of basic beliefs, world view or framework to guide research and practice based on ontological, epistemological and methodological assumptions (Guba & Lincoln, 1994, p. 107; Willis, 2007, p. 8). Guba and Lincoln (1994, p. 107) reiterated that the beliefs “are basic in the sense that they must be accepted simply on faith (however well argued); there is no way to establish their ultimate truthfulness”. Ontology has been variously described in the literature as filters or lenses through which we experience the world or reality (Allison & Pomeroy, 2000; Mack, 2010). Epistemology is described as theories of the nature of knowledge and how one acquires knowledge (Cohen, Manion, & Morrison, 2011; Mack, 2010). The major known paradigms of social science research have their own histories and background, and were “responses to different problems, and they adopted different ways of addressing the problems” (Willis, 2007, p. 32).

Three major paradigms – positivism, interpretivism and the critical theory - are now discussed.

4.3.1.1 Positivism

The perspective of positivism came about during the Renaissance (about 1450-1600) and Enlightenment (1600-1800) periods as a step towards using observations and experiments to discover truths about the world (Willis, 2007, p. 32). Positivism, according to Cohen et al. (2011, p. 7), seemed to claim that science could give the “clearest possible ideal of knowledge”.

P.C. Taylor and Medina (2013, para. 4) discussed that positivism focusses on quantitative methodology which uses experiments or pre- and post-tests to measure scores. Some important assumptions of positivism are the use of scientific methods is the only way to discover truth about the world, and when research is done well scientifically and objectively in a well-controlled context, one can discover comprehensively about human behaviours (Willis, 2007, p. 32). Therefore, positivism has a naïve realism ontology that assumes an objective external reality (Guba & Lincoln, 1994, p. 111). It has a dualist and objectivist epistemology of which the researcher and the subject of research are assumed to be independent of each other; and focusses on scientific, empirical and hypothesis-testing (Cohen et al., 2011, p. 116; Guba & Lincoln, 1994, p. 110).

Cohen et al. (2011, p. 7) argued that this paradigm is less successful in human behaviour research because of the extreme complexity of human nature and the intangible quality of social realities which are opposite to the orderly natural world. The same authors remarked that positivism faces difficulty in a sense that it “regards human behaviours as passive, essentially determined and controlled, thereby ignoring intention, individualism and freedom” (Cohen et al., 2011, p. 15). Due to the criticisms on positivism, an alternative approach in terms of a more subjective paradigm has emerged in the form of interpretivism.

4.3.1.2 Interpretivism

Interpretivism combines two important threads of thought – relativism and rationalism; both of which could be traced back to Greek and Roman philosophy (Willis, 2007, p. 48). Willis (2007, p. 49) highlighted that relativism “is the idea that the reality we perceive is always conditioned by our experiences and our culture” while rationalism is the idea “that you can come to know reality by thinking about it”. Berger and Luckmann (1967, p. 33) have stated that “everyday life presents itself as a reality interpreted by men [sic] and subjectively meaningful to them as a coherent world”. Supporters of interpretivism have argued against positivism in that one can only understand the social world from the viewpoint of those who are involved in the actions undergoing investigation (Cohen et al., 2011, p. 15). The interpretivist paradigm is an approach in which researchers “begin with individuals and set out to understand their interpretation of the world around them” (Cohen et al., 2011, p. 18). Angen (2000, p. 385) highlighted that interpretivists have the assumption that reality is interpreted through the meanings and understandings obtained from the social world. The author (2000, p. 385) further added that without interpretation, there will be no understanding. Its emergence in education research was in the late 1970s and was influenced by anthropology that aimed to understand other cultures or experiences from the inside (P. C. Taylor & Medina, 2013, para. 8).

Interpretivism rests on an ontology that is subjective, interactive and socially-constructed; while its epistemology recognises multiple realities and the importance of understanding a situation through the viewpoints of the participants (Cohen et al., 2011, p. 116). Interpretivists believe that researchers have no access to external reality but only to a socially-constructed one (Willis, 2007, p. 97). Angen (2000, p. 386) highlighted that “truth, from an interpretive perspective, is no longer based on a one-to-one correspondence to objective reality” and “it is acknowledged that what we can know of reality is socially-constructed through our intersubjective experiences within the lived world”.

The emergence of the interpretivist paradigm is not without criticisms. Cohen et al. (2011, p. 21) highlighted one of the criticisms as being that the paradigm has tended to ignore scientific procedures of verification. Critics have also argued that “while it is undeniable that our understanding of the actions of our fellow-beings

necessarily requires knowledge of their intentions, this, surely cannot be said to comprise the purpose of a social science” (Cohen et al., 2011, p. 20).

Cohen et al. (2011, p. 32) highlighted that it has been argued that “positivist and interpretive paradigms are essentially technicist, seeking to understand and render more efficient an existing situation, rather than to question or transform it”. Both positivism and interpretivism were regarded as giving an incomplete account of social behaviours by ignoring political and ideological contexts (Cohen et al., 2011, p. 31). These paradigms were regarded to be so by advocates of the emerging critical theory paradigm.

4.3.1.3 Critical Theory Paradigm

Critical theory, a paradigm that “emerged from Marxism in the first half of the 20th century”, but is different from classical Marxism “in its willingness to explore a wide range of power relationships, including those involving gender, race and ethnicity” (Willis, 2007, p. 81). The paradigm of critical education research has been greatly influenced by the works of Habermas (Cohen et al., 2011, p. 31). This paradigm, as highlighted by Cohen et al. (2011, p. 31), has an intention “not merely to give an account of society and behaviour but to realise a society that is based on equality and democracy for all its members” and “not merely to understand situations and phenomena but to change them”. The paradigm emphasises relations that involve inequalities and power, and to identify and find solutions to the imbalances occurring in society such as loss of biodiversity, climate change and loss of cultural identity among ethnic communities (P. C. Taylor & Medina, 2013, para. 13; Willis, 2007, p. 82).

A critical theory paradigm believes in a material, external and knowable reality (Willis, 2007, p. 83) whereby it is “shaped by social, political, cultural, economic, ethnic and gender values crystallised over time” and now accepted as normal or real (Lincoln & Guba, 2000, p. 168). The paradigm rests on the epistemology that is “transactional or subjectivist” and has “value-mediated findings” (Lincoln & Guba, 2000, p. 168). In critical theory, the researcher and subject of research are linked, and the process is influenced by the researcher’s values and perceptions (Guba & Lincoln, 1994, p. 110). On the same note, Willis (2007, p. 86)

highlighted that for the critical theorists the overall process of research is not a value-free activity, in which each sub-process is influenced by the existing values of the researcher. P.C. Taylor and Medina (2013, para. 14) also stated that the role of the researcher is an agent of change and an advocate for a more equitable and sustainable society. Willis (2007, p. 85) remarked that ideally, critical theorists believe that the research process intermingled with practice can enable those who are oppressed to free themselves.

4.3.2 Methodology chosen for this research

This research has elements of both interpretivism and critical theory paradigm. Positivism was not appropriate to be used because participants involved in this research had subjective views, various actions and behaviours. Positivism regards human behaviours as determined and controlled, therefore intentions and individualism are being ignored.

Although bringing about change is the ultimate aim in this study, it is beyond the scope of this research to study the long-term behavioural and lifestyle impacts and changes as a result of the implementation of the environmental education programme on waste management practices. Therefore, this research cannot be positioned wholly under the critical theory paradigm due to this condition. P.C. Taylor and Medina (2013, para. 26) emphasised that research can be designed in such a way that methods can be combined and quality standards drawn from two or more paradigms; and it is also common for research studies to combine methods and standards from critical and interpretive paradigms.

Taking the approach of interpretivism, ontologically and epistemologically the assumptions accepted were that reality can be seen subjectively from different lenses, and that it was interpreted through various viewpoints and understandings of the research participants about the world. Therefore, in the context of this research, it has elements of interpretivism because of the interaction with the local communities to obtain their views and perceptions on waste management practices in their own areas. This process presented an avenue to gain understanding of the situation through their experiences. It also allowed reflection on the issues, challenges and limitations to manage waste in their villages and in plantations.

Yet this research not only attempted to gain understanding through the viewpoints of the participants, it also aimed to promote changes. Taking the partial critical theory approach in the perspective of promoting changes, epistemologically the assumptions accepted were that the values of the researcher would inevitably influence the process of inquiry, in which the researcher and participants were interactively linked. Therefore, the analysis of data cannot be totally value-free because a researcher would influence the process based on existing values, ideas and reflections.

This research was partially aligned with the critical theory paradigm because it sought to eventually create positive changes among the communities in terms of waste management practices by providing an avenue for discussions and creating rapport through the programme that was co-constructed with, and implemented in, the villages. Cohen et al. (2011, p. 31) stated that the critical theory paradigm seeks to “emancipate the disempowered, to redress inequality and to promote individual freedoms within a democratic society”. In the context of this research, the equality and freedom that were sought were in terms of the provision of waste management services for the local rural communities in the same way that urban communities have access to. This required a process of critiquing whether the existing waste management practices within the community were fair and just, the challenges to attain equality for all and what could be done to address these issues. The research also explored the aspirations of the local communities for waste management in their villages and potential and appropriate solutions.

4.4 Community Research

Since the objective of this research was to develop and implement an environmental education programme with local communities, it was imperative to highlight the characteristics and issues pertaining to community research. Community research is defined as “the practice of engaging community members as co-researchers to research issues within their own communities with a view to accessing community specific knowledge” (Goodson & Phillimore, 2012, p. 4). Community research can include various approaches “ranging from research in

which the community is a full partner and has substantial or complete control of the process to situations in which the community merely represents a unit of study” (Lee, 2008, p. 6). The same author (2008, p. 6) also expressed that the three key approaches to community research were research on communities, research for communities, and research with communities.

Research on communities is a kind of approach in which “the community or its members are the objects of the endeavour while the academic or social planner is the subject” and “often useful for researchers who have time or budget constraints” or “for the purpose of uncovering knowledge that attempts to increase our understanding of how communities function” (Lee, 2008, p. 8). Research for the communities is a study conducted on behalf of the communities to establish a connection with the community and encourage its progress (Lee, 2008, p. 10). On the other hand, research with communities is “rooted in the ethic of community influence” and “the community and the researchers understand each other and interact with one another not only as collaborators, but also as co-learners” (Lee, 2008, p. 12). Other advantages of researching with communities as highlighted by Clark, Holland and Ward (2012, p. 51) included multiple views, more inclusive in terms of diversity and experience of researchers as well as providing opportunities for ideas and voice to be heard. When researching with communities, it is of paramount importance to place stakeholders at the heart of the research (Williamson, 2007, p. 2). It is imperative to learn more about their cultures and social structures before commencing data collection. Their boundaries need to be respected, and research ethics need to be adhered to. Guerin and Guerin (2007, p. 200) stated that “one of the challenges for any collaborative relationship is ensuring that the collaboration is indeed genuine”. Establishing trust is vital for an effective collaboration and engagement with communities (Williamson, 2007, p. 4).

In relation to this research, the approach taken was an overlap of the three approaches in community research. It was research on the community because data and information were gathered about the villagers’ perceptions of the environment and waste management. Information about the current condition of waste management in their villages was obtained as well. It was also research for the community because it looked at bringing about change in terms of waste

management practices among the villagers. It was research with the community because there was an interaction and collaboration to develop the environmental education programme in terms of gaining their thoughts and suggestions on how it could be constructed. Therefore, different approaches were used at different phases of the research. The local communities were directly involved in co-constructing the environmental education programme focussing on waste management practices. The advantages of involving the communities to develop the environmental education programme were that it allowed multiple views and created opportunities or spaces to hear the communities' opinions. However, there were some limitations, for example fully equal partnership was not possible as finalising the programme was not able to be carried out together with the communities due to limited time and budget.

The research with community approach has some characteristics of action research. According to Cohen et al. (2011, p. 344), "action research is a powerful tool for change and improvement at the local level" and it "can be used in almost any setting where a problem involving people, tasks and procedures cries out for solution, or where some change of feature results in a more desirable outcome". Action research is "an approach that uses research findings to inform and shape personal and organisation action" (Newby, 2013, p. 61).

Grundy (1994, p. 28) highlighted that action research is "a cyclical rather than a linear improvement process" and incorporates "four interrelated 'moments' which are reciprocally related to one another", of which "two of these moments are concerned with developing understanding and carrying out action". Action research "does not simply mandate the taking of action by participants to bring about change, it also calls those participants to account by including the obligation for action to be grounded in and evaluated through research" (Grundy, 1994, p. 35). In another publication, Grundy (1987, p. 145) emphasised that strategic moments of action and reflection are related to each other through two organisational moments of planning and observation. Grundy (1987, p. 145) explained that reflection "looks back to previous action through methods of observation which reconstruct practice so that it can be recollected, analysed and judged at a later time" and it also "looks forward to future action through the moment of planning". The principles relevant to my research, among the many

key principles of action research highlighted by Kemmis and McTaggart (1988, pp. 22–25), included the following:

1. Action research is participatory: it is research through which people work towards the improvement of their own practices.
2. Action research is collaborative: it involves those responsible for action in improving it.
3. Action research develops self-critical communities of people participating and collaborating.
4. Action research involves people in theorising about their practices – being inquisitive about circumstances, action and consequences and coming to understand the relationships between circumstances, actions and consequences in their own lives.
5. Action research is a political process because it involves us in making changes that will affect others.
6. Action research starts small, by working through changes which even a single person can try, and work towards extensive changes – even critiques of ideas or institutions which in turn might lead to more general reforms of classroom, school or system-wide policies and practices.
7. Action research starts with small groups of collaborators and eventually involves others.

In this context, the data collected were used to inform the development of the environmental education programme. Changes and improvements in waste management practices among the communities in their homes and plantations were the ultimate aims of the environmental education programme developed during the research.

The principles above were relevant in the context of this research because it was participatory and began with a small group of villagers in the focus workshop critically discussing waste management issues and challenges in their villages as well as existing practices that were possibly poor waste management. The research was also a political process because it involved the villagers making changes to influence others. The environmental education programme was an avenue for better participation and collaboration with the villagers.

The next section presents the research design which includes the methods and stages of data collection.

4.5 Research Design

Before any research is carried out, a research design needs to be detailed. The design of this research is summarised in Figure 4.1. The community environmental education key principles derived from the literature guided the framing of the research design. Stage One of data collection was carried out in June 2013 in Sabah, Malaysia. It involved interviews with government officers, a community survey among the local communities and a focus workshop. Data and findings from Stage One were used to inform the development of the environmental education programme. Stage Two of data collection, carried out in November 2013, involved the programme implementation and evaluation process, and involved a questionnaire, interviews and observation.

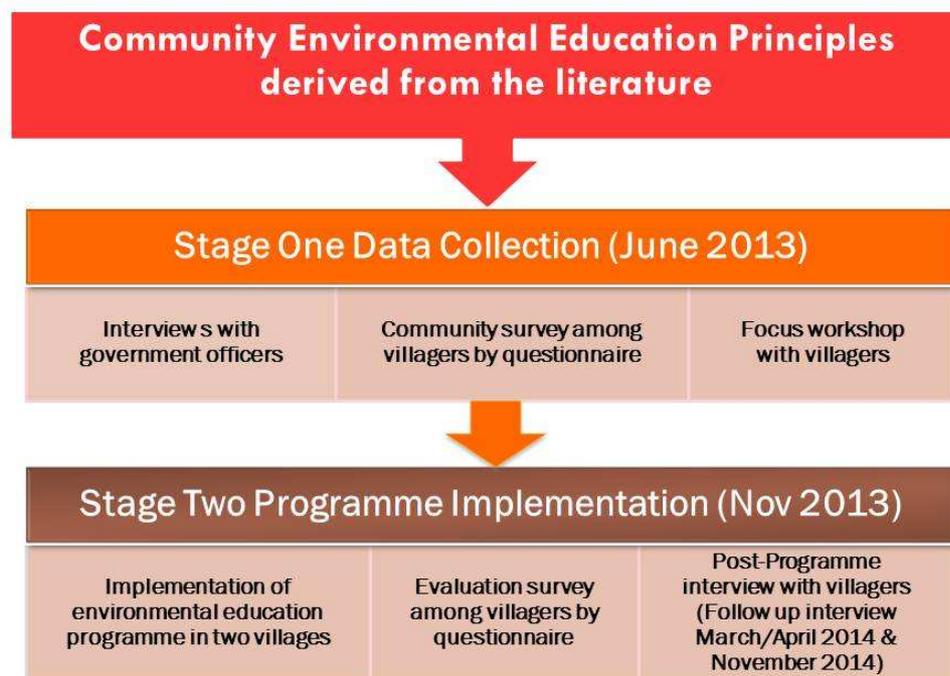


Figure 4.1 The research design

A brief situational analysis visit was conducted in March 2012 to generally identify and prioritise problems affecting the target population or specific

segments of the population. The visit involved a short discussion with three villagers, of whom one of them was a village head. Based on the visit, it was found that most of the independent oil palm smallholders resided and had their own plantations in villages along the Padas River in Beaufort, namely Lupak, Lawa, Kabulu, Batandok, Gadong, Kapawa and Lukut. The villages were outside the local authority's rated area, and therefore no waste collection service was provided. There was also observable rubbish strewn along the road and river during the visit. An initial response from the villagers indicated that a community environmental education programme on waste management practices could potentially be implemented in the villages. These factors indicated their readiness to engage in a community environmental education programme (Clayton & Myers, 2009, p. 189).

The next two sections present the methods used in the research as well as details of stages of data collection.

4.5.1 Methods

A researcher can either use qualitative methods, quantitative methods, or both, to collect data and information. In this research, both qualitative and quantitative methods were used. Gay, Mills and Airasian (2012, p. 7) defined quantitative research as “the collection and analysis of numerical data to describe, explain, predict or control phenomena of interest”. Phillips (2013, p. 176) highlighted that “based on the principles of systematic observation, the collection and analysis of quantitative social science data is an effective and powerful way of testing, verifying, rejecting or proffering revised or different explanations of social life”. Data are usually obtained from questionnaires, tests and other paper/pencil instruments (Gay et al., 2012, p. 120). On the other hand, Gay et al. (2012, p. 7) explained that qualitative research referred to the “collection, analysis and interpretation of comprehensive narrative and visual (i.e. non-numerical) data to gain insights into a particular phenomenon of interest”. Data may consist of notes from observations, and interviews (Gay et al., 2012, p. 120).

Mixed methods, which combines quantitative and qualitative methods, were used in this research to capitalise on the strengths of these two approaches and offered the best way to answer the research questions. Gay et al. (2012, p. 481)

highlighted that mixed methods research builds upon the strengths of both quantitative and qualitative research methods to enable researchers to better understand a situation in a single study. For this research, the research methods were questionnaires, interviews, a focus workshop and observation of discussions.

4.5.1.1 Surveys using questionnaires

Survey research is “a collection and analysis of respondents’ (people, organisation, or other group who respond to the survey) answers to the same set of structured questions” and “the widespread use of surveys is a testament to their value as a research method” (Walter, 2013, p. 122). Cohen et al. (2011, p. 256) highlighted that “surveys gather data at a particular point in time with the intention of describing the nature of existing conditions, or identifying standards against which existing conditions can be compared, or determining the relationships that exist between specific events”. The advantages of conducting surveys are (Walter, 2013, pp. 122–123), as follows:

1. Versatility: Surveys can be used to investigate a wide range of issues and collect information on people’s demographic background, attitudes, values, beliefs, perceptions and opinions.
2. Efficiency: Surveys are able to collect data and information from a large sample in a short period of time.
3. For a large population: A survey could also provide reliable and valid information about a large group of people from a relatively small sample.
4. Suitable for statistical analysis: Relationships between variables in the data could be identified using various statistical analysis techniques.
5. Facilitate secondary data analysis: Data generated by a survey could also be analysed by researchers other than the original person who carried out the survey, referred to as secondary data analysis.

However, according to Walter (2013, pp. 123–124), surveys also have drawbacks such as survey data are snapshots, self-reported, relationship does not equal causality, they cannot provide all the answers and some surveys are expensive. Cohen et al. (2011, p. 259) stated that regardless of the scale of survey, collection

of data or information usually involves one or more of the data gathering techniques namely structured or semi-structured interviews, self-completion or postal questionnaires, telephone interviews, internet surveys, standardised test of attainment or performance, as well as attitude scales.

In this study a survey of villager's perceptions was conducted by questionnaire in Stage One and an evaluation survey was conducted by questionnaire in Stage Two. A questionnaire is a "written collection of self-report questions to be answered by a selected group of research participants" (Gay et al., 2012, p. 388). According to Gay et al. (2012, p. 388) using questionnaires enables participants to respond through the forms provided and data could be collected in a short amount of time. There are three main types of questionnaires, namely structured, semi-structured and unstructured questionnaires (Cohen et al., 2011, p. 381). In this research, semi-structured questionnaires were prepared for both the community survey in June 2013 and the evaluation survey in November 2013. Cohen et al. (2011, p. 382) explained that a semi-structured questionnaire presents "a series of questions, statements or items" for participants "to answer, respond to or comment on them in a way that they think best". Face-to-face administration of the questionnaire among the local communities was chosen instead of mail survey or through email to try to increase response rate, and for practical reasons due to limited access to mail and email services. The questions were responded to in writing by the participants.

The questionnaire for the community survey included questions about demographic information, the participants' perceptions about the environment and waste in villages or oil palm plantations, waste types, waste collection services and waste management practices (see Appendix C). The contents of the questionnaire were reviewed by the supervisory team to ensure they were in line with the requirements of the research questions. The questions were then translated into the Malay language for the respondents. As Malay is the national language of Malaysia this was appropriate. The local villagers also use a local language but as this was unfamiliar to me it was deemed unsuitable for the study instruments. The items in the questionnaires corresponded to the research questions and key principles of the theoretical framework. A local Malaysian researcher, who is fluent in English and Malay, validated the translation from

English to Malay. The documents in English and Malay were sent to her through emails.

To pilot the questionnaire, the final draft of the community questionnaire was sent through email to seven people who lived in local communities in Sabah but were not part of the sampling population. Five persons responded and gave feedback. Their initial reaction was that the questionnaire was long. It took them about 30 minutes to complete. Since all the questions were important for the research, the length of the questionnaire could not be reduced. Therefore, before distributing the questionnaire to the villagers, the estimated time to complete the questionnaire was explained to them, and they did not have a problem with this length. Another suggestion from the pilot group was to increase the font size from 12 to 14. The font of the questionnaire was increased to size 14 as suggested. One of them commented about the Malay word used to translate "neither agree nor disagree". The Malay word used was suitable for the context; however, during the survey, it was explained to the villagers. Another respondent commented on the need to add the word "and ocean" at the end of the sentence to improve the statement "Disposal of waste on the land can have impacts on rivers" (Question B7). The questionnaire was amended accordingly with approval from the supervisory team.

For the evaluation survey, which was administered in November 2013, the questionnaire was developed after the environmental education programme was finalised (see Appendix F). The same process of translation validation was carried out with the researcher from the local university in Sabah, Malaysia. However, the questionnaire for evaluation survey was not piloted because the questions were specifically designed to respond to the programme implementation and only those who attended the programme could respond to them.

4.5.1.2 Interviews

An interview is "a purposeful interaction in which one person obtains information from another" and through interviews, the researcher could "explore and probe participants' responses to gather in-depth data about their experiences and feelings" (Gay et al., 2012, p. 386). Interviews are an appropriate way to access people's perceptions, meanings or definitions of situations (Punch, 2005, p. 168). Gay et al.

(2012, p. 386) highlighted three types of interviews, namely structured, unstructured and semi-structured. Structured interviews have “a specific set of questions to be asked”, unstructured interviews have “questions prompted by the flow of the interview” and the semi-structured interviews “combine both structured and unstructured approaches” (Gay et al., 2012, p. 386). In this research, the structured interview was chosen, in which a specific set of questions were prepared in line with the research questions. Data and information collected through the interviews in Stage One included views, perceptions, current policies, processes and practices related to waste management in Sabah focussing on local communities. The sample of interview questions is in Appendix D. The post-programme interview conducted in Stage Two was also a structured one based on a series of questions which included the villagers’ views on the environmental education programme, any changes and challenges faced in changing practices, as shown in Appendix G. A post-programme structured interview conducted four months after, and again a year after the programme implementation was carried out through the telephone from New Zealand with the villagers. The questions are attached in Appendix H and I. Expert views from the supervisory team were sought to review the contents of all the interview questions.

4.5.1.3 Focus Workshop

In this research, a form of focus group, namely a focus workshop, was carried out with a group of villagers. Travers (2013, p. 247) highlighted that focus groups are “a form of in-depth interviewing, but are conducted with a group of people rather than an individual participant”. Conducting focus groups could harness “group dynamics” and are able to generate “a wide range of opinions and insights that are informed by the interaction of the people in the focus group” (Travers, 2013, p. 247). It is also useful when “the interaction between individuals will lead to a shared understanding of the questions posed” by the researcher (Gay et al., 2012, p. 388).

The focus workshop in this research was organised to provide a platform for a discussion with the local communities towards the co-construction of the environmental education programme. It provided villagers the opportunity to say

how they would like the programme organised and what they would like to learn about (see Appendix E).

4.5.1.4 Observations

When the programme was implemented, a panel discussion was arranged between the villagers and representatives of relevant government organisations to discuss further about potential waste management solutions in the local communities. This discussion was observed and field notes were taken. The type of observation in this research was participant observation. Gay et al. (2012, p. 382) explained that “in participant observation, the observer becomes part of, and a participant in, the situation being observed”. This type of observation was appropriate to this research because it gave insights, and interactions between researcher and the participants were developed.

The next section describes the data collection process of the research.

4.5.2 Data collection process

In this section, the background of the research area, recruitment of sampling population and stages of data collection are explained.

4.5.2.1 Background of the research area

Beaufort is a town and district located in the interior division of Sabah and is 90 kilometres south of Kota Kinabalu, the capital city of Sabah. The Padas River, which is the second longest river in the State, flows across the district. Beaufort district has a total population of 75,900 based on a 2010 census (Department of Statistics, Malaysia, 2010), of which 1379 were independent smallholders (MPOB Office, Beaufort, 2012). The land area covered by the independent smallholders was approximately 5200 hectares in Beaufort (MPOB Office, Beaufort, 2012). Beaufort was chosen as the study area due to its proximity to the state capital and for logistical reasons. It is also representative of rural Sabah. As noted above, several villages surrounded by oil palm smallholdings occur along the Padas River.

Based on my own knowledge and general observation of local communities in Sabah, villages are governed by head villagers and the chairman of the Village Development and Safety Committee. The main roles of a head villager are related to cultural aspects of the people, endorsing engagements and marriages and handling disputes among villagers. The Chairman of the Village and Safety Committee is given the mandate as a local administrative body at village level mainly to coordinate development programmes, safety and as a link between the people and government.

As highlighted in Section 1.4, the study area of Lawa and Lupak villages have general services and most people live in extended families, and live in villages with their lands around them. The economic activity of the people is mainly related to agriculture (oil palm plantations and rubber) and some work in government or private sector.

The participants of this research were villagers and a group of independent oil palm smallholders from various villages in the district of Beaufort, as well as officers from government departments and local authorities. Beaufort is one of the districts in Sabah with a large area under oil palm plantations, as well as having villages outside the rated area of the local authority.

Big companies as well as smallholders could be part of the decision-making voice in the Roundtable on Sustainable Oil Palm (RSPO). Smallholders could become a member of RSPO after forming a group led by a group manager. They could work towards RSPO certification as RSPO supports smallholders by providing funds. Certification could assist smallholders to produce more oil using less land, raising their incomes and reducing risks of land conversion which threaten forests and biodiversity (Roundtable on Sustainable Palm Oil (RSPO), n.d.-b). The big companies are regulated by federal laws in terms of waste disposal (palm oil mill effluent discharge, availability of sedimentation ponds, etc.) and some organise Corporate Social Responsibility activities (including education). Guerin and Guerin (2007, pp. 270–271) stated that when it comes to community research, one needs to “spend more time and resources on documenting details and the contexts of communities, and people who comprise them, as they exist in the moment”.

Relating this to my research, 85 villagers from various villages within the district of Beaufort were involved, based on the criteria as follows:

1. Villagers including heads of villages, heads of Village Development and Safety Committees, and independent oil palm smallholders;
2. Potential contributions and convenience of contact;
3. Oil palm plantations were located within the area;
4. Villages lacking proper waste collection services from the local authority; and
5. Close proximity of villages to Padas River.

The independent smallholders receive guidance and training from the Malaysian Palm Oil Board (MPOB). MPOB is entrusted with meeting the increasing challenges of the industry through their research and development efforts and services. It also plays a facilitating role in achieving ecologically and economically sustainable development of the oil palm industry.

Figures 4.2 and 4.3 show the map of Sabah and the villages in Beaufort. These maps were obtained from the creative common maps, <http://www.openstreetmap.org>.



Figure 4.2 Map of Sabah



Figure 4.3 The locations of Lawa and Lepak villages in Beaufort, Sabah

4.5.2.2 Recruitment of participants

Table 4.1 shows a summary of the data collection process and programme implementation in relation to the research questions.

Table 4.1 Data collection process and programme implementation

Questions based on the Research Questions	Groups	Number of participants	Research methods	Date and Venue
What are the current policies in place for community waste management?	Government departments & Local Authority	Five participants	Interview (30 minutes)	June 2013 Workplace
What are the perceptions of local communities about the policies, processes and practices of waste management in their area?	Head villagers, head of Village Development and Safety Committee other independent smallholders and villagers	37 villagers	Questionnaires (45 - 60 minutes)	13 June 2013 Lawa and Lupak Village Halls
What education programme can be designed and developed for sustainable waste management in local communities?	Villagers, head villagers, head of Village Development and Safety Committee	13 villagers	Focus workshop (3 hours)	25 June 2013 Farmers' Organisation Authority Meeting Room, Beaufort
How do local communities respond to the implementation of a co-constructed waste management programme?	Villagers and independent smallholders	49 villagers Lawa village : 26 attended; 25 returned questionnaires Lupak village: 23 attended and returned questionnaires	Half-day environmental programme, including panel discussions, was implemented Questionnaires were administered to all participants immediately after programme was carried out.	12 November 2013 at Lawa Village Hall 13 November 2013 at Lupak Village Hall
		Eight villagers	Post-programme interviews	27 November 2013 at MPOB Meeting Room/ telephone
		Seven villagers	Post-programme telephone interviews	March/April 2014
		Three villagers		November 2014

The participants for the research were recruited based on their potential contributions to the waste management situation in their village and convenience of contact. Potential participants for interviews were identified from government departments and local authority officers through existing networking. Participants from the local communities were identified through an agency in Beaufort that had a working connection with most of the villagers, including the independent smallholders, head villagers and heads of village committees.

For interview participants from the government departments and local authority, a letter was sent through email to the Heads of Section to gain permission for staff in charge of environmental education or training to participate in the research. Once the heads gave their permission and responded through email, a letter seeking agreement to a consent form was sent to the relevant officers. During the interview that was pre-arranged with the officers, they signed the consent form to be interviewed. Six were invited but only five government and local authority officers participated.

In terms of the invitation to local communities to participate in the community survey in June 2013, an officer from the local MPOB office in Beaufort helped to identify participants based on the criteria such as potential contributions and convenience of contact, smallholders or villagers living in the villages including heads of villagers or the Village Development and Safety Committee and living near Padas River. The request to the MPOB officer to invite the participants was sent through e-mail and the choice of participants rested on the officer's judgement and assessment based on the criteria given to him. He could have invited villagers based on whom he believed could contribute to the discussions. For the community survey, the officer invited 100 villagers of which 37 villagers attended to complete the survey. The letter of consent was given to each villager during the community survey session and it was reiterated that if any of them decided not to participate, he or she need not complete the survey form. A purposeful sampling was carried out after the administration of the questionnaire to identify villagers who attended the community survey to participate in the focus workshop. A purposeful sampling involves "the selection of participants who have key knowledge or information related to the purpose of the study" (Lodico, Spaulding, & Voegtler, 2010, p. 34). A total of 20 villagers were identified and

invited to attend the focus workshop, and 13 attended. The 20 villagers were identified after the community survey based on their active participation and some knowledge of waste management issues during informal discussions. The five government officers who participated in an interview were also invited but they were not able to attend the focus workshop.

For the environmental education programme implementation which was carried out on 12 and 13 November 2013 with a half-day programme each day in the two venues in Lawa and Lupak, villagers were invited to attend by the MPOB officer as above and also to participate in the evaluation survey through a similar process and criteria as with the community survey. For each venue, 30 villagers were initially invited from Lawa, Lupak and nearby villages. The total number of villagers who attended the two programme days was 49, of whom 48 participated in the evaluation survey. During the half-day programme, the presentation was conducted in Malay. The powerpoint presentation was translated to Malay and explained in an appropriate way to the villagers. For the post-programme interview with villagers conducted two weeks after the programme implementation, a purposeful sampling was also carried out. During the implementation of the programme, 10 villagers, a mixture of those who had attended the focus workshop in June and new attendees to the programme, were identified and invited to participate in the interviews. They were identified based on their active participation as well as potential contributions to the research. Each was given an informed consent letter. However, only eight could participate in an interview as two could not attend the session on 27 November 2013 in Beaufort.

4.5.2.3 Stages of data collection

The methodology and research approach described in Sections 4.3 and 4.5 guided the planning and conduct of this research. The detailed research chronology and processes comprising of Stage One and Stage Two are explained in this section.

Stage One data collection is summarised as follows:

1. Interviews with five relevant government department and local authority officers on current policies, processes and

practices in place for community waste management (June 2013).

2. Community survey among villagers and independent oil palm smallholder groups that involved the administration of questionnaires (13 June 2013).
3. A focus workshop with villagers and smallholders to co-construct an environmental education programme on sustainable waste management practices (25 June 2013).

The interviews with the five government officers were conducted throughout the month of June 2013 based on the date and time suitable for them and they were given pseudonyms as shown in Table 4.2.

Table 4.2 List of government officers interviewed in June 2013

Pseudonym	Gender	Organisation
Saloma	Female	State government department
Rahman	Male	Local authority
Rayyan	Male	Federal government department
Imran	Male	Federal government department
Ramlee	Male	State government ministry

They were interviewed in their own offices, except for Rahman who was interviewed in his headquarters building. The interviews were audio-recorded with their permission.

The community survey on 13 June 2013 was carried out in a session during which MPOB also gave a briefing on the latest information about oil palm planting. Data was collected in two sessions; morning and afternoon because the venues for meeting the villagers were arranged in two nearby villages, namely Lawa and Lupak as well as for logistic reasons. Half a day in each village was sufficient to administer the questionnaire. Before the survey began, the informed consent letter was given to each villager. They were informed that it was a long questionnaire and asked for their patience and co-operation. The contents of the letter were

explained to three illiterate villagers. All 37 villagers who were present agreed to participate in the survey, of whom 31 identified themselves as smallholders (see Section 5.2). Each question was read out to the three illiterate villagers and ways they could respond to were explained. During the survey, each question was offered to be read out loud to the rest of the participants but they preferred to take their own time to go through it. Most of them took about 45 minutes to one hour to complete the survey.

As mentioned earlier, a purposeful sampling was carried out to identify participants for the focus workshop. One of the villagers chosen requested a certificate of participation to be given to workshop participants and that was given favourable consideration after consulting the supervisory team. Of the 20 villagers who were invited to participate in the focus workshop on 25 June 2013, 13 attended. In the focus workshop, the preliminary findings of the interviews with five government officers and the survey were presented. The key principles of the community environmental education model derived from the literature were explained briefly to the participants. The villagers agreed to discuss about their aspirations towards the development of education strategies appropriate to their local context. The discussion and interactions during the focus workshop were audio-recorded with their permission, and provided an avenue for the co-construction of the environmental education programme. The programme of the workshop is in Appendix E.

Upon returning to New Zealand after the Stage One data collection, data analysis was carried out. The findings of the data analysis were used to inform the development of the environmental education programme. Questionnaire and interview questions were prepared before returning to Malaysia for the Stage Two data collection.

Stage Two data collection involved the following activities:

1. Implementation of the environmental education programme (12 and 13 November 2013).
2. Evaluation survey among the villagers:

- a. Administration of questionnaires to 48 villagers to evaluate responses immediately after the environmental education programme was implemented (12 and 13 November 2013).
- b. Post-programme interview with eight villagers to evaluate their responses about the programme, changes and challenges encountered (27 - 28 November 2013).
- c. Post-programme follow-up interview with seven villagers to evaluate their responses about any changes and challenges encountered (25 March – 1 April 2014).
- d. One year post-programme follow-up interview with three villagers (November 2014).

The environmental education programme was implemented in Lawa and Lupak villages on 12 and 13 November 2013 respectively. In Lawa, 26 villagers attended the programme and 25 returned the evaluation questionnaires; whilst in Lupak all 23 villagers returned the questionnaires. For each venue, 30 villagers were initially invited to attend. However, the villagers who participated might not have been representative of the overall population in terms of their perceptions and existing behaviours. As highlighted in Section 4.5.2.2, assistance was sought from the MPOB officer to invite the participants based on criteria such as potential contributions and convenience of contact, smallholders or villagers living in the villages including heads of villagers or the Village Development and Safety Committee and living near Padas River. It is possible that he invited the participants based on whom he knew as friends, had some knowledge about waste issues or those who were already practising good waste practices.

For the post-programme interview with villagers, only four of them could be interviewed face-to-face on 27 November 2013. The other four villagers were contacted by telephone for an interview for which they gave their consent. About four months after the programme implementation and with consent sought previously in November 2013, seven of these villagers were interviewed by telephone from New Zealand, with Osman being unavailable. One year after the programme implementation, three villagers were interviewed by telephone from New Zealand. The villagers who were interviewed are listed in Table 4.3, of which each was given a pseudonym.

Table 4.3 List of respondents during the three phases of interviews: Two weeks, four months and one year post-programme

Pseudonym	Gender	Village	Participation in Interview
Johan	Male	Lawa	Two weeks and four months post-programme
Osman	Male	Lupak	Two-weeks post programme
Fikri	Male	Lawa	Two weeks, four months and one year post-programme
Azizah	Female	Lupak	Two weeks, four months and one year post-programme
Samsudin	Male	Tuhu Lupak	Two weeks, four months and one year post-programme
Zarina	Female	Lupak	Two weeks and four months post-programme
Satar	Male	Tuhu Lupak	Two weeks and four months post-programme
Fauziah	Female	Lawa	Two weeks and four months post-programme

The telephone calls were made using a mobile telephone which was put on speaker mode and recorded using an audio-recorder.

The next section discusses the data analysis process used in this research.

4.6 Data Analysis

In any research, the task after data collection is the analysis process. As both quantitative and qualitative data was collected, a variety of analysis methods were used in this research.

Quantitative data analysis, according to Cohen et al. (2011, p. 604), is “a powerful research form, emanating in part from the positivist tradition” and “is often associated with large-scale research, but can also serve smaller-scale investigations”. Cohen et al. (2011, p. 604) stated that numerical analysis could be

carried out using software such as SPSS (Statistical Package for the Social Sciences) or Microsoft Excel. In this research, the quantitative data were analysed using descriptive statistics in Microsoft Excel. Descriptive statistics “describe and present data” and “no attempt is made to infer or predict population parameters, and they are concerned simply with enumeration and organisation” (Cohen et al., 2011, p. 606). Gay et al. (2012, p. 322) indicated that the key types of descriptive statistics are frequencies, measures of central tendency, measures of variability, measures of relative position and measures of relationship. This research used mainly frequencies to describe the numerical data. Frequencies refer to “the number of times something occurs; with descriptive statistics, frequency usually refers to the number of times each value of a variable occurs” (Gay et al., 2012, p. 322).

All closed and scale questions in both surveys were analysed quantitatively. Variables from the questionnaire such as gender, occupation, age group and perceptions on environment and waste were given units of measurement or scores. For example, for gender the units of measurement were 1 for female and 2 for male respondents. For perceptions on environment and waste the units of measurement were 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree) and 5 (strongly agree). Each respondent of the questionnaire was given an identification value, for example V1 for respondent labelled number 1. Once all the variables were scored for each respondent, the resulting data were tabulated and entered into a spreadsheet in Microsoft Excel. The next step for this method was to summarise the data using descriptive statistics as described earlier.

Qualitative data analysis “involves summarising data in a dependable and accurate manner which leads to the presentation of study findings in a manner that has an air of undeniability” (Gay et al., 2012, p. 465) and also “involves organising, accounting for and explaining the data; in short, making sense of data in terms of the participants’ definition of the situation, noting patterns, themes, categories and regularities” (Cohen et al., 2011, p. 537). A thematic analysis (TA) method was chosen to analyse the qualitative data in the research. TA is a “method for identifying, analysing and reporting patterns (themes) within data” (Braun & Clarke, 2006, p. 79). Gay et al. (2012, p. 478) highlighted that identifying themes or key headings in qualitative data is dependent on the ideas that have emerged

both in the data collection as well as literature review. Coding, on the other hand, is a process of giving codes or labels as a way to identify patterns and give meaning to the data (Gay et al., 2012, p. 478). Braun and Clarke (2013, p. 178) stated that “TA as a named approach was first developed by Gerald Holton, a physicist and historian of science, in the 1970s but has only recently been recognised as a distinctive method with a clearly outlined set of procedures for the social sciences”. One of the main strengths of TA is its flexibility (Braun & Clarke, 2013, p. 178). For this research, Theoretical TA was used because “analysis is guided by an existing theory and theoretical concepts as well as by the researcher’s standpoint, discipline knowledge and epistemology” (Braun & Clarke, 2013, p. 175).

The open-ended data gathered from the questionnaires, interviews, focus workshop and observation of the programme implementation from both Stages One and Two were analysed using the thematic analysis method. Interviews were carried out both in English and Malay, therefore, the interviews in Malay were translated based on context during transcribing. The discussion during the focus workshop held in Malay was also translated based on context during the transcribing process.

Once the qualitative data were transcribed in Microsoft Word, meaningful codes were assigned to each response. The research questions guided the coding process to make sense of all the data gathered. After the coding process was completed, an excerpt of the data went through a peer review or validation process during which another EE researcher separately assigned codes to the responses. The codes were then compared for validation. Based on the comparison, all the codes assigned to the excerpt were of similar context. The codes were later collated and grouped into potential themes using a manual method of physically re-arranging the printed codes to identify patterns and themes. This process was repeated until the codes were grouped into themes that were meaningful and could respond to the research questions or related to ideas that emerged during the literature review. Findings from Stage One and Two are presented in Chapters Five, Six and Seven.

4.7 Limitations

Limitations and challenges encountered in terms of research methodology are discussed in this section.

In this research, face-to-face administration of questionnaires as well as interviews were carried out in an attempt to increase response rate, and for practical reasons due to limited access to mail and email services.

No audit of the respondents' actual action or behaviours could be carried out. Data were collected based on the assumptions that respondents have understood all the questions and have responded truthfully. Interviews were carried out post-programme but not all villagers were involved in this process. Since villagers responded to the questionnaire anonymously, certain responses that required further explanation could not be explored. For example, when the villagers used 'daily lives' in their written response, it could only be assumed that it could relate to ecosystem services such as water, food and decomposition of waste.

Elements of bias were possible in preparing the questionnaires because they were prepared with pre-conceived ideas and specific information to be gathered from the villagers to respond to the research questions. However, the preparation of the questions corresponded to the theoretical framework.

To a certain extent, the power and social relationships might have influenced the findings as some of the participants could have given information that they thought was "safe" for them instead of criticising about waste management in their villages. Power and social relationship could be seen as equal or imbalance in terms of the ability to influence people's responses and behaviour. By giving responses that were deemed "safe", the villagers could be wanting to avoid any negative consequences from any criticism about the lack of waste collection services.

After the administration of the questionnaire, a purposeful sampling was carried out to identify villagers from the attendees to participate in the focus workshop. A total of 20 villagers were identified and invited to attend the focus workshop

based on their active participation and some knowledge of waste management issues during informal discussions. However, only 13 could attend. The five government officers who participated in an interview were also invited to the focus workshop but they were unable to attend. It was difficult to understand the view of the whole community through the perceptions of the few villagers who attended the focus workshop. At the same time, it was not possible to gain commitment from the entire village to attend the focus workshop.

The participants for the research were recruited based on their potential contributions to the understanding of the waste management situation in local communities, and the convenience of contact. However, the responses given by these participants may not be representative of the entire population and therefore the generalisability of the results is limited. Since assistance was sought from the MPOB officer to invite the participants, the choice of participants rested on the officer's judgement and assessment based on the criteria given to him.

Document analysis of the guidelines, policies or regulations was not carried out in this research. Instead, those documents were only reviewed as literature. The process of document analysis and identifying impacts of the regulations could have given deeper insight into the contents, strengths, limitations, similarities or differences of the documents had time permitted.

Once the qualitative data were transcribed in Microsoft Word, meaningful codes were assigned to each response. The coding process was carried out with the research questions as guidance and an excerpt of the data was peer reviewed for validation process. However, although this process was carried out thoroughly and to the best of my knowledge, there could also be instances where the coding might not be the most appropriate for certain responses.

Due to the limitation of time and opportunity to see the respondents face-to-face, telephone interviews was the method chosen in the follow up phase. The telephone calls were made using a mobile telephone which was put on speaker mode and recorded using an audio-recorder. One of the limitations of phone interviews was it was not possible to observe the respondent's reaction when emphasising their responses.

Attrition of participants during the interview process occurred, and could have resulted in limited information gathered and possibly affected the reliability of results. Those who agreed to be interviewed throughout the process were those possibly more engaged in the education programme, and were not necessarily representative of the whole population. At the same time, it was difficult to guard against the attrition because the decision to participate was entirely dependent on the individuals.

Follow-up interviews were not carried out with the representatives from the government departments within the period of research. Such interviews may have been useful to obtain their views post-programme implementation, and thereby provide a more holistic view of the programme.

It is acknowledged that the process of co-construction in the focus workshop was not a comprehensive one. However, it was more than a consultation because interaction about their aspirations for the village and plantation with the villagers was carried out actively, meaning I reflected on their problems as well as obtained their suggestions about what might be carried out for their communities.

The timeframe of the programme provided limited opportunities to the villagers; hence, the impact of the intervention was likely to be limited. However, the initial favourable responses by the villagers gave an indication that further programmes post-research are possible outside the timeframe of this PhD study.

4.8 Data Validity and Trustworthiness

Producing valid and reliable data in any research is of high importance, especially for those who will apply the outcomes of the research. One of the important keys to effective research is its validity and trustworthiness as it is “a requirement for both quantitative and qualitative/naturalistic research” (Cohen et al., 2011, p. 179).

For quantitative research, Cohen et al. (2011, p. 180) highlighted that “validity must be faithful to its premises of positivism and positivist principles” such as

internal validity, reliability (replicability), external validity (generalisability) and objectivity. They further added that “this involves being faithful to the assumptions underpinning the statistics used, the construct and content validity of the measures used, the careful sampling, and the avoidance of a range of threats to internal and external validity” (Cohen et al., 2011, p. 180). Internal validity “deals with the question of how research findings match reality” (Merriam, 1998, p. 201) and “seeks to demonstrate that the explanation of a particular event, issue or set of data which a piece of research provides can actually be sustained by the data” (Cohen et al., 2011, p. 183). External validity on the other hand, refers to “the degree to which the results can be generalised to the wider population, cases, settings, times or situations” (Cohen et al., 2011, p. 186). Reliability refers “to the extent to which research findings can be replicated” (Merriam, 1998, p. 205). Objectivity, according to Newby (2013, p. 121), means “that the researcher is dispassionate in their judgement and, by implication, that another disinterested researcher would reach the same conclusion when faced with the same evidence”.

However, Eames (2003, p. 109) highlighted that “application of the positivistic criteria to interpretive research creates serious complications”. Altheide and Johnson (2013, p. 407) expressed that “a positivistic view of validity works fine in a different social universe where there are not multiple perspectives, vastly different methods and materials with which to work, and myriad uses and audience” but “that is not our social research world”. The same authors added that humans in the social world interpret meaning through the process of interactions and this contributes to the construction of social reality (Altheide & Johnson, 2013, p. 407). For example, Merriam (1998, p. 205) highlighted that reliability is a problem in social sciences because human behaviour is always changeable. The alternative approaches to the issues of validity and reliability in qualitative research are now discussed.

Trustworthiness of qualitative research can be established by “addressing credibility, transferability, dependability and confirmability” of studies (Gay et al., 2012, p. 392). The concept of credibility in qualitative research is parallel to the idea of internal validity used in quantitative designs (Guba & Lincoln, 1989, p. 236; Suter, 2012, p. 363). Credibility refers to establishing a match between the participants’ perceptions or constructed realities and those realities represented or

portrayed by the researcher (Guba & Lincoln, 1989, p. 237; Lodico et al., 2010, p. 169). Credibility is also concerned with “the believability of the findings and is enhanced by evidence such as confirming evaluation of conclusions by research participants, convergence of multiple sources of evidence, control of unwanted influences, and theoretical fit” (Suter, 2012, p. 363). Gay et al. (2012, p. 392) stated that in terms of credibility, researchers need to consider and address the various complexities in the study undertaken that are difficult to explain.

Transferability is akin to the concept of external validity (Guba & Lincoln, 1989, p. 241) and referred to as “the evidence supporting generalisation of findings to other contexts – across different participants, groups, situations and so forth” (Suter, 2012, p. 363). Transferability is relative, requiring a researcher to include context-relevant statements so the reader could identify with the setting as well as make the judgement whether the lessons from one site are appropriate for the reader to transfer its findings to another site (Gay et al., 2012, p. 392; Guba & Lincoln, 1989, p. 241; Lodico et al., 2010, p. 173).

The idea of dependability in qualitative research is parallel to the concept of reliability in quantitative design. Dependability is concerned with “stability of data over time” (Guba & Lincoln, 1989, p. 242). It refers to a situation where the researcher is able to identify processes used to collect and interpret data, and gather evidence to support claims that if the study is to be carried out again, similar findings would be obtained (Lodico et al., 2010, p. 172; Suter, 2012, p. 363). However, due to the constantly changing perceptions and social world, even if the study is to be done again with the same participants, it would then become a new study (Suter, 2012, p. 363). Therefore, dependability can be enhanced by audit trails, rich documentations, triangulation process and data review by other researchers (Lodico et al., 2010, p. 173; Suter, 2012, p. 363).

The idea of confirmability in qualitative research is similar to the idea of objectivity in quantitative research and is concerned with “assuring data, interpretations, and outcomes of inquiries are rooted in context and persons” (Guba & Lincoln, 1989, p. 242) as well as control of research bias (Suter, 2012, p. 363). Confirmability could be enhanced by peer review or confirmability audit (Guba & Lincoln, 1989, p. 243; Suter, 2012, p. 363).

The strategies to promote trustworthiness in qualitative studies include (Gay et al., 2012, pp. 392–393; Guba & Lincoln, 1989, pp. 237–239; Suter, 2012, p. 364):

1. Triangulation or multiple sources of data as evidence.
2. Prolonged participation at study site.
3. Conduct member checks to test overall report.
4. Consultation with experts, peer review or debriefing with another researcher or colleague to reflect on data.
5. Audit trail or detailed record of data collection.

Triangulation is the process of using ‘two or more methods of data collection in the study of some aspect of human behaviour’ (Cohen et al., 2011, p. 195) or uses ‘data collection strategies and data sources to obtain a more complete picture of what is being studied and to cross-check information’ (Gay et al., 2012, p. 393). Triangulation techniques in social sciences aim to explain clearly the richness and complexity of human behaviour by making use both qualitative and quantitative data (Cohen et al., 2011, p. 195). There are various types of triangulation as highlighted by Cohen et al. (2011, p. 196), for example:

1. Methodological triangulation: this type uses either ‘the same method on different occasions’ or ‘different methods on the same object of study’.
2. Time triangulation: this uses cross-sectional and longitudinal designs to take into account factors of change and time.
3. Theoretical triangulation: this type uses ‘alternative or competing theories in preference to utilising one viewpoint only’.
4. Investigator triangulation: this type ‘engages more than one observer’ or ‘data are discovered independently by more than one observer’.

In this research, methodological triangulation and time triangulation were chosen. In terms of methodological triangulation, qualitative and quantitative methods were used, while time triangulation involved carrying out the interviews two

weeks, four months and one year post-programme to take into account the factor of change and time.

The next section explains the data validity and trustworthiness approaches taken in this research.

4.8.1 Data validity and trustworthiness approaches in the research

Following the discussion above, several approaches were taken to maximise validity and trustworthiness of the quantitative and qualitative data and analysis used in this research.

For the questionnaires used in Stage One and Stage Two, the issue of validity was addressed by obtaining expert views on the questions being asked from the supervisory team. The Stage One questionnaire was also piloted as described in Section 4.5.1.1.

Records of data collection – photos, audio-recordings and field notes – were taken accordingly. In terms of credibility of the qualitative data, the data were analysed repeatedly, and thoughts and feelings were examined throughout the analysis process with the research questions as a guide. Member checks were conducted by sending the interview transcripts to the government officers to enable them to evaluate the contents of the transcription. All of them agreed to the transcripts with minor amendments from Saloma. Peer review was also used in which an excerpt of the interview transcripts was sent to another EE researcher to enable her to reflect on the data and code them according to her own reflection. Both codings were compared and found to be consistent.

Multiple sources of data were collected through methodological triangulation, in which qualitative and quantitative methods were used. Information from the questionnaires and interviews were compared to reach a conclusion on specific issues. For example, during the evaluation survey, villagers were asked to respond to the statement “the environmental education programme was beneficial for me” (B1). During the interview with selected villagers two weeks after the programme

implementation, one of the questions asked was “it is now two weeks since the implementation of the environmental education programme on waste management practices. How do you feel about the programme?”

Time triangulation was also used in which post-programme interviews were carried out three times namely two weeks, four months and one year post-programme to take into account the factor of change and time.

4.9 Research Ethics

This section discusses the background of research ethics and the ethical considerations given in this research.

4.9.1 Background of research ethics

Research ethics are given a high priority in most research work, especially those conducted by universities. Kawulich and Ogletree (2012, pp. 206–207) summarised the common elements of the ethical guidelines of the American Indian Law Centre 1999, Aboriginal Healing Foundation 2000, and the Australian Institute of Aboriginal and Torres Strait Islander Series 2011 for community researchers to adhere to, among others, as: “1) acknowledge family and community elders and tap into their knowledge and support, 2) identify and establish links between community members and available services, 3) share the potential benefits to the community of their participation in the study, 4) use culturally relevant terminology and language, 5) respect cultural and spiritual traditions, belief systems and intellectual and cultural property rights, 6) ensure that participants understand their right to voluntary consent and withdrawal at any time, 7) ask permission to use technology (recorders, cameras)”. These ethical elements are similar to requirements of the University of Waikato before commencement of any research and are further discussed in Section 4.8.2.

Kawulich and Ogletree (2012, p. 212) argued that involving communities in a research process can encourage them to think about solving community problems that could initiate change. In relation to this research, ethical guidelines were followed according to the permission given by the Faculty of Science and

Engineering Human Research Ethics sub-committee of the University of Waikato (see Appendix A and B).

When working with even relatively small communities, researchers should be aware of diversity (Guerin & Guerin, 2007, p. 178). Communities indeed have layers and differences (Williamson, 2007, p. 3). Homogeneity should not be assumed in any community because there is no singular person who can represent the whole community (Guerin & Guerin, 2007, p. 270). Day and Farenden (2007, p. 69) highlighted that “the diversity of values, cultures and beliefs found in community environments means that community life often harbours dispute, tension and conflict as well as cooperation and collaboration and often at the same time”. With all these in mind, the next section outlines the ethical considerations taken in this research.

4.9.2 Ethical considerations in research

To assure confidentiality, the participants were informed through the consent letter that data gathered from them was to be kept confidential and only used for the purpose of the research. The participants were also informed that data collected during the study would be used in writing the PhD thesis, reports, publications or in presentations. Those involved in interviews, the focus workshop and panel discussions were advised that pseudonyms would be used in the data presented in publications or presentations. To avoid potential harm to participants, data collection was held at the participants’ offices or village halls. Times and dates of meetings were arranged to reduce inconvenience to participants. Permission was sought to audio-record or take photos during the sessions.

During the research, anonymity was guaranteed in the questionnaire administration. Participants filled in the questionnaires together in the village halls and a box was provided for participants to submit the questionnaires. Data from the questionnaires were mainly aggregated and open-ended responses were attributed to a respondent’s code in data presentation.

At the time of gaining informed consent, the participants were advised of their right to decline to be involved. Participants could decline to be involved in the research by not completing the questionnaire. For interviews, participants could

withdraw any or all data they have provided up until two weeks after receiving any summary of their interview. Focus workshop summaries were provided to participants, where possible, through e-mails, for them to verify and these participants were also advised of their right to remove their own data if desired.

Being from the same state in Malaysia, it was an advantage to be aware of the culturally sensitive ways of approaching people. In terms of religion, when food was provided for the focus workshop and programme sessions, it was catered halal since most of the participants were Muslims. As a token of appreciation for the participants' time and co-operation, in addition to the food supplied, small but meaningful souvenirs from New Zealand were given, as this was customary in Sabah.

4.10 Chapter Summary

The objective of the study described in this chapter was to develop an environmental education programme together with local communities and the independent oil palm smallholders in Beaufort, Sabah, Malaysia focussing on sustainable waste management practices.

The three major paradigms – positivism, interpretivism and critical theory - were discussed in the chapter. Positivism was not appropriate to be used because this research dealt with a group of people with subjective views, various actions and behaviours. The ontological and epistemological assumptions of interpretivism were accepted in this research whereby reality can be seen subjectively from different lenses, and that it was interpreted through various viewpoints and understandings of the research participants about the world. Taking the partial critical theory approach in the perspective of promoting changes, epistemologically the assumptions were accepted whereby the values of the researcher would inevitably influence the process of inquiry, in which the researcher and participants were interactively linked.

The community research approach taken in this research was an overlap of the three approaches in community research. Different approaches were used at

different phases of the research. The researching with community approach has some characteristics of action research.

Mixed methods, which combined quantitative and qualitative methods, were used in this research to capitalise on the strengths of these two approaches and offered the best way to answer the research questions. For this research, the research methods were interviews, questionnaires, a focus workshop and observation of discussions. The participants for the research, namely government officers and villagers, were recruited based on their potential contributions and convenience of contact.

The data collection process involved two stages as follows:

1. Stage One:
 - a. Interviews with five relevant government departments and local authority.
 - b. Community survey among villagers and independent oil palm smallholder groups.
 - c. A focus workshop with villagers and smallholders to co-construct an environmental education programme on sustainable waste management practices.

2. Stage Two:
 - a. Implementation of the environmental education programme.
 - b. Evaluation survey and interviews with the villagers.

In this research, the quantitative data were analysed using descriptive statistics in Microsoft Excel. The open-ended data gathered from the questionnaires, interviews, focus workshop and observation of panel discussions from both Stages One and Two were analysed using the thematic analysis method.

Limitations and challenges encountered in terms of research methodology were highlighted such as no audit of the respondents' actual action could be carried out, elements of bias were possible in preparing the questionnaires, power and social relationship issues, participants may not be representative of the entire population, document analysis was not carried out, process of co-construction was not a

comprehensive one, and the timeframe of the programme provided limited opportunities to the villagers.

The alternative approaches to the issues of validity and reliability in qualitative research were discussed, namely credibility, transferability, dependability and confirmability. Several approaches were also taken to maximise validity and trustworthiness to deal with both quantitative and qualitative parts of this research, for example obtaining expert views from the supervisory team, piloting the first questionnaire, taking detailed records of data collection, examining data thoroughly, conducting member checks, peer review and using triangulation.

Research ethics were given a high priority in the research work and confidentiality was ensured among participants. Times and dates of meetings were arranged to reduce inconvenience to participants. Permission was sought to audio-record or take photos during the sessions. Anonymity was guaranteed in the questionnaire administration. Pseudonyms were used when citing data from interviews, focus workshop and panel discussions. At the time of gaining informed consent, the participants were advised of their right to decline to be involved. Proper ways to approach the communities were taken into account.

The next chapters present the findings that were gained from this research approach.

Chapter Five: Stage One Interview, Community Survey and Focus Workshop Data

5.1 Chapter Overview

This chapter presents the findings from the first stage of data collection in June 2013 in Kota Kinabalu and Beaufort, Sabah, Malaysia. In this chapter, topics discussed are the demographic background of respondents and the main themes of perceptions, environmental policies, education and awareness as well as waste behaviours. The main themes were developed during the analysis of data in which responses were coded and grouped according to themes.

Quantitative data were collected through a community survey, whilst qualitative data were obtained through interviews and a focus workshop. Data from this stage were used to inform the development of the environmental education programme that was later implemented in November 2013 in Beaufort. Sources of data are mentioned accordingly in the discussions.

5.2 Demographic Background

The pre-programme interviews were conducted in Kota Kinabalu, Sabah, with five government officers from relevant government organisations.

The community survey in June 2013 involved 37 villagers, where 32 (86%) were male, and five (14%) were female. Generally, based on personal observation of many community meetings that I have attended in Sabah, participation by mostly males is not unusual in local communities in Malaysia. In terms of age groups, more than 70% were above 41 years old, as shown in Figure 5.1.

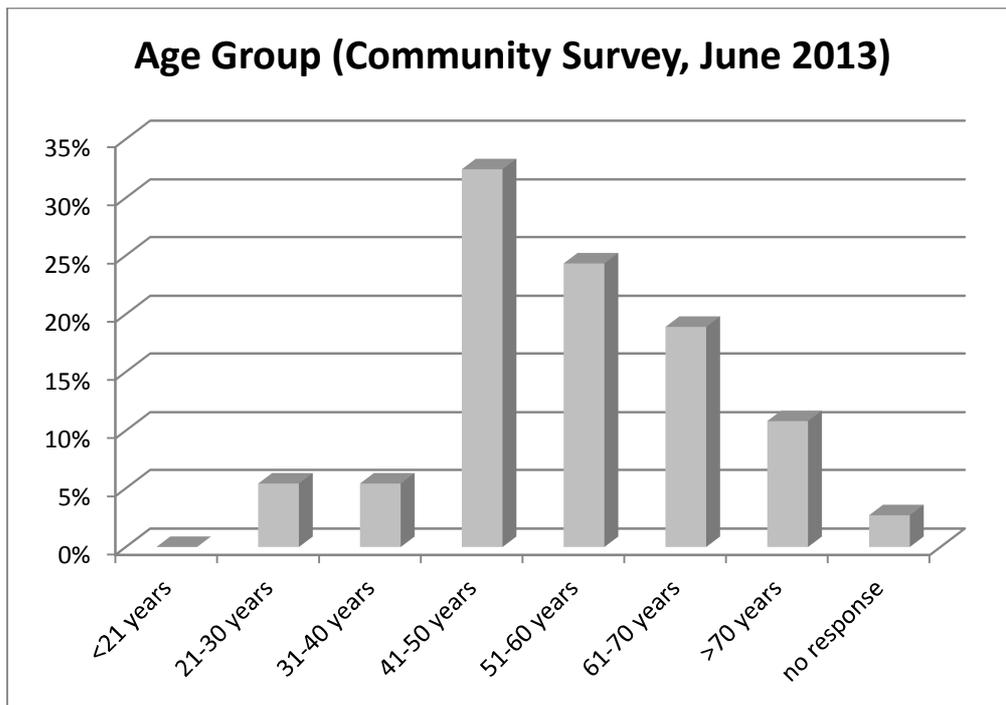


Figure 5.1 Age group of respondents in community survey (June 2013)

The respondents came from various neighbouring villages, and data collection was centralised in the villages of Lawa and Lupak due to availability of meeting places. When asked about their occupations, to which they were able to give multiple responses, most villagers described themselves as oil palm smallholders (31/37), of whom some also noted that they were working as a teacher (2/37), in the government sector (4/37) or having a leadership role in the village (1/37). All the female villagers described themselves as housewives.

After the community survey was completed, a focus workshop with 13 villagers was held in Beaufort in June 2013. These 13 villagers were also present during the community survey.

A coding system was used to maintain anonymity of respondents. For the community survey by questionnaire, which was filled in anonymously, the 37 respondents who completed the survey were coded Villager 1 to Villager 37. The discussion from the focus workshop among villagers was labelled as Focus Workshop. For the interviews with government officers before the implementation of the environmental education programme in November 2013, they were given pseudonyms as shown in Table 5.1.

Table 5.1: List of government officers interviewed pre-programme

Pseudonym	Gender
Saloma	Female
Rahman	Male
Rayyan	Male
Imran	Male
Ramlee	Male

The following findings are derived from the community survey, interviews and focus workshop. The presentation begins with the villagers’ and government officers’ perceptions about waste.

5.3 Perceptions of Waste

In terms of perceptions regarding waste, two sub-themes, namely environmental perceptions and waste management perceptions, were identified in the villagers’ responses in the questionnaires and in the interviews with government officers.

5.3.1 Environmental perceptions

Generally, perceptions about waste revolve around over-consumption, packaging of products, cleanliness, awareness and attitude, and impacts on the marine environment, rivers and land. However, based on the data from this research, this section focusses on responses of government officers and villagers regarding the importance of the environment and cleanliness, and of biodiversity and sustainable development. The idea of cleanliness is more human-centred as it is concerned with tangible, day-to-day activities that people can relate to.

5.3.1.1 Importance of the environment and cleanliness

There was strong support amongst villagers and government officers for a clean environment. As shown in Table 5.2, 30 of the 31 who responded agreed or strongly agreed to the statement “I believe we must keep our environment clean all the time” (B3). Furthermore, open-ended responses from the villagers in the community survey suggested that they felt the importance of the environment revolved around themselves, such as their health, and how they felt they

connected the environment to their daily lives. For example, one villager wrote that “the environment is important for our daily lives as well as our health” (Community survey, villager 1). Another villager responded “the environment is important because it is connected to health issues” (Community survey, villager 14). The term ‘daily lives’ was not explained well by the villagers in their written responses, and it may be related to ecosystem services such as water, food and decomposition of waste. This could be a limitation of responses by questionnaire as there was not an opportunity to explore these responses further.

When asked to respond to the statement “I like my village to be clean of waste” (C1), there was also strong agreement amongst the villagers (see Table 5.2). Furthermore, the majority of respondents (17/28) disagreed or strongly disagreed with the statement “My village is not always clean of waste” (C2). They appeared to believe that their village was always clean. However, 7 villagers of the 28 who responded agreed with the same statement, indicating a differing opinion about the state of cleanliness in their villages.

Table 5.2 Villagers' responses to a list of statements regarding the environment and waste and general waste management in the village (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

No.	Statement	Response					N	Did not respond
		1	2	3	4	5		
B3	I believe we must keep our environment clean all the time.	0	0	1	14	16	31	6
C1	I like my village to be clean of waste.	1	0	0	17	16	34	3
C2	My village is not always clean of waste.	4	13	4	7	0	28	9

Most villagers were clear in their responses that they would not dispose of waste carelessly in their village. In response to the statement "I throw waste wherever I want to" (C21), 23 villagers of the 28 responded that they never do (see Table 5.3). However, based on observations during the visits, plastic bottles and bags were scattered around in the village, suggesting a possible contradiction in this response.

Table 5.3 Villagers' responses to a list of statements regarding own waste management practices

No.	Statement	Response			N	Did not respond
		Never	Sometimes	Always		
C21	I throw waste wherever I want to.	23	5	0	28	9

One of the interview respondents, Ramlee, highlighted the need to learn from developed countries about cleanliness efforts. Ramlee remarked that "we want to look at our surroundings. If the surrounding is not clean, it is not comfortable. If

you look at developed countries, they really look after their environment. We want to be like that too” (Interview, Pre-Programme). Ramlee’s perception of developed countries which had a pleasant and clean surrounding provided an aim for him. However, he may have overlooked the possibility of other forms of environmental challenges such as pollution from the manufacturing sector or impacts of oil and gas exploration in these countries.

The next sub-section discusses the importance of biodiversity and the environment as well as sustainable development. This issue was raised by the government officers but not by the villagers.

5.3.1.2 Biodiversity, sustainable development and the environment

Another view regarding issues of waste and the environment considers its impact on biodiversity, rather than human health. During the interviews, one of the government officers, Rayyan, did highlight the importance of maintaining biodiversity and the environment through certification processes. He stated “at this stage, apart from optimising smallholders’ income, [our organisation] also emphasises maintaining biodiversity, looking after the environment. We are going towards Good Agricultural Practice (GAP)” (Interview, Pre-Programme).

Maintaining biodiversity and the environment is a holistic view which was not mentioned by the villagers during the survey or focus workshop. The villagers appeared more focussed on localised issues and what affected them on a daily basis. Based on Rayyan’s mention of maintaining biodiversity, it appeared that he had a holistic understanding of protecting the environment at a macro level.

Only one officer responded through the interview about how waste management is linked to the bigger picture of sustainable development. When asked what role should waste management play in sustainable development in Sabah, Saloma commented “promoting proper waste management such as recycling and regeneration so that sustainable development can be improved by using resources efficiently” (Interview, Pre-Programme). When asked if people generally understood what sustainable development was, Saloma responded “they know the

meaning of sustainable development, but they don't know how to achieve it (Interview, Pre-Programme).

Although the issues of biodiversity and sustainable development were mentioned by only two officers during the interviews, it is useful to discuss how best to improve understanding and awareness of these issues in Chapter Eight.

5.3.2 Waste management perceptions

This section presents the villagers' and government officers' perceptions about waste management in rural village areas, considering domestic waste as well as waste from plantations and mills.

5.3.2.1 Importance of waste management

Waste management as a specific issue was perceived as important by both government officers and villagers. One of the government officers, Saloma, stated that "I'm glad that waste management is one of the main issues being raised in Sabah. I hope all districts will be gazetted as rated area soon" (Interview, Pre-Programme). The rated area mentioned here by Saloma means the area within the jurisdiction of the local authorities in which solid waste collection services, among others, are provided, and people living in the area are required to pay taxes in support.

When asked in the survey, 27 villagers of the 29 who responded stated that there were no domestic waste collection services provided by the local authorities in their villages. This correlates with the general situation that many areas outside the local authorities' rating area, including the study area in Beaufort, do not have waste collection services.

Yet both domestic and agricultural waste is being produced in these areas. The villagers reported that the types of domestic waste that were generated in their homes, in the order of most reported, were food waste, plastic bags, plastic bottles, paper or cardboard, glass bottles, garden waste and animal waste. This finding indicates that much of the waste generated in homes was organic. Waste such as plastic bottles and paper could be recycled. This is similar to the findings in the

Solid Waste Master Plan Study in Sabah report that stated most domestic waste generated in Sabah was organic and recyclable (Chemsain Konsultant, 2007c, p. 20).

In terms of agricultural waste, 24 villagers of the 25 who responded indicated that there were also no collection services for this type of waste. The oil palm smallholders reported that the types of waste generated in plantations, in the order of most reported, were oil palm fronds, pesticide and fertiliser containers and fuel containers. This finding indicates that the waste can be categorised as either organic (oil palm fronds) or recyclable (containers).

Responsibility for, and impacts of, waste management generated diverse opinions amongst the villagers. When asked to respond to the statement “it is the government’s responsibility to manage waste properly” (C10), 19 of the 28 who responded agreed or strongly agreed, as shown in Table 5.4. This gives an indication that the majority of the villagers looked to the government for waste management services. But at the same time, the villagers also strongly agreed (29/30) that they should work together in waste management (see Table 5.4), indicating that they did not see the responsibility lying completely outside their control. While they were willing to work together with other villagers to manage waste in their village, they appeared to feel that they needed some form of assistance from the government.

Table 5.4 Villagers' responses to a list of statements regarding general waste management in the village (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

No.	Statement	Response					N	Did not respond
		1	2	3	4	5		
C10	It is the government's responsibility to manage waste properly.	0	4	5	16	3	28	9
C11	Villagers should work together to manage waste in the village.	1	0	0	19	10	30	7
C12	Waste actually has value if it is well managed.	0	0	2	20	7	29	8
C13	It takes too much time and effort to manage waste properly.	0	7	3	15	3	28	9

The main waste issues raised by some villagers were health problems, indiscriminate dumping of waste, foul smell, pollution, safety and waste after or during festivities. For example, when asked "If there are waste problems in your village, in your opinion, what are the worst problems?", one villager wrote "It will bring health problems to humans" (Community survey, villager 13). Two villagers commented "indiscriminant dumping of waste" (Community survey, villagers 1 and 28). Villagers 4, 18 and 32 raised the issue of "foul smell". Villager 7 commented about "pollution and safety" while villagers 24 and 25 wrote "waste after/during festivities". Another potential issue related to waste was raised by one of the government officers, Rahman, who indicated that if waste was not managed properly, it could affect the tourism sector in the state. He commented "tourists come to Sabah and say "Sabah is a very beautiful place" except for the lack of public amenities and waste management. This could make them want to avoid our place" (Interview, Pre-Programme).

When considering managing waste, the issues of value and time management arise. In terms of the value of waste, Table 5.4 shows that 27 of the 29 responded agreed or strongly agreed to the statement "waste actually has value if it is well managed" (C12). However, as shown in the same table, 18 of the 28 who

responded agreed or strongly agreed to the statement “it takes too much time and effort to manage waste properly” (C13). It is interesting to note that although most villagers thought waste had value if well-managed, they also felt they faced time management issues to manage waste properly.

In the focus workshop held after the community survey, the preliminary findings of the interviews with five government officers and the survey were presented. The key principles of the community environmental education model derived from the literature, namely local, awareness and knowledge, participation, skills and capacity building, attitudes, behaviour change/transformation, lifelong learning, learner-centred, leadership, collaborative and shared aspiration/goals were briefly explained to the participants. A shared aspiration was emphasised because it was the foundation of the environmental education programme. A consensus among the villagers was sought in order to steer the discussion toward the development of education strategies appropriate to their local context.

The discussion on shared aspirations started with one of the villagers asking for examples. A few examples were given such as “villagers manage their waste through recycling” and “walkways in my villages are always clean”. One of the workshop participants remarked that “if we manage waste properly, it will create prosperity” (Focus workshop). Another stated that “if we managed waste, for example, recycled items, it can bring positive impacts to us such as economic benefits” (Focus workshop). When discussing plantation waste management, one of the villagers expressed the following:

The pesticide containers in the plantations can be recycled accordingly. So, there is a motivation there in terms of economic benefits. Money gives motivation. We have been told not to throw, just recycle but there has not been a motivation to do so. But now, we see less people throwing aluminium cans for example because of the known value. People start collecting cans to sell. It is the same with scrap metal. (Focus workshop)

The villagers aspirational consensus was “a clean village and to gain economic benefits through recycling”. For their plantations, they aspired to “create well-managed plantation surroundings and to gain economic benefits through recycling”. These goals were used as the foundation to discuss the development of

education strategies for the villagers. These are discussed in the following chapter on the co-construction of the environmental education programme.

The next sub-section presents data on perceptions of waste reduction, recycling and disposal.

Domestic waste: Reduction and recycling

The discussion in this sub-section focusses on waste reduction and recycling perceptions and practices. Since disposal is the last resort in the waste management hierarchy, waste reduction and recycling ought to be considered before taking the option of disposal. In the community survey, a list of statements or questions pertaining to waste reduction and recycling were designed to gauge their perceptions and practices.

Recycling seemed to be the preferred option among the villagers rather than reducing waste. The results in Table 5.5 showed that a majority of respondents (28/31) responded 'agreed' or 'strongly agreed' to the statement "waste reduction is important to reduce pressure on the environment" (B5). However, a majority of them also agreed or strongly agreed that "recycling is a better option than waste reduction" (B6) (See Table 5.5). These responses indicated that although the villagers perceived waste reduction as important, recycling was seen to be a better or convenient option for them. When asked "If you recycle things, what would help you to recycle more?" in the community survey, some of the villagers who responded stated that they recycled mainly for economic benefits. For example, one villager stated "I can sell empty coke tins for recycling to middleman" (Community survey, villager 16). Another wrote "to get profit" (Community survey, villager 29). The recycling activities seemed to be motivated by monetary gains rather than environmental considerations. This is an example of a pro-environmental behaviour which has benefits for the environment but is not necessarily motivated by environmental concerns. The data in Table 5.5 showed that 21 of the 29 villagers agreed or strongly agreed that "as far as I know, villagers practice recycling" (C8). During the focus workshop, villagers were asked where they sent cans for recycling. One responded "there is a place that accepts scrap metals. What we don't have now is plastic containers and

newspapers recycling” (Focus workshop). When probed further where the place was, the response was “nearby but there is no signage” (Focus workshop). Another villager stated that “there is no recycling service at present” (Focus workshop). At this stage, there seemed to be some vague responses surrounding the issue of recycling. The issue of recycling in villages is discussed further in Section 6.4.2.

Table 5.5 Villagers’ responses to a list of statements regarding the environment and waste (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

No.	Statement	Response					N	Did not respond
		1	2	3	4	5		
B5	Waste reduction is important to reduce pressure on the environment.	0	2	1	19	9	31	6
B6	Recycling is a better option than waste reduction.	1	0	0	16	13	30	7
C8	As far as I know, villagers practice recycling.	0	3	5	13	8	29	8

Up to this stage of discussion, the findings seemed to indicate that it is likely that the villagers practise waste reduction or recycling with weak environmental considerations. However, by practising waste reduction and recycling, it is already a positive start for better waste management. Table 5.6 shows the villagers’ responses about their waste reduction and recycling practices. When asked about their waste reduction practices as shown in Table 5.6 (C14-C17), the majority of the villagers reported that they sometimes or always practiced waste reduction. A majority of the villagers (23/ 27) responded sometimes or always to the statement “I reuse things” (C18). In terms of composting, 18 villagers of the 26 responded sometimes or always to the statement “I do composting at home” (C19). As mentioned earlier, since recycling seemed to be the preferred option among the villagers rather than reducing waste, one would expect a higher number of

villagers to respond to sometimes or always to statement “I recycle things” (C20) (see Table 5.6).

Table 5.6 Villagers’ responses to a list of statements regarding own waste management practices

No.	Statement	Response			N	Did not respond
		Never	Sometimes	Always		
C14	I practice waste reduction by only buying what I need and using it all.	4	14	11	29	8
C15	I practice waste reduction by purchasing goods with minimal packaging.	0	18	7	25	12
C16	I practise waste reduction by buying durable products.	3	11	14	28	9
C17	I practice waste reduction by donating and/or selling old items.	7	16	6	29	8
C18	I reuse things.	4	14	9	27	10
C19	I do composting at home (example: food waste, garden waste).	8	9	9	26	11
C20	I recycle things (example: papers, aluminium cans, glass bottles, plastic bottles)	8	6	13	27	10

Domestic waste : Disposal issues

The discussion in this sub-section focusses on waste disposal issues. Data are presented in Tables 5.7 and 5.8 based on the questions and different scales of response in the community survey. Due to the inter-connection of issues, discussion is interwoven between those two tables.

Based on my observation as an environmental educator in Sabah, typical types of waste disposal for areas without waste collection services are burying in the ground, burning or throwing into the rivers or drains. Based on the data collected in the community survey, responses from the villagers seemed to indicate that with a lack of safer alternatives such as waste collection services, the existing waste disposal methods were burying and burning. A majority of the villagers reported that no waste was thrown into the rivers.

Villagers' general knowledge, perceptions and related practices of waste disposal impacts on rivers and ocean were gauged in the community survey. When asked to respond to the statement "disposal of waste on the land can have impacts on rivers and oceans" (B7), the responses were spread out across the scale as shown in Table 5.7. This may indicate that the respondents were unsure of the impacts of waste disposal on rivers and oceans. As shown in the same table, 28 of the 30 villagers who responded disagreed or strongly disagreed to the statement that "putting waste in the river is acceptable because it all washes out to sea" (B9), indicating that they believed that it was not good practice to put waste into the river. When then asked to respond to the statement "waste is thrown into our local rivers" (C4), while the majority of the villagers, (21/29) who responded indicated that they did not think that happened, there were some who felt that it did happen or who were unsure. Furthermore, as shown in Table 5.8, when asked if they personally put waste in the river (C23) 27 of the 28 villagers who responded reported that they never did. The issue of waste in the local river revealed some uncertainty amongst the villagers and this is discussed further with similar findings in the next chapter.

Table 5.7 Villagers' responses to a list of statements regarding the environment and waste (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

No.	Statement	Response					N	Did not respond
		1	2	3	4	5		
B7	Disposal of waste on the land can have impacts on rivers and ocean.	2	10	4	7	6	29	8
B8	Burying waste in the ground is a safe way to dispose of it.	1	3	0	20	8	32	5
B9	Putting waste in the river is acceptable because it all washes out to sea.	5	23	0	2	0	30	7
B10	Burning waste is not a good way to dispose of it.	2	9	1	18	1	31	6
C3	Some people throw waste anywhere they like in my village.	2	19	2	4	0	27	10
C4	Waste is thrown into our local rivers.	8	13	3	5	0	29	8
C5	Bad smells from waste is a problem in my village.	5	18	2	3	0	28	9
C6	Burning of waste in the open air happens in my village.	8	14	1	6	0	29	8
C7	Dumped waste can cause health problems.	5	3	0	18	4	30	7

Table 5.8 Villagers' responses to a list of statements regarding own waste management practices

No.	Statement	Response			N	Did not respond
		Never	Sometimes	Always		
C22	I dig a hole and bury waste.	1	9	19	29	8
C23	I put waste into the river.	27	2	0	29	8
C24	I burn waste.	7	18	6	31	6

Burying waste was another form of waste disposal practised by the villagers. As shown in Table 5.7, 28/32 villagers responded agreed or strongly agreed to the statement “burying waste in the ground is a safe way to dispose of it” (B8). In terms of practices as shown in Table 5.8, 28 villagers of the 29 who responded stated that they sometimes or always “dig a hole and bury waste” (C22). Therefore, the practice of burying waste appears to be common in the villages and could be linked to the lack of alternatives such as waste collection services by the local authorities.

Burning of waste was also another form of waste disposal practice in the villages. The responses to the statement “burning waste is not a good way to dispose of it” (B10), showed diverse responses as shown in Table 5.7. While some respondents believed burning was an acceptable mode of waste disposal, the majority did not. When asked directly if they burnt waste (C24) as shown in Table 5.8, 24/31 villagers admitted to doing so. However, interestingly as shown in Table 5.7, 22/29 villagers were less inclined to agree to “burning of waste in the open air happens in my village” (C6). With consideration of these data in connection with the interviews with the government officers, it appeared that burning was being practiced as a way to dispose of waste. For example, one of the government officers, Rayyan, commented that “people usually burn, because that’s easy” (Interview, Pre-Programme). Another officer, Rahman, when interviewed on how rural local communities managed their waste, stated the following:

In terms of household waste, they sort it out on their own. Some throw into the rivers too. Sometimes we give talks in villages, we advise them to dig

a hole and bury waste. Some waste that can be burned, they burn (Interview, Pre-Programme).

It is interesting to note that villagers were also advised to dig a hole and bury waste by the government department where Rahman works. This appeared to indicate the limitation of the relevant government department to provide for proper and safer waste disposal alternatives to the villagers.

Another officer, Imran, who was asked about the current situation of domestic waste management in Sabah, had a different view, responding that he felt that domestic waste management was under control in Sabah. He remarked “as a whole, what I can say, it’s still under control. Still can be managed. [Our department] hasn’t received any complaint regarding domestic waste. Only through the media, but more directed to local government” (Interview, Pre-Programme). However, this may not be representative of all places in the state.

To summarise this sub-section on domestic waste disposal in the villages, it seems that burying was prevalent, burning somewhat occurred but villagers reported that they did not undertake disposal in waterways.

5.3.3 Plantation waste

The discussion in this sub-section focusses on plantation waste. Data are presented in Tables 5.9, 5.10 and 5.11 based on the questions and different scales of response in the community survey. Due to the inter-connection of issues, discussion is interwoven between those tables.

Most of the villagers who responded in the community survey were oil palm smallholders i.e. 31 of the 37 respondents. As mentioned in Section 5.2.2.1, the common types of agricultural waste from the plantations reported by the villagers were oil palm fronds, pesticide and fertiliser containers and fuel containers. In the community survey, there was a specific section to be filled in only by oil palm smallholders.

There seemed to be a general perception among the villagers that plantation waste was managed properly. As shown in Table 5.9, 24 of the 28 smallholders who

responded agreed or strongly agreed to the statement “I believe waste on smallholders’ plantations is well managed” (D1). This corresponds to the response of the villagers to the statement “I believe oil palm smallholders manage waste properly in their plantations” (C9) of which 24/30 villagers agreed or strongly agreed, as shown in Table 5.8. Based on the demographic data, 31 villagers described themselves as oil palm smallholders. The remaining six had different occupations. Among the six non-smallholders who responded to statement C9, the majority appeared to believe that smallholders’ plantation waste was managed properly.

Table 5.9 Villagers’ responses to a list of statements regarding general waste management in the village (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

No.	Statement	Response					N	Did not respond
		1	2	3	4	5		
C9	I believe oil palm smallholders manage waste properly in their plantations.	0	2	4	19	5	30	7
D1	I believe waste on smallholders’ plantations is well managed.	1	3	0	15	9	28	3

There was a mixed response among the smallholders on how they perceived management of plantation waste; this could be based on their knowledge and experiences. When asked to respond to the statement “I dispose of plantation waste properly” (D13), 14 of the 20 responded always (see Table 5.11). Interestingly, in the same table, 14/21 smallholders responded always to the statement “I throw oil palm waste wherever is convenient in my plantation” (D15). Based on these responses, the smallholders could be assuming that disposing waste properly was equivalent to throwing waste wherever was convenient within their plantations. There could be an interesting contradiction to statement D13 as proper waste management could be viewed as composting the oil palm fronds and disposing of the fertiliser and pesticide containers according to existing

regulations. As shown in Table 5.10, 17/23 respondents disagreed or strongly disagreed to the statement “some smallholders seem to just throw waste anywhere they like” (D3). However, it is also interesting to note that six villagers agreed that some smallholders seemed to throw waste anywhere they liked (see D3, Table 5.10). While 24/28 agreed or strongly agreed that waste on smallholders’ plantations was well-managed (Table 5.9), 13/21 agreed that “there are waste management problems on smallholders’ plantations” (D2) (Table 5.10). Ten smallholders did not respond to statement D2. This particular statement was gauging their general perception of smallholders’ plantations that they know of. Some smallholders seemed to think there were waste management problems in the plantations. However, since the majority of them perceived that the plantations were well-managed, the problems, in their knowledge, could be those that did not warrant immediate attention.

Table 5.10 Oil palm smallholders' responses to a list of statements regarding general waste management in oil palm plantations (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

No.	Statement	Response					N	Did not respond
		1	2	3	4	5		
D2	There are waste management problems on smallholders' plantations.	0	6	2	13	0	21	10
D3	Some smallholders seem to just throw waste anywhere they like.	2	15	0	6	0	23	8
D4	Waste from plantations is thrown in rivers.	3	15	1	5	0	24	7
D5	Bad smells from plantation waste is a problem.	4	4	3	12	0	23	8
D6	Unmanaged plantation waste can cause health problems.	2	1	3	13	4	23	8
D9	Open burning of waste happens in plantations.	3	12	3	3	0	21	10
D10	The cost of managing waste in my plantation is high.	0	8	4	4	0	16	15

Table 5.11 Oil palm smallholders' responses to a list of statements regarding waste management practices in own plantations

No.	Statement	Response			N	Did not respond
		Never	Sometimes	Always		
D13	I dispose of plantation waste properly.	0	6	14	20	11
D14	I compost oil palm waste.	10	8	2	20	11
D15	I throw oil palm waste wherever is convenient in my plantation.	1	6	14	21	10
D16	I bury oil palm waste.	12	6	2	20	11
D17	I dump oil palm waste into the river.	19	0	0	19	12
D18	I burn oil palm waste.	8	11	2	21	10
D19	I reuse old fertiliser/pesticide/fuel containers.	17	3	2	22	9

Mixed responses were received when smallholders were asked about various disposal methods in their plantations. There seemed to be an affirmation that waste was rarely thrown from the plantations into the river as shown in Table 5.10 (D4) and Table 5.11 (D17). When asked about burning, Table 5.10 shows that 15/21 smallholders disagreed or strongly disagreed with the statement “open burning of waste happens in plantations” (D9). Only 3/21 said it happened. However, 11 responded sometimes and two admitted ‘always’ to the statement “I burn oil palm waste” (D18) (see Table 5.11). One smallholder admitted “I burn once in three months” (Community survey, villager 16). It is interesting to note the discrepancy in these two responses regarding the same issue of burning. It is possible that open burning might happen in isolated areas of the plantation that were not visible to others, or that the idea of open burning was not well understood by respondents. In terms of composting oil palm waste, as shown in statement D14 in Table 5.11, there was a mixed response. Similarly, responses to burying oil palm waste in statement D16 received a mixed response as shown in

Table 5.10. In terms of reusing old fertiliser/pesticide or fuel containers, 17 of the 22 responded that they never did that (see Table 5.11).

Other issues were raised in the community survey such as cost, further improvements in plantations, health problems and bad smells. As shown in Table 5.10, half (8/16) of the smallholders responding did not agree to the statement “the cost of managing waste in my plantation is high” (D10), but a quarter (4/16) did. Cost to manage plantation waste may not be an issue to some smallholders if they are choosing options such as burning or composting. However, this result may not be representative of all smallholders as 15 did not respond to the statement. In another question in the survey, when asked “Do you think management of waste in your plantation can be improved?”, 18 of the 31 responded waste management in their plantations could still be improved. One smallholder wrote “need to be hardworking to improve plantations” (Community survey, villager 3). Another commented “use proper agricultural techniques such as arrange the fronds, bury pesticide containers in a proper place” (Community survey, villager 32). It is interesting to note that villager 32 perceived burying pesticide containers as a “proper agricultural technique”. Table 5.10 shows that 17/23 respondents agreed or strongly agreed that “unmanaged plantation waste can cause health problems” (D6), but there was less agreement that “bad smells from plantation waste is a problem” (D5) (see Table 5.10), which could potentially lead to health issues.

Proper waste management priorities and enforcement might be emphasised in big plantations or mills only, and not in smallholders’ plantations, at the present time. Imran, one of the officers interviewed indicated that on-site waste management was available mostly in big plantations or mills :

Most of the mills manage their EFB (empty fruit bunches) waste on-site either through control burning (open burning is forbidden) as final disposal by using incinerator, convert it as a fibre to become solid fuel for the boilers or use/export as a base material for mattress, and/or compost it to become organic fertiliser (Interview, Pre-Programme).

Another officer, Rayyan, believed that based on the present scenario in Sabah, proper management was being practiced by smallholders. However, enforcement was lacking. He commented:

Based on the present scenario in Sabah, overall in terms of smallholders, proper management is being practised. In terms of enforcement and awareness....the State Government has formed local authorities and waste management is part of the services. However, the emphasis is perhaps on big mills. For rural areas, enforcement is lacking (Interview, Pre-Programme).

5.3.4 Summary of perceptions of waste

The ideas of human- and eco-centredness in dealing with waste emerged in the data. The issue of cleanliness related to tangible, day-to-day activities was broadly discussed by the government officers and villagers. It seemed to be an important issue; however, there was a discrepancy between reality and the villagers' perception of cleanliness.

Although the issues of biodiversity and sustainable development were only highlighted by two officers during the interviews, it seemed important to develop understanding and awareness about them among the villagers.

Waste management was perceived as an important issue. The villagers seemed to prefer recycling than waste reduction. The domestic waste disposal practices in the villages seemed to indicate that burying was prevalent, burning somewhat occurred and villagers indicated that they did not dispose of waste in waterways.

Some smallholders seemed to think there were waste management problems in the plantations. However, a majority of smallholders perceived that the plantations were well-managed for waste. Presumably, based on their knowledge, the problems could be those that did not warrant immediate attention.

The villagers agreed that their aspiration for the village was "a clean village and to gain economic benefits through recycling". For their plantations, they aspired to "create a well-managed plantation surroundings and to gain economic benefits through recycling". These goals were included as the foundation for co-constructing the environmental education strategies for their villages.

The next section presents findings on policies and regulations pertaining to waste management in villages and oil palm smallholders' plantations, and challenges in terms of enforcement and co-operation.

5.4 Environmental Policies

This section presents data on the respondents' perceptions on policies and regulations pertaining to waste management in villages and smallholders' plantations, and the challenges of enforcement and co-operation in waste management practices.

5.4.1 Waste management regulations

Perceptions on waste management regulations and policies in Sabah were gathered through the interviews with government officers and community survey.

In terms of a specific regulation pertaining to waste management for local communities, there was only one indicated by one of the interview participants. The regulation directly related to waste management was known as the Uniform (Anti-Litter) By-Laws 2010 enforced under the jurisdiction of the local authority. Rahman stated that "in terms of regulations, we have an Anti-Litter By-Law that covers all matters pertaining to waste. It's been updated in 2011" (Interview, Pre-Programme). During the community survey, the villagers were asked whether they were aware of any policy or regulation on waste management in their village and plantations. For waste management regulation in villages, while 10/33 reported they were aware of regulations, a majority (23/33) indicated that they were unaware. When asked to explain further about any regulations they knew of, one of the respondents wrote that "indiscriminant dumping of waste is prohibited" (Community survey, villager 15). These findings seemed to indicate a general lack of awareness among the villagers of waste management regulations or it could also possibly be that its importance may not be emphasised. In terms of provision of waste collection services by the local authority to the villages, 27/29 responded there were no domestic waste collection services provided.

Other participants involved in the interviews indicated that their organisations had no policies or regulations specific to local communities, but did have some broader policy on waste management. For instance, they described policies or regulations on open burning control and the Sabah Environmental Education Policy (SEEP). Imran stated the following:

[Our department] doesn't have specific policies or regulations in waste management for rural local communities. We enforce only the mills through licensing conditions. Indirectly, we control open burning of their waste through Section 29A (Prohibition on Open Burning) and Section 29B (Owner or Occupier of Premises Liable for Open Burning) (Interview, Pre-Programme).

However, for Imran's department, there seemed to be some exemptions for burning garden waste in villages. Imran remarked "according to our law, we do allow the villagers to burn garden waste, but not rubbish. In plantations, we promote zero burning, and not slash and burn" (Interview, Pre-Programme). He added that "during a haze period with API (Air Pollution Index) exceeding 200, we issue a directive for no open burning activities at all" (Interview, Pre-Programme). In terms of complaints about open burning, Imran explained:

So far, we haven't received any complaints, because I think the villagers know each other and can accept it, unless open burning happens in a housing area. If we receive a complaint in a housing area, we will give advice not to do it again (Interview, Pre-Programme).

Another officer, Ramlee, stated:

Actually, our focus is not on this, as it's only a side activity for us. Our focus is actually on increasing economy of the hardcore poor, but at the same time we also want the villagers to be aware of the environment, and especially to do something about waste. As you know, waste management in villages is not really in order. We want the villagers to have awareness on how to maintain cleanliness, not to throw rubbish indiscriminantly, and if possible, recycle or make compost (Interview, Pre-Programme).

From the interviews with these government officers, it appeared that there was a lack of specific waste policies or regulations for villages. There was also a lack of awareness of villagers of existing waste policies for their villages.

One particular policy, the Sabah Environmental Education Policy, does include a mention of waste management. As one officer, Saloma, remarked "we don't really have our policies on waste management focussing on rural local communities but

the Sabah Environmental Education Policy is a little bit related to waste management” (Interview, Pre-Programme).

The Sabah Environmental Education Policy (SEEP) is jointly implemented by the Sabah Environmental Education Network (SEEN) members. On SEEP, Saloma explained:

There are action plans in the policy whereby the communities are encouraged to practise good practices in waste management. The Sabah Environmental Education Policy is implemented by the government sector, non-government organisations, private sectors, educational institutions, and also media and public. Monitoring for the implementation of the Sabah EE Policy is done once every two years (Interview, Pre-Programme).

However, the effectiveness of implementation of the community waste management action plan, which is included in the policy, could not be determined at the time of interview. This data indicates there are gaps in the efforts to improve waste management and to provide efficient waste collection services in Sabah, especially in rural areas. This limitation may contribute to the challenges faced by villagers in handling both domestic and plantation waste.

In terms of the oil palm smallholders’ awareness of waste management regulation in plantations, there were mixed responses; 12/31 felt there were regulations, 10/31 responded that they weren’t aware of any and 9/31 did not respond at all. Some smallholders who responded that they were aware of regulations gave examples such as being “prohibited to throw fertiliser and pesticide waste into the river, open burning” (Community survey, villager 23), taking “proper care of oil palm plantations” (Community survey, villager 27), knowing “when it's time to collect the oil palm, the fronds must be placed in the walkways” (Community survey, villager 17) and being “prohibited to do open burning” (Community survey, villager 32). None of them mentioned specific names of any guidelines that were available for smallholders or whether they had any certification at all. This data indicated some awareness about policy regarding open burning, as described above, but little awareness of any other policies.

Under the Malaysian Palm Oil Board (MPOB), a code of good agricultural practice for oil palm estates and smallholdings has been developed as a guideline.

In the document, there are provisions for managing waste in plantations such as under section 4.8.11 on empty pesticide container proper disposal (Malaysian Palm Oil Board (MPOB), 2008, pp. 8). For example, section 4.8.11.1 stated “empty pesticide containers should not be re-used and their disposal shall be in a manner that avoids exposure to humans and contamination of the environment”. Section 4.8.11.5 outlined “empty containers should be secured until disposal”. Another section, 3.8.11.6 stated that “disposal or destruction of containers should be in accordance with the Pesticide Act 1974 (Act 149) and/or any other relevant local regulations”. The smallholders’ perceptions of the value of these guidelines received mixed responses. When asked to respond to the statement “the guidelines for disposing of fertiliser and pesticide containers are useful” (D7), 18/22 responded agreed or strongly agreed (see Table 5.12).

Table 5.12 also shows a range of responses to the statement “the guidelines for disposing of used fuel and/or its containers are not useful” (D8). This finding indicates less certainty around the guidelines for this type of container. There is an interesting difference regarding types of waste and may indicate uncertainty as to what might be considered as waste.

Table 5.12 Oil palm smallholders' responses to a list of statements regarding general waste management in oil palm plantations (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

No.	Statement	Response					N	Did not respond
		1	2	3	4	5		
D7	The guidelines for disposing of fertiliser and pesticide containers are useful.	2	1	1	14	4	22	9
D8	The guidelines for disposing of used fuel and/or its containers are not useful.	3	7	3	9	0	22	9

Table 5.13 Oil palm smallholders' responses to a list of statements regarding waste management practices in own plantations

No.	Statement	Response			N	Did not respond
		Never	Sometimes	Always		
D11	I dispose of pesticide and fertiliser containers according to guidelines.	4	6	11	21	10
D12	I dispose of used fuel and/or its containers according to guidelines.	4	6	10	20	11

As shown in Table 5.13 above, 17/21 smallholders indicated that they sometimes or always disposed of pesticide and fertiliser containers according to the guidelines. This agrees with the data regarding awareness of the guidelines. In the same table, a majority of smallholders (16/20) also indicated that they disposed of used fuel and/or its containers according to guidelines. This contradicts the range of responses to the statement about awareness of the guidelines, and may either reflect confusion over the awareness question, or that when asked directly about what they do, the smallholders were more inclined to indicate that they do the 'right' thing. Interestingly, there were four smallholders who stated they never

disposed of the containers according to guidelines. Due to the nature of the questionnaire, there was no requirement for the respondents to explain their responses further for the statements such as D7 and D8. Therefore, their exact method of disposal could not be identified. However, one possibility is that they reused the containers, as highlighted by the government officer, Rayyan, as follows:

As I said earlier, they either bury, burn, reuse or throw waste into rivers. Some of them reuse the containers as flower pots. However, in the RSPO [Roundtable for Sustainable Palm Oil] [guidelines], that is not allowed. [Code of Practice] COP doesn't allow that too. COP is actually stricter than RSPO (Interview, Pre-Programme).

It is interesting to note that in Section 5.2.3 it was indicated that villager 32 perceived burying pesticide containers as a “proper agricultural technique”. There could be more smallholders who perceived proper disposal in such a way. This could be due to lack of proper guidance or emphasis on waste management and awareness.

Based on information obtained from the interview, certifications such as Code of Practice (COP) (Malaysian Standard) and Roundtable for Sustainable Palm Oil (RSPO) (International standard) are available for oil palm smallholders. Policy and regulations on waste management for smallholders were embedded in the certification process. Rayyan informed that “we are at the campaigning stage. Our Ministry encourages the smallholders to practice Good Agricultural Practice (GAP) through the introduction of a certification called Code of Practice (COP). It is concurrent with the RSPO” (Interview, Pre-Programme). Rayyan further remarked the guidelines emphasised “on methods to manage waste, for example, on how to dispose of pesticide containers” (Interview, Pre-Programme).

Other officers who were interviewed said that there was an absence of policy for waste management for smallholders in their organisations. When asked if his organisation has any current waste management policies and regulations specifically for smallholders, Rahman replied “no we don't but hopefully after” (Interview, Pre-Programme). Additionally, Saloma said “there is no policy in this organisation but we promote recycling through EIA (Environmental Impact Assessment) approval conditions” (Interview, Pre-Programme).

Saloma further suggested that a general policy on waste disposal related to communities be developed. She stated:

As I mentioned, the local authorities should get involvement from the communities/independent oil palm smallholders. And they should set general policies and regulations for administration and control of environmental impact of waste disposal for more detail, and yes, utilising existing budget more effectively, and promoting 3R practices to the communities or the independent oil palm smallholders (Interview, Pre-Programme).

It was interesting to note that none of the government officers mentioned the existence of the Solid Waste Management Master Plan Study in Sabah that was published in 2007. The master plan contained various recommendations and strategies for improvement through a better, safer and environmentally beneficial solid waste management for the 22 local authorities in Sabah. The master plan has a policy framework with four main thrusts, as highlighted in Section 3.4.1, namely establishing an institutional framework, awareness and public participation, privatisation of services and providing safe and environmentally-friendly technologies.

The next section presents data on issues of enforcement and co-operation as gathered from the government officers and villagers.

5.4.2 Enforcement & co-operation

Important issues raised by the government officers and villagers were the lack of coordination and enforcement in implementing regulations on waste management. One of the reasons suggested was lack of human resource in the enforcement agencies, as Rahman commented that "the Anti-Litter Bug Campaign covers it all. But in terms of manpower, we are limited. It's not easy" (Interview, Pre-Programme).

Imran also claimed a "lack of enforcement by the agencies given powers" (Interview, Pre-Programme), when asked about the challenges faced to implement policies and regulations. Another officer, Rayyan, further commented "for me,

apart from awareness and education, what's important is enforcement" (Interview, Pre-Programme). Villagers also saw this as an issue, with one claiming in the community survey "there is no enforcement by relevant organisations" (Community survey, villager 13).

The importance of co-operation and commitment of government agencies and village leaders to find solutions to existing problems was highlighted. According to Imran, challenges occurred perhaps due to "not enough coordination and cooperation among the agencies involved" (Interview, Pre-Programme). Working together with other agencies was seen as a way to reduce the gap in enforcement, as Rahman said "in our planning, we call relevant agencies with regulations on waste to discuss on who will do what. If there is a complaint, we will work together to solve the issue" (Interview, Pre-Programme).

When asked if there was a way for waste management to be improved in the village, one of the villagers wrote "the commitment of villagers especially the head of village and the Village Development and Safety Committee" (Community survey, villager 23). At community level, village leaders are in the best position to guide and motivate other villagers. A strong leadership in villages could contribute to improvements in community development, including waste management.

5.4.3 Summary of environmental policies

Only one known specific regulation on waste management was available for local communities called the Uniform (Anti-Litter) By-Laws 2010 enforced under the jurisdiction of the local authority. Other government officers indicated that their organisations had only some broader policy on waste management. The findings highlighted various regulations, policies or guidelines, summarised as follows:

1. Good Agricultural Practice (GAP) guidelines
2. Roundtable for Sustainable Palm Oil (RSPO) guidelines
3. Uniform (Anti-Litter) By-Laws 2010
4. Malaysian Environmental Quality (Scheduled Waste) Regulations 2005
5. Sabah Environmental Education Policy
6. Pesticide Act 1974 (Act 149)

7. Solid Waste Management Master Plan Study in Sabah
8. Section 29A (Prohibition on Open Burning)
9. Section 29B (Owner or Occupier of Premises Liable for Open Burning)

Most villagers indicated that there were no provisions of waste collection services by the local authority to the villages. There was also a lack of awareness of any existing waste regulation for their villages, but some awareness about open burning among smallholders. There were mixed responses among smallholders on the value of the guidelines for managing waste such as fertiliser, pesticide or fuel containers in plantations.

There seemed to be gaps in the efforts to improve waste management and to provide efficient waste collection services in Sabah, especially in rural areas. Enforcement was seen as lacking and needing improvement. The roles, co-operation and commitment of government agencies and village leaders to improve waste management were seen as important.

The next section presents data related to education and awareness with two sub-themes, namely education and programmes. The education sub-theme highlights the importance of awareness, education and responsibility, and the roles of formal, non-formal and informal education. The programme sub-theme presents existing community programmes, reinforcing efforts and participation.

5.5 Education and Awareness

This section begins with a discussion on various issues under the sub-theme of education, namely the importance of awareness, education and responsibility, and the roles of formal, non-formal and informal education.

5.5.1 Education

Environmental education is the heart of this research. Taking an environmental education approach to improve waste management in local communities could help create awareness and trigger potential actions for improvement. Various

issues pertaining to education were raised during the interviews and in the community survey.

5.5.1.1 Importance of awareness, education and responsibility

The importance of awareness, education and responsibility was raised frequently by the officers, as well as some villagers. For instance, Rayyan highlighted the importance of awareness and education for smallholders by saying “[Our organisation] will always give continuous guidance to the smallholders. If education is lifelong, then there will be awareness. And implementation too, especially for the new smallholders” (Interview, Pre-Programme).

Rayyan raised the issue of continuous guidance and lifelong education, which is pertinent because it is one of the important principles in community environmental education. In the community survey, 27/30 villagers agreed that waste management can be improved in their villages. One villager remarked it can be improved through “guidance from relevant authorities” (Community survey, villager 7). Another villager wrote there is a “need for proper guidance on proper waste management from relevant authorities” (Community survey, villager 13). In terms of improvement in waste management in plantations, one smallholder commented there is a need for “briefing from relevant authorities on public awareness” (Community survey, villager 23). During the focus workshop, the villagers were asked if they have been given a briefing on Good Agricultural Practices (GAP). A few of them responded “not yet, perhaps it’s not our turn yet” (Focus workshop). In one of the interviews, Rayyan informed that his Ministry was at the stage whereby they were campaigning and creating awareness on GAP. Based on his response, it could be the campaigns on GAP had yet to be extended to the group of villagers involved in the focus workshop.

Creating awareness on specific issues such as scheduled waste and open burning was also raised with the government officers during the interviews. Under the Malaysian Environmental Quality (Scheduled Waste) Regulations 2005, scheduled waste includes metal and metal-bearing waste, waste containing principally inorganic or organic constituents which may contain metals and organic materials, or waste that contain inorganic or organic constituents.

Pesticides and herbicides are among those listed as schedule waste. Imran commented :

We focus more on scheduled waste, and also educate them not to burn, and manage waste properly. For example, how to manage used oil, we give them knowledge on how to manage properly according to the law. We ask them to use licenced contractor to collect (Interview, Pre-Programme).

The responses above by government officers from different departments in Sabah indicate there are somewhat overlapping jurisdictions over waste management, not only in terms of regulation but also education. Various departments are involved in solid waste management in Sabah and the lack of coordination among them may result in duplication of efforts and use of resources (Chemsain Konsultant, 2007c).

Creating awareness among specific groups, particularly village leaders, within the community was also discussed. One of the officers, Ramlee, remarked that “we need to give education to increase knowledge, especially the village committee leaders. We try to involve them. Hopefully, through education, they can apply what they learn” (Interview, Pre-Programme).

Not only awareness, but the co-operation and commitment of village leaders were also seen as imperative to find solutions to waste problems, as highlighted in Section 4.2. Another officer, Rahman, argued for the importance of building capacity of teachers in waste education. He expressed that “what’s important is the teachers. They should have activities on waste management. Teachers must be given awareness first” (Interview, Pre-Programme). However, asking teachers to educate their students on waste management might not be effective in the short-term, unless the children could influence their families to be concerned about proper waste management practices and to take actions at home.

Instilling a strong sense of responsibility was seen as an important factor in ensuring better waste management. One of the officers, Rahman, emphasised that “for communities, we need to give emphasis that waste management is everyone’s responsibility..... Education is really important. The problem of waste is mentality. Not everyone thinks that waste is everyone’s responsibility” (Interview, Pre-Programme).

The interconnectedness of awareness, attitude and responsibility to act emerged strongly from the responses of the government officers.

5.5.1.2 Formal, non-formal and informal education

The education process as a whole, either formal, non-formal or informal, was perceived as important. In terms of education focussing on waste management, it needed to be interesting, consistent and on-going to be effective. Capacity building through creating awareness among teachers was also highlighted.

There were a variety of responses on how education could occur in environmental education. When asked how education could occur, Imran responded “for me, environmental education should be incorporated in curriculum as well as traditional culture”, Saloma remarked “formal, so nobody is under privileged from getting the education” and Ramlee stated “yes, it should be done in all ways” (Interview, Pre-Programme).

The need to improve education and increase knowledge was also raised in the interviews. Education was also seen as a process that should be consistent, on-going and interesting to the public. Rayyan commented:

For me, at the awareness level, the government has carried out campaigns to encourage recycling. However, education needs to be improved. If we look at the industry, although we emphasise control of toxic dumping, some of them still dispose into the rivers. This is what happens. Enforcement has been done, education has been carried out (Interview, Pre-Programme).

On the same issue, Ramlee remarked that “we need to give education to increase knowledge, especially the village committee leaders. We try to involve them. Hopefully, through education, they can apply what they learn” (Interview, Pre-Programme). Saloma asserted the following:

I think education on waste management should be consistent, on-going and stimulates interest in the public. When they are interested, they will frequently demand to be involved in the decision-making process and this helps to ensure the programme runs smoothly (Interview, Pre-Programme).

The three officers seemed to strongly believe in the importance of education to increase knowledge and its continuous improvement. The suggestion by one of

the officers to incorporate environmental education into the curriculum concurs with the existing formal environmental education system in schools reported in most countries which embeds environmental education in all subjects (Bolstad et al., 2006, p. 38; Calik, 2009, p. 110; Platje & Slodczyk, 2009, p. 100; Salih & Yahya, 2009, p. 216; N. Taylor, Littledyke, et al., 2009, p. 319; N. Taylor, Taloga, et al., 2009, p. 30). Another officer remarked that providing education would improve knowledge among the community leaders who could eventually apply the knowledge. To a certain extent, this is in line with Andrews et al. (2002, 168) who argued that knowledge could be an instrument to transform an individual. One of the officers stated that when education is consistent and interesting, people would be interested and demand to be involved in decision making process to ensure the smooth running of any programme. However, this is not always the case because as Ballantyne and Packer (2011, p. 201) argued, those who had intentions to adopt environmentally responsible behaviour do not necessarily translate those intentions into behaviours. In addition, as highlighted by Hines et al. (1987, p. 7) situational factors such as social pressures or opportunities to choose different responses could encourage or discourage environmental actions.

The next sub-theme on programmes presents data on existing community programmes, reinforcing efforts and participation.

5.5.2 Programmes

5.5.2.1 Existing community programmes

Various community programmes focussing on waste management have been carried out by government agencies in Sabah to create awareness, convey information and train local communities. The challenges and success stories of these programmes are presented in this sub-section.

Based on the interviews with government officers, community programmes have been conducted for local communities, which included training on solid waste management for community leaders, campaigns and other meetings. When asked how their organisations convey waste management information to rural local communities or the oil palm smallholders, Saloma informed that “[the department] do training together with another ministry on solid waste management to the

community leaders” while Imran stated “by conducting an education and awareness programmes to the target groups instead of enforcement alone” (Interview, Pre-Programme). To the same question, Rahman remarked “through regular meetings with the communities, or unplanned meeting. We depend on the Anti-Litter Bug Campaign, because there are complete components of actions in that. We go to schools, villages, government departments, we educate them how to manage waste” (Interview, Pre-Programme). On the same note, Ramlee explained:

That’s why in our environmental course for the village committee leaders, one of the activities is to do compost with co-operation from the local authority and other departments. We have another course, a management and administrative course for village committee leaders. One of the sessions is on environment and waste management (Interview, Pre-Programme).

One of the limitations faced in conducting the programmes was the lack of feedback on progress from the local communities after the programme implementation. Ramlee expressed that “yes, we do but feedback we get is very slow. Only a few received. But we are not giving up. As you know, this is a voluntary thing (Interview, Pre-Programme). On the same issue, Saloma commented that “they are required to send reports every six months, but as far as I know from the ministry, which is the organiser, they only received about less than 10 feedbacks from the community leaders” (Interview, Pre-Programme).

There seemed to be a range of awareness of educational activities related to waste management in the villages involved in the survey. During the community survey, the villagers were asked whether they had taken part in any environmental education activities related to waste management practices before. More than half of those who responded (20/28) stated they had taken part in activities, in the order of most reported: cleaning up rubbish in the village, attending environmental talks, cleaning up rubbish from the river and composting. The smallholders were also asked a similar question on whether they have had any training on how to manage waste on oil palm plantations. Out of the 22 smallholders who responded, only eight stated they had, while the remaining 14 responded that they had not. In the order of most reported, the training activities were attending talks or briefing, composting and disposal of containers. This lack

of awareness could be that for the particular villages in this study, the community environmental education programmes had yet to be expanded to their area by the relevant departments.

It was acknowledged that some local communities' efforts and environmental campaigns have been successful, for example, in reducing usage of plastic bags. Imran expressed "I appreciate efforts by NGOs for trying to phase out the use of plastic bags in supermarkets, very effective so far. Now we can see a lot of people bringing along eco-bags" (Interview, Pre-Programme).

5.5.2.2 Reinforce efforts

Although there have been success stories, the government officers were of the opinion that there was still a lack of effort in waste education, for example, in the importance of waste minimisation, recovery and disposal. As Saloma expressed "I think, waste minimisation, recovery and disposal are not implemented widely in Sabah" (Interview, Pre-Programme). When asked about the cause of this challenge, Rahman admitted "Maybe it's also due to lack of promotions from our part, our weakness" (Interview, Pre-Programme).

The government officers and some villagers believed that public information should be reinforced and campaigns should be continuous. Ramlee suggested to "organise more activities especially cleaning-up activities and awareness.... Keep on reminding and give constant publicity. For me, if the self-awareness is already there, we would not throw rubbish indiscriminantly" (Interview, Pre-Programme).

In the community survey, the villagers were asked how waste management can be improved in their villages. One of them responded "cleaning-up" (Community survey, villager 26). Another remarked "prepare a special programme for recycling such as talks and relevant facilities" (Community survey, villager 32). The concept of caring and helping within communities, such as village clean-up, was also emphasised. A government officer, Ramlee, commented that "for me, it would be continuing the spirit of helping each other through cleaning-up efforts. It's a culture from before to help each other in the villages" (Interview, Pre-Programme). However, one of the government officers argued that cleaning-up

activities alone were not effective in improving waste management, saying “For me, cleaning up activities don’t work. Awareness should be given first” (Interview, Pre-Programme). In addition, cleaning-up activities are mostly dealing with the symptoms of the problem and not the cause, and so whilst they can help villagers to take action and create pride in their villages, this type of action in itself will not bring about lasting change.

As part of the reinforcement efforts to create awareness, in the focus workshop to co-construct the environmental education programme, some of the villagers suggested “briefing or talks by relevant government departments such as Environment Protection Department, Department of Environment and others” (Focus workshop). They also suggested the preparation of “a brief guideline or poster and distribute to schools, village halls and houses” (Focus workshop). This is discussed further in the next chapter.

5.5.2.3 Participation

The importance of participation of local communities and relevant stakeholders in waste education programmes was highlighted by government officers and the villagers. Saloma commented “I think the responsibility should be under local authorities by getting involvement from the communities and oil palm smallholders” (Interview, Pre-Programme). Another officer, Imran, remarked “Maybe they don’t have the knowledge of the usefulness and value of their waste. That is why, they just dump it. All parties should be involved actively as one community in dealing with this issue together” (Interview, Pre-Programme).

In the community survey, as shown in Table 5.14, most of the villagers (31/32) agreed or strongly agreed to the statement “I would like to take part in activities to care for the environment”. When asked another question in the community survey whether they would like to participate if there was an opportunity to learn how to manage waste better, 30 villagers of the 31 indicated yes. Their responses to these questions indicated willingness to participate in waste management activities and to improve their practices.

Table 5.14 Villagers’ responses to a list of statements regarding the environment and waste (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

No.	Statement	Response					N	Did not respond
		1	2	3	4	5		
B4	I would like to take part in activities to care for the environment.	0	1	0	22	9	32	5

The concept of Corporate Social Responsibility (CSR) was also seen as an important approach to work with communities in improving waste management. For example, Imran suggested:

May be able to use the concept of waste minimisation, waste to wealth / money. The mills should provide Corporate Social Responsibility (CSR) to villagers by providing local waste collection centre, using waste as a fuel or composting and buy waste with an attractive market price (Interview, Pre-Programme).

Being aware of the importance of participation, in the focus workshop to co-construct the environmental education programme, some of the villagers suggested involvement of “state assembly representatives or member of parliament, government organisations and other villagers” (Focus workshop). This is discussed further in the Chapter 6.

5.5.3 Summary of education and awareness

The interconnectedness of awareness, attitude and responsibility to act towards better waste management was apparent in the data, as well as the need for continuous guidance, lifelong education and capacity building. Creating awareness on specific issues and for certain target groups was also seen as imperative.

The education process as a whole, either formal, non-formal or informal, was perceived as important. Education about waste management was recommended to be interesting, consistent and on-going to be effective.

Various community programmes focussing on waste management have been carried out by government agencies in Sabah to create awareness, convey information and train local communities. However, challenges remain. There was still a lack of effort in waste education, for example, to extensively promote the importance of waste minimisation, recovery and disposal. Participation of local communities and relevant stakeholders in waste education programmes was seen as vital.

What sort of education might be needed can be informed by the waste behaviours of participants, and these are discussed next.

5.6 Waste Behaviours

This section begins with data on participants' attitudes that were identified through the interviews as key barriers to improve waste management, and villagers' responses related to attitudes and behaviours in the community survey.

5.6.1 Attitudes and behaviours

Attitude and behaviours such as complacency, ignorance, dependency on government initiatives, lack of support, understanding, knowledge and awareness were identified by the government officers as the key barriers to improving waste management. These barriers together with lack of waste disposal facilities were seen to further impede any improvement in waste management practices in local communities.

In terms of the challenge to change attitudes and behaviours, Imran remarked that “for them, it’s a normal thing, they are used to it for so long. And there’s no place to dispose of the waste too. The challenge is to change an individual’s habit. That’s the main challenge” (Interview, Pre-Programme). Saloma stated that “it’s

hard to get support from the public and changing people's attitude" and Ramlee commented that "I think it's attitude. We try to give awareness to them how important it is to follow the regulation. For example, at this time, don't do open burning. But still, it happens" (Interview, Pre-Programme). In terms of lack of awareness of the importance to minimise waste, one of the officers, Saloma, commented:

I think, people in Sabah are still not really aware of what are the reasons of minimising waste and what should they do. They only care about how much they spend daily on buying things without thinking about how will their waste end up (Interview, Pre-Programme).

The government officers felt that people were dependent on the government to provide waste management services and also unwilling to take actions. For example, Saloma commented that "I think some of them are still dependent on the government to manage their waste and there are also some of them who are not willing to take any action" (Interview, Pre-Programme). Another officer, Rahman commented about dependency on the government that "people are used to subsidies [given by the government for fuel]" (Interview, Pre-Programme).

Despite the attitudes and behaviour challenges discussed above from the interviews with government officers, it is interesting to note how the villagers responded in the community survey. When asked to respond to the statement "I don't believe it is my responsibility to care for the environment", a majority who responded disagreed with it, as shown in Table 5.15. These respondents appeared to believe it was their responsibility to care for the environment. However, ten villagers agreed to the statement, indicating that they felt that responsibility lay elsewhere; most probably with government departments, village leaders or politicians. In spite of these somewhat diverse views about responsibility, 29 villagers of the 31 who responded agreed or strongly agreed to the statement "I believe that any environmentally-friendly actions I take would benefit the environment" as shown in Table 5.15. These responses indicated the majority of the villagers believed that any pro-environment actions they take would benefit the environment. Since they were not required in the community survey to explain further how their actions would benefit the environment, some of the benefits

could possibly be keeping the village surroundings clean of waste or making an effort to send their rubbish to a bin centre in town.

Table 5.15 Villagers’ responses to a list of statements regarding the environment and waste (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

No.	Statement	Response					N	Did not respond
		1	2	3	4	5		
B1	I don’t believe it is my responsibility to care for the environment.	1	14	3	8	2	28	9
B2	I believe that any environmentally-friendly actions I take would benefit the environment.	0	1	1	16	13	31	6

5.6.2 Lack of environmentally friendly options

As mentioned earlier, the barriers related to attitudes and behaviours together with lack of waste disposal facilities were seen by participants to further impede any improvement in waste management practices in local communities.

5.6.2.1 Provision of proper waste management services

As expected, expansion of rating area, request for waste collection services and the establishment of community collection centres were suggested by many participants. Provision of proper waste disposal facilities was seen as crucial, especially by the villagers, for the improvement of waste management in their villages. In the community survey, villagers were asked “Do you think waste management can be improved in your village? If yes, in what ways do you think it can be improved?”. Many responses were received. Among them were “waste is collected weekly” (Community survey, villager 15), “government to provide bins in villages and collected by garbage trucks twice a week” (Community survey, villager 17), “services by the local authority” (Community survey, villager 24 and

25) and “requesting the local authority to provide bins or areas to throw waste” (Community survey, villager 19). When asked a similar question in the community survey “What waste management practices would you like to change in your village?”, among the responses were “to have bins so waste are disposed of properly” (Community survey, villager 1) and “to provide waste collection area” (Community survey, villager 18). During the focus workshop, one of the villagers suggested “provide a clustered facility for waste collection for individuals to send garbage bags to” (Focus workshop).

On expansion of rating area, Rahman explained:

...in terms of services, we can only do what we can. (Silence, flipping through his document) Coincidentally, today we had a meeting about this. For example, Beaufort, the area is about 424 acres (referring to rating area). Padas Damit 7 acres, Membakut 158 acres, Lingkungan 4 acres, Gadong 2 acres. Apart from Beaufort and Membakut, the others are small, so we focus less. Today during the meeting, it is being gazetted that the whole district of Beaufort is under our rating area, based on the Gazette announced on 10 October 2012. However, after being gazetted, there is a need to do a sub-gazette to implement necessary plans. There is no specific plan at this time though (Interview, Pre-Programme).

Rahman’s response on the expansion of rating area seemed to indicate they are facing constraints to expand although the whole district of Beaufort was already gazetted in their rating area. At the time of interview, there was no specific plan to carry out a sub-gazette to enable them to implement the new rules.

As with the constraint to expand the rating area, the local authority seemed to face limitations to provide waste management collection services to rural areas. The villagers in these areas were left to manage waste on their own, most of the time using disposal methods that were considered not environmentally friendly. In one of the interviews, Rahman explained:

In terms of how we handle things, it is still far behind. I mean, if the rubbish is about 100%, we can only handle perhaps 70%-80%. The rest is beyond our control. Local Authorities usually focus on town area. In rural areas, sometimes, those not included in the rating area, it’s hard for us to handle. The same goes to ocean or river. In the context of Padas River, its flow is too fast, so rubbish is being washed out fast too. Rivers are outside our jurisdiction but people still refer to us.... What I mean is, in terms of handling our work. The highest is 80%. Whether it’s important or not (referring to waste management), it is definitely important, especially plastics (Interview, Pre-Programme).

Among the existing barriers highlighted for efficient waste disposal facilities and services were budget constraint and unsuitable location to build a landfill. Saloma commented that “we have only one landfill in Sabah [that has] implemented this practice, which is situated in Kayu Madang, Telipok. I think, budget constraint and location are the challenges in the other areas” (Interview, Pre-Programme). Another officer, Imran, expressed that there are “difficulties here, we as a department, we try to push the local government to set proper sanitary landfills” (Interview, Pre-Programme).

The lack of provision of proper waste management for rural areas was also experienced in plantations, as discussed in the next section.

5.6.2.2 Handling waste in plantations

As mentioned in Section 3.4.1 on waste management regulations, specific guidelines to clean and dispose of fertiliser or pesticide containers were available. However, at the time of interview, there were neither scheduled waste collection centres nor services requested from licenced companies to collect scheduled waste by the smallholders. During the focus workshop, the smallholders were informed about the Good Agricultural Practice of which there was a provision on how to manage empty pesticide containers. When asked if they have ever arranged for companies to collect the containers, a smallholder replied “we’ve never done it yet” (Focus workshop). In terms of oil palm fronds, these were normally arranged in walkways and left to decompose.

The reported practice of managing scheduled waste by smallholders was reusing fertiliser containers or burying them. One of the officers, Rayyan expressed that some villagers “use the containers to fill in water for bathing. There are villagers with water problem. They wash the containers using soil a few times and reuse them” (Interview, Pre-Programme). He also added that:

At this stage, no one collects from the smallholders. Hazardous waste is collected only in big towns, for example, in hospitals. But at the district level, no. Even domestic waste, collection by the local authority is only in town areas, not rural areas. So the easiest way I’ve noticed is they burn, reuse or unfortunately throw waste into the river. (Interview, Pre-Programme)

In terms of recycling fertiliser or pesticide containers, one of the officers, Imran explained that “they can be disposed of to plastic recyclers. If they don’t rinse the containers, they fall under scheduled waste” (Interview, Pre-Programme). He also informed that “before these are being disposed of, the smallholders need to rinse the containers three times. The water from rinsing can still be used as fertiliser” (Interview, Pre-Programme). However, there seemed to be a limitation to handle a small amount of scheduled waste from smallholders. Imran remarked that “if the containers are not rinsed, then that’s under our department, but only in big volume. If just a few, it’s difficult” (Interview, Pre-Programme). He also added that there were five to six licenced companies in Sabah that collect scheduled waste (Interview, Pre-Programme).

5.6.2.3 Traditional knowledge vs traditional methods

In terms of the linkage between traditional knowledge and waste management, the responses from the government officers seemed to indicate that there was a lack or no link due to the different types of waste produced in the past compared to modern times. Rahman commented “we can’t connect waste management from the olden days because those days waste was natural and organic. Now, we have waste like plastics. We used to have paper bags too before” (Interview, Pre-Programme). Similarly, another officer, Ramlee expressed that “a long time ago, we didn’t have much waste. Now we have different types of waste” (Interview, Pre-Programme).

On the other hand, villagers indicated that burying or burning waste were the traditional practices carried out in villages. When asked “Is there a traditional method to dispose of waste safely in your village? If yes, please explain”, among the villagers’ responses were “I dig a deep hole and bury rubbish such as tins, broken glass bottles, plastics and others” (Community survey, villager 11), “put into a dug hole” (Community survey, villager 13), “bury in the ground, burn” (Community survey, villager 17) and “bury, burn” (Community survey, villager 24 and 25). Burying or burning may have worked in the past when waste was only organic, but in modern times with more complicated types of waste and their impacts on the environment, those methods are no longer appropriate. Comparing

the interview and community survey questions, analysis of data could have been clearer if the terms used were standardised i.e. instead of using “traditional knowledge” in the interview, “traditional methods” could have been a better choice. Furthermore, the respondents’ understanding of traditional knowledge and methods could differ from each other.

5.6.3 Summary of waste behaviours

The government officers identified complacency, ignorance, dependency on government initiatives, lack of support, understanding, knowledge and awareness as the key barriers to improving waste management. Together with lack of waste disposal facilities, both were seen to further impede any improvement in waste management practices in local communities. On the other hand, villagers also expressed their willingness to work together with other villagers to improve waste management but at the same time appeared to still be dependent on the government for assistance.

Many villagers suggested expansion of rating area, waste collection services and the establishment of community collection centres for their villages as these were seen as crucial by them.

The lack of provision of proper waste management for rural areas was also experienced in plantations. There were neither scheduled waste collection centres nor services requested from licenced companies.

In terms of the connection between traditional knowledge and waste management, the responses from the government officers seemed to indicate that there was a lack or no link due to the different types of waste produced in the past compared to modern times. When asked about traditional methods of disposal, villagers indicated burying or burning as traditional practices, despite the types of waste having changed from traditional times.

The final section of this chapter presents the key ideas of data and findings from the stage one data collection.

5.7 Chapter Summary

Key ideas are presented in this section as a summary of this chapter presenting the stage one interview, community survey and focus workshop data.

The overarching themes of this chapter are perceptions of waste, environmental policies, education and awareness, and waste behaviours. The findings encompassed by these themes are interconnected with one another; hence indicating the complexity of dealing with waste management.

The issue of cleanliness related to tangible, day-to-day activities seemed to be an important issue brought up by the officers and villagers. However, there was a discrepancy between reality and the villagers' perception of cleanliness. The villagers seemed to value the environment and cleanliness, but in practice, rubbish was still observed in their villages.

It was recognised by the officers that the importance of biodiversity and the issues of sustainable development should also be highlighted among the villagers to create better understanding and awareness. This could give the villagers a holistic view about the environment; not only localised issues that affected them on a daily basis.

Waste management was perceived as an important issue in villages and plantations. The villagers seemed to prefer recycling than waste reduction. The domestic waste disposal practices seemed to indicate that burying was prevalent, burning somewhat occurred and villagers indicated that they did not dispose of waste in waterways. Some smallholders seemed to think there were waste management problems in the plantations; however, a majority of them perceived that the plantations were well-managed. Presumably, based on their knowledge, the problems could be those that did not warrant immediate attention.

The villagers' aspiration for their village was "a clean village and to gain economic benefits through recycling", and aspired to "create a well-managed plantation surroundings and to gain economic benefits through recycling". These

goals were included as the foundation for co-constructing the environmental education strategies.

At the time of data collection, only one known specific regulation on waste management was available for local communities called the Uniform (Anti-Litter) By-Laws 2010 enforced under the jurisdiction of the local authority. Other government officers indicated that their organisations had only some broader policy on waste management.

Most villagers indicated that there were no provisions of waste collection services by the local authority to the villages. There was also a lack of awareness of any existing waste policies for their villages, but some awareness about open burning among smallholders. There were mixed responses among smallholders on the value of the guidelines for managing waste such as fertiliser, pesticide or fuel containers in plantations.

Enforcement of existing regulations was seen as lacking and needing improvement by both officers and villagers. The roles, co-operation and commitment of government agencies and village leaders to improve waste management were seen as important.

The interconnectedness of awareness, attitude and responsibility to act towards better waste management as well as continuous guidance, lifelong education and capacity building emerged in the data. Creating awareness on specific issues and for certain target groups was also seen as important.

The education process as a whole, either formal, non-formal or informal, was perceived as vital. To be effective, education about waste management needs to be interesting, consistent and on-going.

Various community programmes focussing on waste management have previously been carried out by government agencies in Sabah to create awareness, convey information and train local communities. However, challenges remain.

The government officers identified complacency, ignorance, dependency on government initiatives, lack of support, understanding, knowledge and awareness as the key barriers to improving waste management. However, many villagers suggested expansion of rating area, waste collection services and the establishment of community collection centres for their villages as ways to overcome these barriers. The lack of provision of proper waste management for rural areas was also experienced in plantations.

Based on the findings, there seemed to be little or no link between traditional knowledge and waste management, perhaps due to the different types of waste produced in the past and at the present time. Villagers indicated burying or burning as traditional practices, which are not appropriate for much of today's waste.

The next chapter presents the process of developing the environmental education programme for the local communities and its implementation in two villages in Beaufort, Sabah.

Chapter Six: Programme Development and Implementation

6.1 Chapter Overview

This chapter presents the process of developing the environmental education programme and its implementation. The development of the programme which focussed on waste management practices took place from June until October 2013. The focus workshop, held in June 2013 in Beaufort, Sabah (as described in Chapter Four) was a platform for a discussion together with the local communities towards the development of the environmental education programme. Data and findings from interviews and the community survey as presented in Chapter Five were also used to inform the development of the programme.

The next section describes the process of framing and developing the environmental education programme.

6.2 Framing the Programme

This section presents the process and details of the framing and co-construction of the environmental education programme with the local communities.

The willingness expressed by the local communities to participate in environmental education activities paved the way for the environmental education programme to be co-constructed. As reported in Section 5.4.2.3, 31/32 villagers who completed the community survey responded that they *agreed or strongly agreed* to the statement “I would like to take part in activities to care for the environment”. When asked specifically if they would like to participate if there was an opportunity to learn how to manage waste better, 30/31 villagers responded that they agreed.

During the focus workshop in June 2013 with 13 villagers, preliminary findings of the interviews with the government officers and the community survey, as well as the key principles of community environmental education, were presented. The discussion in the focus group, which has been described in Section 5.2.2.1,

resulted in a consensus of the villagers' aspirations and goals towards better waste management. Their aspirations for the village were "a clean village and to gain economic benefits through recycling" and for the plantations were to "create a well-managed plantation surroundings and to gain economic benefits through recycling". When asked what type of educational activities they would like, the villagers suggested briefings, talks or lecture by relevant government departments and brief guidelines or a poster as part of the environmental education programme. Briefings or talks are a well-known method to convey information to the public. Based on personal experiences in conducting environmental education programmes in Sabah, local communities seemed to be familiar and comfortable with this method of information delivery. The suggested contents of the brief guidelines or poster were relevant waste management information such as suitable practices to be carried out by communities and contact details of organisations that can assist them. They also suggested an activity such as a lucky draw for a prize. While it could be considered as an extrinsic motivation, that is getting a reward to participate, including a lucky draw in any programme is a common practice in Malaysia, based on my personal observations when attending various events. Although a lucky draw is an activity with no direct relevance to environmental education, it could be a means to encourage participation of the villagers during the programme. Participation, as highlighted in Chapter Two, is one of the key principles in community environmental education.

Two villages, Lawa and Lupak, were proposed by the villagers themselves as the venues for the programme. This suggestion indicated that they were physically comfortable with the venue, and this was in line with a model of learning that took into account physical context which could influence interaction and experiences of learners (Skanavis et al., 2005, p. 324). The villagers indicated a preference for the programme to be held in the morning, and the dates of 12 and 13 November 2013 were agreed upon. During the focus workshop, it was agreed that their suggestions were to be taken into consideration when finalising the details of the programme. For practical reasons, they understood and acknowledged that the final programme would also incorporate my ideas as the researcher.

Using the data and findings in Chapter Five, the programme was developed and customised to respond to the current situation, needs and perceptions of the local communities. The programme development process involved the following steps:

1. Summarising key ideas or issues from data collected in Stage One as presented in Chapter Five;
2. Linking key ideas to the theoretical principles of community environmental education detailed in Chapter Two; and
3. Addressing issues and developing content of the environmental education programme.

The key ideas to inform the development of the programme were summarised from the data collected through interviews, the community survey and the focus workshop. This process occurred upon returning to New Zealand after the data collection in Malaysia. From this stage, no further discussion on the details of the programme was carried out with the communities as it was previously agreed during the focus workshop that their suggestions and ideas would be taken into account.

Each key idea was then linked to the theoretical principles of community environmental education. Linking the key ideas to the theoretical principles was important because these principles gave a framework to the overall research and served as a guide to develop the programme. The environmental education programme was conducted in the Malay language.

The ultimate aim of the overall programme was focussed towards positive behavioural change and transformation of perspective. For the local communities to have clean villages or well-managed plantation surroundings and economic benefits through recycling, as indicated in their aspirations, they needed to make some changes in lifestyle and actions as well as to find ways to obtain access to waste collection services and facilities. Their perspectives needed to be geared towards those aspirations. The programme provided an avenue for awareness to take place and for knowledge to be shared, as well as for connections to be made with the relevant stakeholders who could assist them to improve waste management conditions in their villages. Creating awareness and knowledge and aiming towards behavioural changes were among the theoretical principles of

community environmental education. Jackson (2011, p. 30) stated that “learning results from reflecting on experience” from which meaning can be obtained, and “this learned meaning enables us to act in definite ways in the future”. How people react towards certain issues is usually expressed through behaviours.

In this research, the purpose of education is to meet the needs of communities in terms of environmental protection and to enable them to become active citizens towards positive environmental improvements. According to the *Guidelines for the Preparation and Professional Development of Environmental Educators*, an environmental educator must know how to “identify and model methods for presenting the environment or environmental issues in appropriate and engaging ways for learners of different ages, backgrounds, levels of knowledge, and developmental abilities” as well as to “select environmental education materials and strategies that are developmentally appropriate for a designated age or level of knowledge” (North American Association for Environmental Education, 2010, p. 14). The *Guidelines* also outline several fundamental instructional strategies such as lecture, discussion, debates, hands-on observation and others (North American Association for Environmental Education, 2010, p. 14). In this research, all the participants representing the local communities were adults. Among the factors related to adult learning as highlighted by Cranton (2011, p. 53) was “adult learning is practical or experiential in nature” and “adults prefer collaborative and participatory learning”. Therefore, live, face-to-face communication and interactions through a presentation and discussions were chosen as the most appropriate instructional methods for the local communities involved in the research. Although one could argue that other instructional methods such as through the email, uploading a video on a website or distributing brochures or information packs could convey the necessary information, these methods were not appropriate for the local communities involved in the research. The villagers who attended the focus workshop indicated that they did not have emails and only preferred to be contacted by phone. This indicated that e-literacy levels or infrastructure availability of villagers was still quite low at that time.

In the context of this research, a workshop that included a talk or presentation was identified as one of the suitable approaches to convey information, interact with the villagers and engage in discussions. The workshop began by explaining the

purpose of the programme (see Figure 6.1). The purpose of the workshop was to help the communities acquire awareness and knowledge of the environment focussing on waste management related issues.

In response to the villagers' request for brief guidelines and a poster, the development of a small poster was seen as visually effective for the villagers. Posters are an effective visual communication tool to convey brief information and create awareness. Dallen, Gubbels, Engel and Mfenya (2002, p. 79) stated that "a poster is an abstract" and should also be "an eye-catcher, containing a brief message, understood at a glance". As discussed by the villagers, the message contained in the poster would be about actions that could be carried out by villagers to improve waste management as well as important contact details of relevant government organisations.

The key ideas identified in Chapter Five and the literature review and how they lead to the contents and approaches in the environmental education programme are now discussed.

6.3 Key Ideas

The key ideas and programme development process discussed in this section are summarised in Table 6.1.

Table 6.1 The key ideas and programme development process

Key Ideas	Linkage to Theoretical Principles	Activities
Acknowledging the villagers' ideas	Local Awareness and knowledge	Workshop
Theme: Healthy Environment, Healthy People, Healthy Future	Awareness and knowledge Attitude	Workshop
Cleanliness and importance of waste management	Local Awareness and knowledge Attitude	Workshop, video presentation
Lack of waste collection services and awareness of guidelines	Local Awareness and knowledge Attitude Leadership Being collaborative	Panel discussion
Connecting awareness, attitude and responsibility to act	Awareness and knowledge Attitude Participation Being collaborative Lifelong learning Learner-centred	Workshop
Barriers to improve waste management	Awareness and knowledge Attitude Behavioural change	Overall environmental education programme

In this section, the six key ideas discussed are:

1. Acknowledging the villagers' ideas
2. Theme: Healthy Environment, Healthy People, Healthy Future
3. Cleanliness and importance of waste management
4. Lack of waste collection services, and awareness of guidelines
5. Connecting awareness, attitude and responsibility to act
6. Barriers to improving waste management

The key ideas identified are linked in one way or another to the overall scope of sustainable development that is to meet “the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, pt. I). In the context of waste management in local communities, ideally, waste needs to be managed with a focus on minimisation and recovery, instead of disposal, to reduce pressure on the carrying capacity of the ecosystems and to enable future generations to enjoy the same or better quality of life. The Local Government Management Board of Luton in 1994, as cited by Huckle and Sterling (1996, p. 2), outlined 13 general indicators of a sustainable community, four of them being “resources are used efficiently and waste is minimised by closing cycles”, “pollution is limited to levels which natural ecosystems can cope with and without damage”, “people’s good health is protected by creating safe, clean, pleasant environments and health services which emphasise prevention of illness as well as proper care for the sick” and “access to facilities, services, goods and other people is not achieved at the expense of the environment or limited to those with cars”. However, implementation of the broad concept of sustainable development requires great effort throughout the world especially in countries that are still developing and struggling with social, environmental and economic issues.

6.3.1 Acknowledging the villagers' ideas

In the workshop introduction, it was important to acknowledge the ideas and thoughts of the villagers. Therefore, background information obtained from the community survey was presented to them. Included in the information presented was the number of villagers who responded in the community survey and who

were involved in the focus workshop. To put matters into perspective, their perceptions of the environment were presented back to them because their responses helped shape the contents of the presentation. For the villagers, they perceived the environment to include forest, the countryside, village or town area, river, air and people. Most of them also indicated that the environment was important or very important. These perceptions gave a snapshot of their collective pre-conceived beliefs or understanding about the environment.

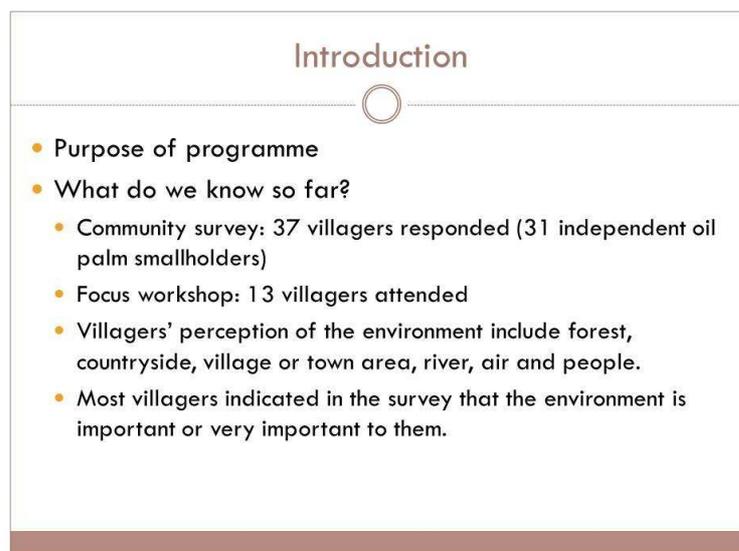


Figure 6.1 Introductory slides during the workshop with villagers

The statistical data of reported types of waste generated at home and on plantations obtained from Stage One data collection were presented, as shown in Figures 6.2 and 6.3. Presenting these data to the villagers was important to create awareness of the types of waste being produced and the possibilities of managing these waste types, by for example composting or recycling them. For example, food waste or oil palm fronds could be turned into compost to be used at their homes or plantations.

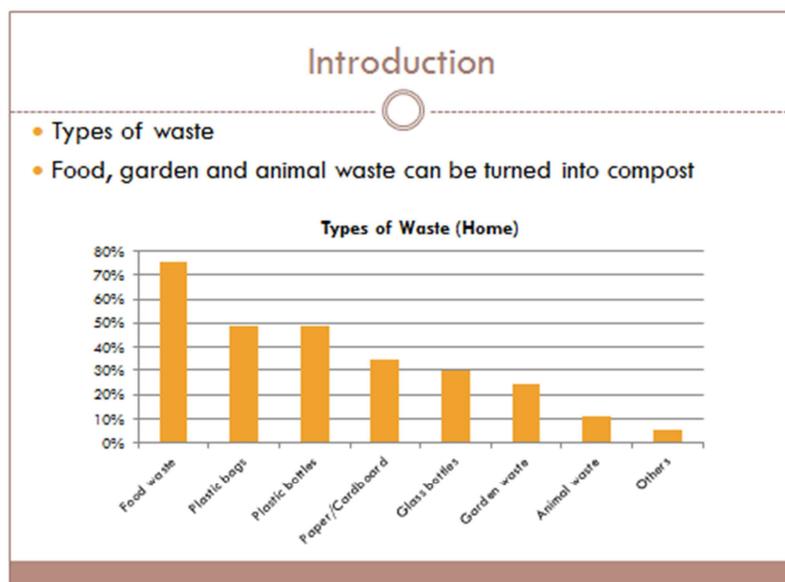


Figure 6.2 Types of waste at home as reported by the respondents

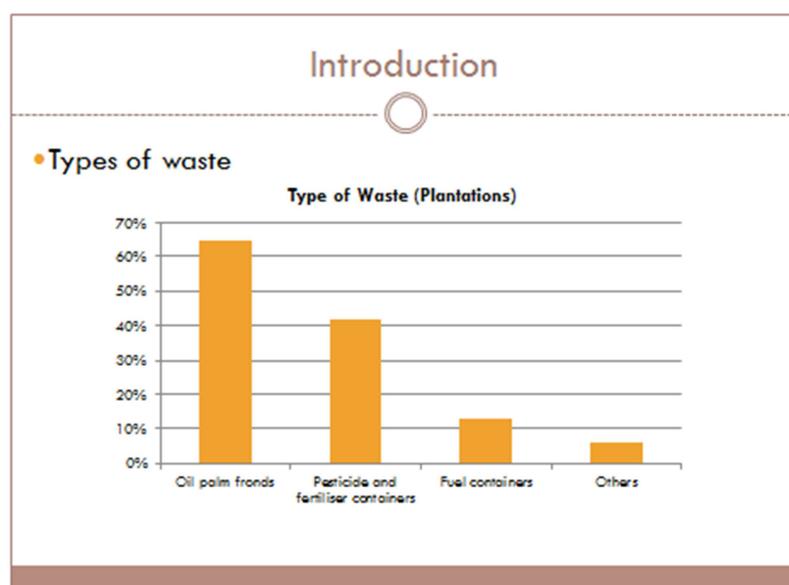


Figure 6.3 Types of waste in plantations as reported by the smallholders

As mentioned earlier, the *Guidelines for the Preparation and Professional Development of Environmental Educators* listed discussion as one of the instructional strategies in environmental education. As part of the participatory learning process for the villagers, a panel discussion amongst villagers and representatives from the government organisations to discuss waste management issues was planned and conducted during the environmental education programme. This further acknowledged the villagers' ideas.

6.3.2 Theme: Healthy Environment, Healthy People, Healthy Future

The development of the programme took into consideration two theoretical principles of community environmental education related to this key idea, namely developing awareness and knowledge, and attitudes. Any environmental education programme for communities should help people to acquire awareness and knowledge of the total environment and its associated problems, as well as values and motivation to actively participate in environmental protection. In this research, creating awareness and knowledge among the villagers on issues related to waste management was an important step towards improving their practices.

The educational component of the programme began with the theme of “Healthy Environment, Healthy People, Healthy Future” (see Figure 6.4).



Figure 6.4 The theme of environmental education programme in November 2013

The first two components of the theme - “Healthy Environment” and “Healthy People” – were explained next. Figure 6.5 outlines the holistic roles of the environment and maintaining biodiversity. The importance of the environment was emphasised with a focus on biodiversity. Biodiversity is defined as “the variety of life on earth” (Hamblen & Canney, 2013, p. 7). In the *Convention on Biological Diversity*, a fuller definition is given as “the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems” (Secretariat

of the Convention on Biological Diversity, 2003, p. 81). In the community survey, the villagers indicated that the environment was important or very important to them, and therefore it was vital to explain the word biodiversity to reiterate the connections between themselves and the environment. It was also imperative to explain that a healthy environment ensures ecosystem services are being provided for the benefits of the people.

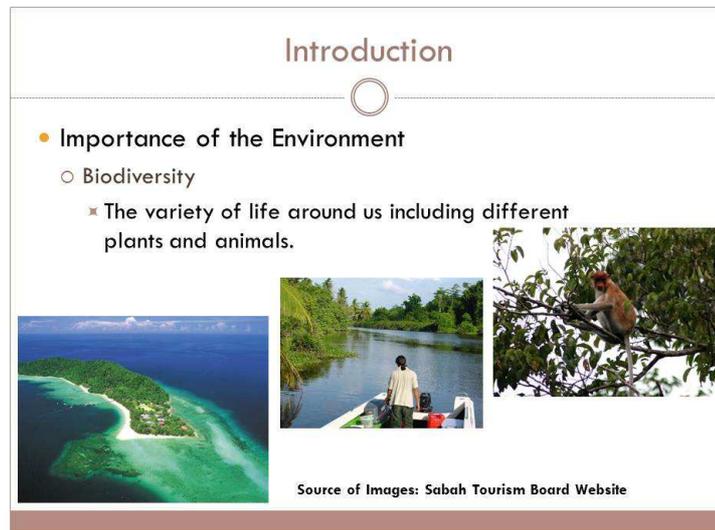


Figure 6.5 Holistic roles of environment and maintaining biodiversity

The slide shown in Figure 6.6 was used to explain the importance of ecosystem services. Ecosystem services are the “range of benefits provided to people from ecosystems” (Primack, 2010, p. 547). Examples of the benefits are production of oxygen, water and air purification, protection from erosion, food, waste decomposition, food production, spiritual, cultural, recreational, traditional knowledge and flood control. To minimise the use of complicated terms, the term ecosystem was not directly used during the presentation. However, it was explained through the question “why do we need to keep the environment healthy and functioning?”. Simple examples they could relate to in their daily lives were used. Based on the villagers’ response in the community survey, there was strong support for a clean environment. As shown in Table 5.2 in Chapter Five, 30 of the 31 villagers who responded in the community survey agreed or strongly agreed to the statement “I believe we must keep our environment clean all the time”. They also indicated that they felt the importance of the environment revolved around themselves, such as their health. The next part of the presentation shown in

Section 6.3.3 highlighted how an unclean environment and waste could affect people's health.

Introduction

○ Why do we need to keep the environment healthy and functioning?

- produce oxygen, purify air and water
- protect water channels and shores from erosion
- decompose waste
- produce food (crops, wild foods and spices, seafood, etc.)
- hold the cures to diseases (e.g. traditional knowledge)
- maintain and renew soil fertility
- moderate weather extremes and their impacts (e.g. drought and floods)



- allow recreation (e.g. ecotourism)
- cultural and spiritual inspiration

Source of Images: Sabah Tourism Board Website

Figure 6.6 Importance of ecosystem services

The third component of the theme - “Healthy Future” – is now discussed. The inter-generational equity being advocated in sustainable development initiatives was reflected in this component. A healthy environment, together with the wellbeing and good health of the people, are not only vital for the present generation but also the next. In the context of waste management, the ability of this generation to have effective and efficient ways to deal with waste would contribute positively in the long term. The theme also emphasised the interconnection of the environment and humans. When human activities pressure the earth beyond its carrying capacity, negative consequences are experienced. An example of this is the disposal of plastic bags into rivers. When plastic bags are thrown into rivers, they do not disintegrate easily and eventually they might flow into the oceans. They might be mistakenly ingested by turtles or other sea animals as food. Apart from this problem, disposal of land-based waste into the oceans results in a significant accumulation of debris that is already causing a major problem for the global community, as highlighted in the next sub-section.

6.3.3 Cleanliness and importance of waste management

In relation to this key idea of cleanliness and importance of waste management in the programme development, the theoretical principles of community

environmental education of being local, developing awareness and knowledge, and attitudes were taken into consideration. Apart from developing awareness, knowledge and attitudes as described in section 6.3.2, any environmental education programme for communities should be bound by local context and located within the community. The findings based on data collected during Stage One seemed to indicate the issue of cleanliness was related to tangible, day-to-day activities and seen as an important issue by the officers and villagers. However, there was a discrepancy between reality, and the villagers' perception of cleanliness. The discrepancy was that the villagers indicated a high priority for cleanliness in their villages; however, based on observations during the visits, plastic bottles and bags were scattered around in the village.

Waste management was perceived as an important issue in villages and plantations, whereby the villagers seemed to prefer recycling to waste reduction. The importance of recycling was also reflected in the villagers' aspiration for their villages and plantations. The domestic waste disposal practices seemed to indicate that burying was prevalent, burning occasionally occurred and villagers indicated that they did not dispose of waste in waterways. Some smallholders seemed to think there were waste management problems in the plantations; however, a majority of them perceived that the plantations were well-managed.

To address the issue of a discrepancy between reality and the villagers' perception of cleanliness and to reiterate the importance of managing waste properly, information presented included evidence on how an unclean environment and waste can affect people's health. For example, the effects and risks of burning waste were explained. These are shown in the slides in Figures 6.7 through 6.10. Figure 6.7 explained the impacts of open burning of waste.

As highlighted in Section 3.3.1.3, it was stated that there have been "significant increases in the incidence of sickness among children living in households where garbage is dumped or burned in the yard" (United Nations Human Settlements Programme, 2010, p. 22). Kampa and Castanas (2008, p. 362) stated that "an air pollutant is any substance which may harm humans, animals, vegetation or material" and "an air pollutant may cause or contribute to an increase in mortality or serious illness or may pose a present or potential hazard to human health". In

terms of open burning of waste, Wiedinmyer, Yokelson and Gullett (2014, p. 9523) stated that open burning “at both the residential level and at dump sites produces many atmospheric pollutants, including greenhouse gases (GHGs), reactive trace gases, particulate matter (PM), and toxic compounds”. The United States Environmental Protection Agency (EPA) described dioxins as “a group of toxic chemical compounds that share certain chemical structures and biological characteristics” and they “can be released into the environment through forest fires, backyard burning of trash, certain industrial activities, and residue from past commercial burning of waste” (United States Environmental Protection Agency, 2010). The agency also added that “dioxins break down very slowly and past releases of dioxins from both man-made and natural sources still exist in the environment” (United States Environmental Protection Agency, 2010). Air pollution in many cities, as highlighted by Hill (2010, p. 118), “often causes painful breathing, eye irritation, and headaches” and “trees and plants are also adversely affected”. Hill (2010, p. 118) explained that “pollutants that the EPA identified account for the large majority of air pollution both in the United States and worldwide” are “carbon monoxide (CO), sulphur dioxide (SO₂), nitrogen oxides (NO_x), ozone (O₃) and particulates or particulate matters (PM₁₀)”. During the presentation, the consequences of open burning of waste were explained and examples the villagers could relate to were given.



Figure 6.7 Impacts of waste on environment and health: Open burning of waste

The examples of impacts of open burning were visually shown to the villagers in Figures 6.8 and 6.9. Routledge and Ayres (2006, p. 19) highlighted that research carried out over the previous ten years or so found that “patients with

cardiovascular disease may be those that are most at risk from inhaling polluted air”. Numerous studies have also found that “all types of air pollution, at high concentration, can affect the airways” (Kampa & Castanas, 2008, p. 364). Kampa and Castanas (2008, p. 364) also highlighted that “the different composition of air pollutants, the dose and time of exposure and the fact that humans are usually exposed to pollutant mixtures than to single substances, can lead to diverse impacts on human health” and these effects “can range from nausea and difficulty in breathing or skin irritation, to cancer”.

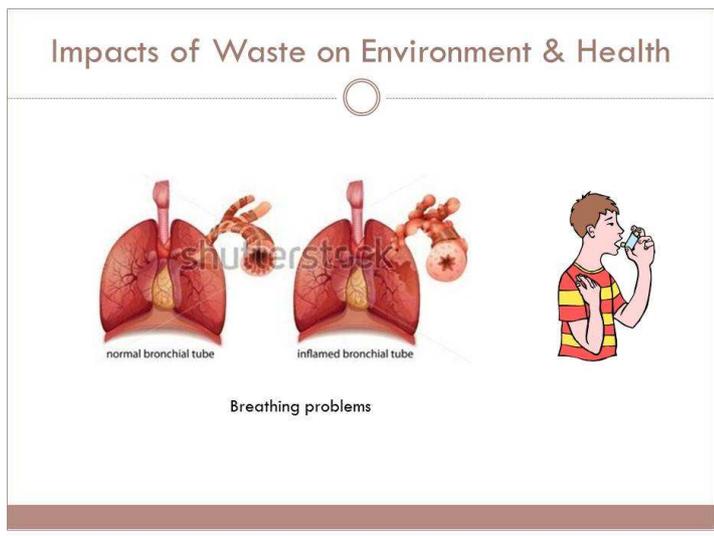


Figure 6.8 Impacts of waste on environment and health : Breathing problems

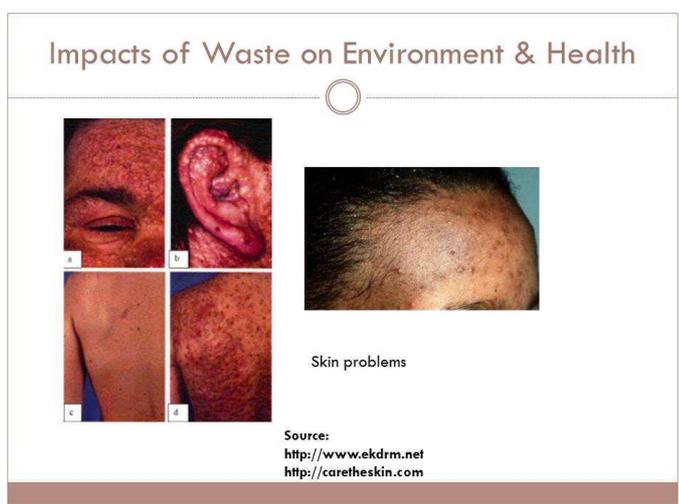


Figure 6.9 Impacts of waste on environment and health : Skin problems

The issue of dioxin was raised and explained as shown in Figure 6.10. According to the United States Environmental Protection Agency, “studies have shown that

exposure to dioxins at high enough levels may cause a number of adverse health effects, including cancer” (United States Environmental Protection Agency, 2010).

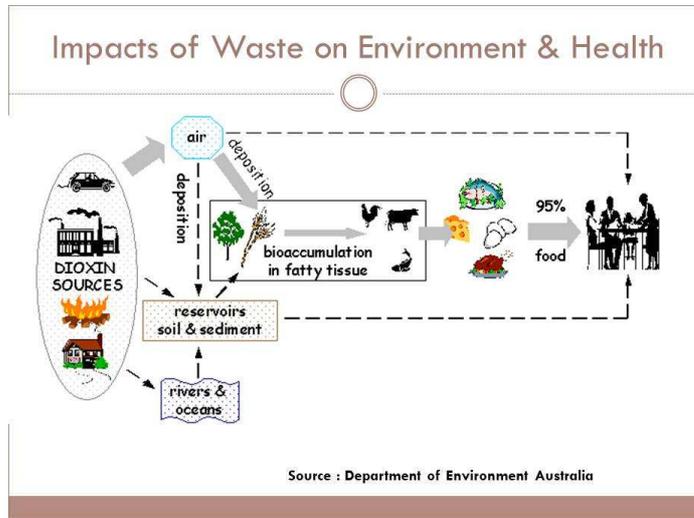


Figure 6.10 Impacts of waste on environment and health : Dioxin sources

It was reiterated during the presentation that improper disposal of waste could harbour rats, mosquitos or flies that were known as vectors of infectious diseases such as dengue fever or malaria (see Figure 6.11). As highlighted in Section 3.3.1, when waste is not disposed of appropriately, it could harbour such vectors (Nathanson, 1997, p. 273). The example given to the villagers was malaria, as the disease is widely known in Malaysia (see Figure 6.12).

Impacts of Waste on Environment & Health

- Improper disposal of waste have impacts on human health, plants, animals, rivers and oceans. Examples:
 - When waste is not disposed of appropriately, it can harbour rats, mosquitoes, flies, etc that are vectors of infectious diseases such as dengue fever, malaria, cholera, food poisoning, etc.

Figure 6.11 Impacts of waste on environment and health : Infectious diseases

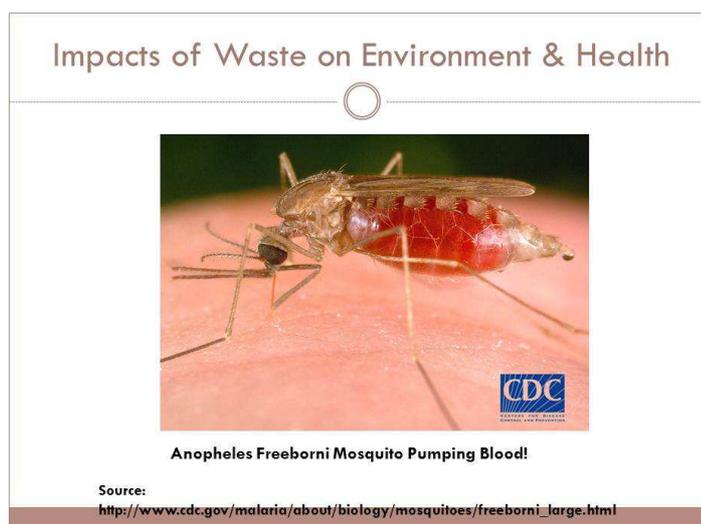


Figure 6.12 Impacts of waste on environment and health : Malaria

The impacts of waste disposal into the rivers and oceans (see Figure 6.13) were explained to the villagers. Waste on land could be washed away into drains and rivers especially during heavy rainfall. These would eventually flow into the sea and ocean. The waste could be mistaken for food and ingested by marine animals. These issues were emphasised by showing a video entitled “Our Debris Filling the Sea” produced by the National Oceanic and Atmospheric Administration. The video was obtained from the website of National Oceanic and Atmospheric Administration (Snider, n.d.). The contents of the video were explained before showing. The video showed how man-made waste was found in the most remote areas on Earth, and the majority came from land-based sources. The video was chosen because it presented waste issues that were familiar in Malaysia. Although it was in English, the audience reaction indicated that the visuals shown were sufficient to convey the messages.



Figure 6.13 Impacts of waste on environment and health : Rivers and oceans

After the video presentation, a discussion was carried out and these questions were posed to the villagers:

1. Do we want our lives now and our future generations to be affected by impacts of pollution?
2. Have the issues shown in the short video happened here before?
3. What do you think of the quality of the river here?
4. Do people take water from the river for drinking? Is there a situation where people need to draw water directly from the river? What happens if there is no tap water supply for the villagers?

Their responses are presented in Section 6.4.2.

To address the issues of waste minimisation, recovery and proper disposal, the contents of the presentation included the benefits, with examples, of proper waste management, emphasis on waste minimisation, and information on relevant organisations to contact for further assistance. The snapshots of the slides are shown in Figures 6.14 – 6.17. The contents were based on the literature review on the components of waste management in Section 3.2.1.

As highlighted in Section 3.2, solid waste was defined as “non-liquid waste materials arising from domestic, trade, commercial, industrial, agriculture and mining activities, and from the public services” and comprise of materials such as

“dust, food waste, packaging in the form of paper, metals, plastics or glass, discarded clothing and furnishings, garden waste, and hazardous and radioactive waste”. In the context of this research, the term ‘waste’, ‘garbage’ and ‘litter’ were used to indicate domestic waste from homes, and where appropriate, the term ‘agricultural waste’ was used to define waste from agricultural activities. The three main components of waste management that are referred to are those according to Withgott and Brennan (2011, p. 618), namely “1) minimising the amount of waste we generate, 2) recovering waste materials and finding ways to recycle them and 3) disposing of waste safely and effectively”. Figure 6.14 outlined these three components.

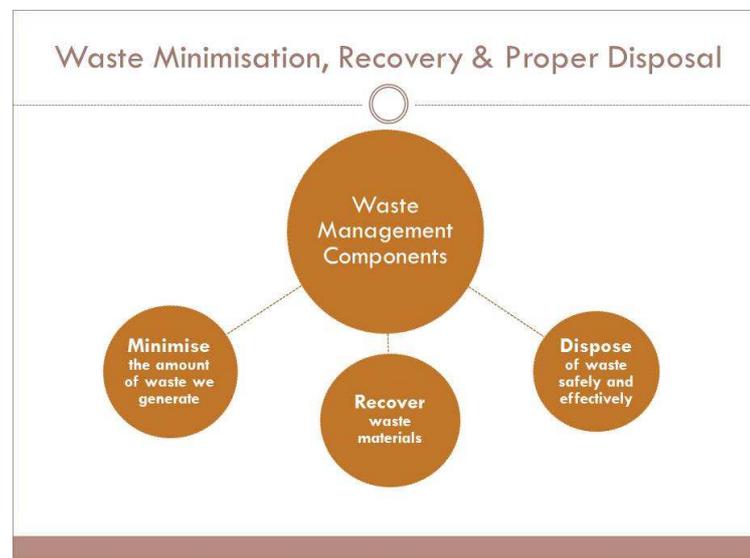


Figure 6.14 Components of waste management

Figure 6.15 outlined some examples of waste minimisation for the villagers. Waste minimisation or source reduction is the preferred approach in waste management. Among the ways to reduce the amount of materials entering the waste stream are: 1) consumers purchase less goods or goods with minimal packaging, 2) use durable products (e.g. choose vehicles, light bulbs or furniture that will last longer), 3) purchasing used items, 4) donating old items, 5) manufacturers to make industrial practices more efficient, 6) reduce consumption, 7) purchase products made from recycled materials, and 8) purchase products designed for ease in recycling (Botkin & Keller, 2011, p. 537; Buckingham & Turner, 2008, p. 158; Withgott & Brennan, 2011, p. 618).



Figure 6.15 Components of waste management: Waste minimisation

The slide used to discuss waste recovery is shown in Figure 6.16. Waste recovery is defined as “the use of a material not necessarily in its original form” (Buckingham & Turner, 2008, p. 162) which involves “removing waste from the waste stream” (Withgott & Brennan, 2011, p. 618). Recycling and composting, both categorised under recovery (Withgott & Brennan, 2011, p. 618), were explained to the villagers.



Figure 6.16 Components of waste management: Waste recovery

At the present time, disposal of waste is inevitable regardless of how “effectively we reduce our waste stream through source reduction and recovery” (Withgott & Brennan, 2011, p. 618). However, waste can still be disposed of safely and

effectively. The common disposal methods used are open dumps (less desirable option), sanitary landfills and incineration. Figure 6.17 indicated ways the villagers can deal with disposal issues in their villages, for example, negotiate with the Beaufort District Council for waste collection services.



Figure 6.17 Components of waste management : Waste disposal

The next key idea about the lack of waste collection services, and awareness of guidelines is now discussed.

6.3.4 Lack of waste collection services and awareness of guidelines

In relation to the key idea of lack of waste collection services, and awareness of existing guidelines, the theoretical principles of community environmental education of being local, developing awareness and knowledge, and attitudes, leadership and collaboration were taken into account. As such, any programme for the communities should be bound by the local context because the villagers know their situation well and would be able to respond to issues affecting them. Apart from acquiring awareness, knowledge and attitudes, any environmental education programme for communities should also focus on consistent leadership and on collaborating with other relevant parties. Consistent leadership is vital to guide and motivate villagers. Collaboration within communities and with external

organisations could help to find solutions to the existing waste management challenges.

Based on the findings during the Stage One data collection, one of the key challenges in the villages was the lack of waste collection services, and awareness of guidelines. Most villagers indicated that there were no provisions for waste collection services in their villages and plantations by the local authority. There was also a lack of awareness of any existing waste policies or guidelines for their villages. Some smallholders seemed to be aware about regulations on open burning prohibition in plantations.

To address the existing challenges faced by the villagers in terms of waste collection services and lack of awareness of guidelines, a panel discussion was included as part of the environmental education programme to create an avenue for interaction and collaboration with relevant authorities to find solutions to the waste management challenges in the villages. It was emphasised that responsibility to manage waste properly was not only the government's, but that everyone had a role. Issues discussed were about how communities could work together to find solutions, mechanisms or processes for facilities provision (e.g. waste collection services, community waste collection centre, recycling services), importance of leadership in villages to keep momentum in any efforts undertaken, and roles of the Cleanliness Bureau in the Village Development and Safety Committee. The importance of continuous collaboration and motivation was also emphasised. The villagers were also encouraged to keep abreast of current developments in waste management through the media or internet. The outcomes of the panel discussion are presented in Section 6.4.2.

6.3.5 Connecting awareness, attitude and responsibility to act

The theoretical principles of community environmental education related to this key idea were developing awareness and knowledge, and attitudes, participation, being collaborative, lifelong learning and being learner-centred. Apart from a way to develop awareness, knowledge, and attitudes, and encouraging collaboration, any environmental education programme for communities should provide an opportunity to participate actively towards environmental protection, and give emphasis on lifelong learning. People need to continuously learn throughout their

lives and improve accordingly. An education programme should also focus on being learner-centred or self-directed learning in which the villagers choose how they can improve and set goals in their waste management practices.

To emphasise the importance of education, the presentation included highlights of current initiatives in waste education in Sabah, for example, SERASI (Environmentally-Friendly Schools) and community environmental programmes (see Figure 6.18).



Figure 6.18 Current initiatives in waste education

The importance of community empowerment was emphasised to the villagers based on the slide in Figure 6.19. It was reiterated that everyone was responsible to manage waste. A strong and supportive community was imperative to ensure success of community development. Bhattacharyya (2004) highlighted that community development aims at building solidarity and including community members in problem-solving. Attitude and behavioural changes of a group of individuals in the village would likely influence others to make changes as well. The importance of improvement through lifelong learning and being learner-centred was encouraged by highlighting the theme of “Healthy Environment, Healthy People, Healthy Future”.

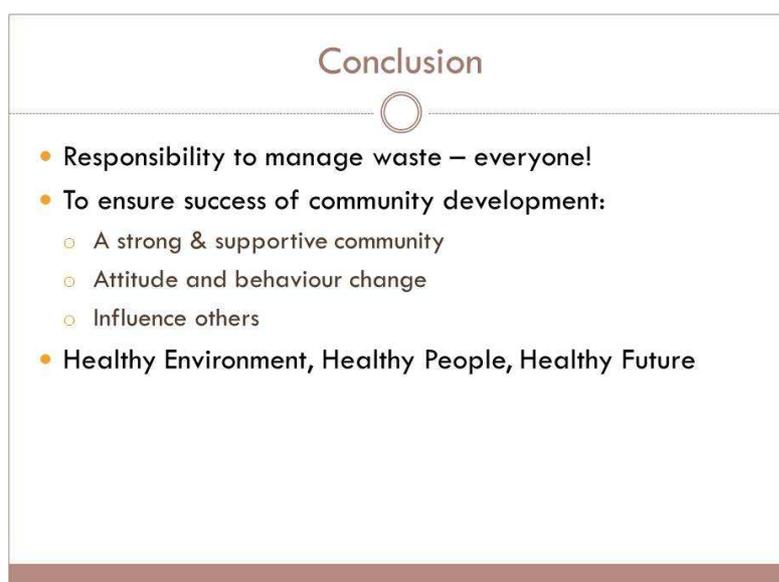


Figure 6.19 Emphasis on community empowerment

6.3.6 Barriers to improve waste management

Complacency, ignorance, dependency on government initiatives, lack of support, understanding, knowledge and awareness were identified as the key barriers to improving waste management. The theoretical principles of community environmental education related to this key idea were developing awareness and knowledge, attitudes, and behavioural change. Apart from being able to create awareness, knowledge and improve attitudes, any environmental education programme for communities should aim towards positive behavioural change and transformation of perspective. From an educational approach, the overall development of the environmental education programme hoped to address the barriers above among the communities in Lawa and Lupak.

The programme implementation in the two villages of Lawa and Lupak is now discussed.

6.4 Implementing the Programme

This section presents the process of programme implementation including its structure and delivery, and the outcomes of discussions. The language used throughout the programme implementation was Malay, as this was a common language spoken by all participants.

6.4.1 The Programme structure

Once the programme was developed, the schedule was prepared as shown in Table 6.2. The presentation slides during the workshop were prepared in Microsoft Powerpoint and visually presented using a data projector. During the workshop, a discussion was carried out after a video presentation on marine debris. A group of panellists then had a discussion with the villagers. This was followed by a discussion on the draft poster. The community survey was then carried out and to conclude the event, the villagers were invited for light refreshments and a lucky draw.

Table 6.2 Programme schedule with the theme “Healthy Environment, Healthy People, Healthy Future”

Time	Activity
8:30 am	Registration
9:00 am	Workshop on “Healthy Environment, Healthy People, Healthy Future” by Susan Pudir
9:45 am	Panel Discussion Panellists: Representatives of the Environment Protection Department, Malaysian Palm Oil Board and Beaufort District Council Discussion on poster
10:35 am	Community survey – a brief questionnaire
11:00 am	Light refreshment and lucky draw
	End of programme

6.4.2 Programme delivery

As agreed by the villagers during the focus workshop, the dates of programme implementation were 12 November 2013 for Lawa, and 13 November 2013 for Lupak. In terms of the villagers' attendance, 26 participated in Lawa and 23 in Lupak. The programme began at 8:30 in the morning and ended by lunch time.



Figure 6.20 The audience during programme implementation in Lawa Village (12 November 2013)

Figure 6.20 shows the audience during the workshop on 12 November 2013. During the discussion in Lawa after the video presentation, the villagers expressed the view that they did not want their lives and that of the future generations to be affected by the impacts of pollution. When asked if any issue shown in the video has ever happened in their village, for instance, improper disposal of waste, one of them responded “there had been incidents of that” (Programme Implementation Discussion) but no further details were given. To respond to the question about the quality of the river in their village, one of the villagers responded that “Padas River was a clear river a long time ago, but now it’s always murky. I believe there are factories in the upstream throwing waste into the river. Many outsiders live along the river too, and throw waste into the river including building their toilets by the river” (Programme Implementation Discussion). Some of the villagers reported that apart from harvesting rainwater, sometimes they needed to draw water from the river when there was a disruption in water supply.

A similar discussion was conducted in Lupak Village after the video presentation. Again, some of the villagers responded that they did not want their lives and of the future generations to be affected by the impacts of pollution. When asked if any issue shown in the video has ever happened in their village, one of the villagers responded “indiscriminant dumping of waste was happening in the village” (Programme Implementation Discussion). One of the villagers claimed that “Padas River was polluted by waste, and about 30 years ago the river was clean” (Programme Implementation Discussion). One of the villagers who lived on the other side of the river had no tap water supply so her family would either buy water or draw water from the river.

Based on their responses, the communities from both villages indicated that they did not want pollution to impact adversely on them or on future generations. However, based on the discussion as mentioned earlier, there have been incidents of improper disposal of waste happening in their villages. River Padas, a river that flows through their villages, seemed to be polluted as well. The potential solutions to these issues were discussed further during the discussion with the panellists.

During both sessions of the panel discussion, key issues raised were the need for environmental guidance, the absence of waste collection and recycling services, setting up a small committee and availability of assistance from government departments.

In terms of providing environmental guidance to communities, the villagers’ responses seemed to indicate a high dependency on the government or village leaders to do so. One of the panellists indicated that a government ministry has organised environmental-related courses for selected villages throughout Sabah. However, one of the villagers gave their view that “relevant information does not reach the villagers” (Panel Discussion). When it was suggested that the villagers could also assist to convey information gained through events like the environmental education programme to others in the community, one of the villagers disagreed by expressing that “the Ministry of Environment is responsible to give courses or seminars to the Village Development and Safety Committee Chairman and representatives” (Panel Discussion). Another commented that “if it involves Village Development and Safety Committee, the persons given the

responsibility in cleanliness or the environment should be the one given courses so they understand or gain awareness” (Panel Discussion). One of villagers expressed the idea that the “village heads or Village Development and Safety Committee chairman should be the ones to convey messages to other villagers” (Panel Discussion). Based on the experiences dealing with local communities in Sabah, the village heads or Village Development and Safety Committee chairmen are highly regarded by villagers as leaders at the local level. They act as a link between the government and the local communities in terms of community development and solving local issues.

The concerns of the villagers about lack of waste collection or recycling services were discussed. As highlighted in Section 5.2.2.1, 27/29 villagers indicated that there were no domestic waste collection services provided by the local authorities to their villages. During the panel discussion, one of the villagers suggested that “waste collection services could be provided at least once a week or every two weeks” (Panel Discussion). The same villager stated that “for those who have vehicles, we have to send the waste to the town centre for disposal. For those without vehicles, what happens? They throw waste into the river!” (Panel Discussion). Based on the findings in Section 5.2.2.1, recycling seemed to be the preferred option among the villagers rather than waste reduction, but the information by one of the panellists indicated that there was no recycling company operating in Beaufort. The panellist, who represented Beaufort District Council, stated that “the recycling company has closed down. But for scrap metal, companies from KK [Kota Kinabalu] come and collect. Perhaps they don’t have enough volume of recyclables” (Panel Discussion). However, he could not give more details about the recycling company such as how long it operated before closing down.

A suggestion to form a new committee was raised by one of the villagers. He remarked “If we can form a small committee focussing on the environment in this village, with its chairman, vice chairman, secretary and its working committee, then meetings can be held from time to time to discuss issues and find solutions to waste management problems” (Panel Discussion). However, there was already an existing body called the Village Development and Safety Committee operating in villages. The decision whether to form a new committee or improve the

mechanism of existing teams needed to be made and agreed upon by the communities themselves.

During the panel discussion, the villagers were asked whether they had any shredding machine to shred oil palm fronds to help the composting process. The villagers responded that they did not have one. The matter was raised to give the villagers an idea for further discussions. No information on the shredder machine could be given to the villagers at the time of programme. The MPOB representative on the panel did not have any information on a shredder machine, as he commented “at this stage we don’t have any suggestion for the machine. So far, we inform the smallholders to just place the fronds on the ground” (Panel Discussion). One of the villagers commented that “the fronds are actually useful to protect the oil palm roots” (Panel Discussion).

The panellists highlighted various types of assistance available to the communities. One of them stated that seed money to organise environmental activities was available to be applied for from the Environment Protection Department. The panellist also indicated that “there is a network called Sabah Environmental Education Network with members of various expertise” (Panel Discussion). A panellist from the Beaufort District Council explained that for areas outside the rating area of the local authority for waste collection services, he suggested “village head to send an official letter to request for collection centres for your village. It could be considered by the council” (Panel Discussion).

The outcomes of the panel discussions in both villages indicated that the sessions were useful as an avenue to create rapport and collaboration between the communities and relevant government departments.

As highlighted in Section 6.2, the development of a poster was seen as visually more important for the villagers than a guideline. The poster that was designed contained information about actions that could be carried out by villagers to improve waste management as well as important contact details of relevant government organisations. A draft in Malay was prepared before the programme was conducted.

A brief discussion about the poster on waste minimisation, recovery and proper disposal was also carried out during the education programme. After going through the information and suggestions given by some of the villagers, everyone agreed on the contents of the poster. The poster was then printed on A3-sized paper and distributed to the villagers who were interviewed two weeks after the programme implementation. They agreed to put the posters up in appropriate places such as village halls in their villages. The English version of the poster is shown in Figure 6.21.



Figure 6.21 The English version of the poster

6.5 Challenges in the Programme Implementation

The implementation of the environmental education programme in both villages, Lawa and Lupak, encountered some minor challenges in terms of timing, venue, panel discussion and questionnaire response.

Based on the programme schedule prepared earlier, registration time for participants was at 8:30 am. Transportation was provided for me by the Environment Protection Department (EPD) from Kota Kinabalu to Beaufort, which is about 90 kilometres south. On the first day of the programme at Lawa, my colleagues from EPD and I only arrived at 9:00 am. Although we had been to the village before, we did not anticipate the traffic congestion on that particular day. Fortunately, the villagers waited patiently for us while we set up the computer and projector. On the second day at Lupak, we left Kota Kinabalu earlier and arrived on time.

The venue on the first day was sheltered but was too bright to set up the projector. Therefore, the powerpoint presentation, including the video clip on marine debris, was not clear. However, fortunately, printed copies of the presentation were made, so those were distributed to the villagers. The venue on the second day was better and the presentation and video clip were clearer. One of the lessons learned when implementing community environmental education was the need to improvise as venues in villages may not be always compatible with the use of technology.

During the panel discussion on the first day, representatives from the Beaufort District Council were not able to attend. Therefore, a specific discussion on provision of waste collection services was not able to be carried out with them, as planned. However, they attended the programme on the second day at Lupak. The villagers were happy that there were representatives from the district council and therefore, a discussion about waste collection services was carried out.

In terms of the evaluation questionnaire responses after the programme implementation, 25 out of 26 villagers responded in Lawa; while all the 23 villagers responded in Lupak.

6.6 Chapter Summary

This section summarises the process of developing the environmental education programme and its implementation.

The key ideas that became the foundation of the development of the environmental education programme were:

1. Acknowledging the villagers' ideas
2. Theme: Healthy Environment, Healthy People, Healthy Future
3. Cleanliness and importance of waste management
4. Lack of waste collection services, and awareness of guidelines
5. Connecting awareness, attitude and responsibility to act
6. Barriers to improving waste management

These key ideas were linked to the theoretical principles of community environmental education presented in Chapters Two and Three which lead to the approach taken in the programme.

The responses of the villagers during the discussion indicated their aspiration for living without the impacts of pollution. They also highlighted current key waste challenges faced in their villages. The panel discussion presented an avenue to discuss and find solutions for issues such as the need for environmental guidance, lack of waste collection and recycling services, setting up of a committee and availability of assistance from government departments. The outcomes of the panel discussions indicated the usefulness of such programmes as an avenue to create rapport and collaboration between the communities and relevant government departments.

The poster containing brief information on waste minimisation, recovery and proper disposal as well as contact details of relevant government departments was finalised together with the villagers.

There were some minor challenges encountered during the implementation of the environmental education programme in both villages, Lawa and Lupak. They were related to timing, venue, panel discussion and questionnaire response.

The next chapter presents an evaluation of the programme delivery and impact. Data were obtained through a questionnaire, interviews with villagers and follow-up interviews by telephone.

Chapter Seven : Stage Two Evaluation Data

7.1 Chapter Overview

This chapter presents the findings of evaluation data collected in Stage Two. The evaluation of the programme included a survey by questionnaires and interviews with villagers carried out in November 2013, and follow-up telephone interviews from New Zealand to Malaysia in March/April 2014 and November 2014.

Quantitative data were collected through the evaluation survey, while qualitative data were obtained from the interviews as well as the open-ended questions in the questionnaire. Sources of data are mentioned accordingly in this chapter.

The next section describes the demographic background of respondents.

7.2 Demographic Background

The evaluation survey was carried out after the programme implementation in both villages of Lawa and Lupak in November 2013.

The evaluation survey involved 48 villagers of which 43 (90%) were male and only 5 were female (10%). In terms of age group, more than 85% were above 41 years old, as shown in Figure 7.1.

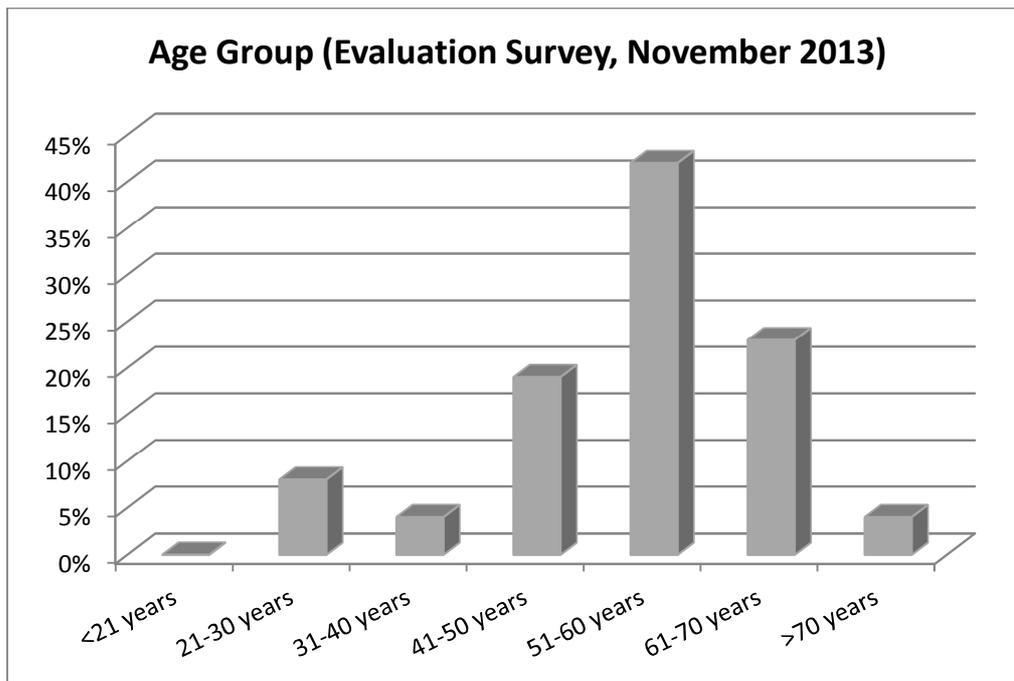


Figure 7.1 Age group of respondents in evaluation survey (November 2013)

When asked about their occupations, to which they were able to give multiple responses, most of them described themselves as oil palm smallholders (32/48), a teacher (1/48), government staff (2/48), having other agricultural-related work (2/48) or other occupations such as pensioners or leaders in the village (9/48). All the female villagers described themselves as housewives. Comparing the demographics between the participants in the Stages One and Two, the groups were similar in terms of being predominantly male respondents, the majority of them were more than 41 years of age and they were mostly oil palm smallholders.

During the programme, ten villagers, a mixture of those who had attended the focus workshop in June 2013 and new attendees to the programme, were identified for the interview two weeks later in Beaufort, Sabah (See Section 4.5.2). They were chosen based on their active participation in the education programme as well as their potential contributions to the research based on positions they held in the villages. However, only eight participated in the interview because the other two were unavailable at the time of interviewing. The post-programme interviews were conducted on 27 and 28 November 2013. The villagers were invited to meet in MPOB Office Meeting Room in Beaufort on 27 November 2013 for the interviews. However, only four could attend and the rest were interviewed through the telephone on the next day.

Interviews through the telephone were conducted to determine any progress after the programme implementation and the interviews conducted in November 2013. The first follow-up interviews from New Zealand to Malaysia through the telephone were conducted from 25 March until 1 April 2014 based on the availability of the villagers. Only seven villagers could be contacted from the eight previously interviewed. A year after the programme was implemented, follow-up interviews through the telephone were conducted in November 2014 with three villagers to find out about any progress or challenges encountered.

A similar coding system to stage one's data gathering was used to maintain anonymity of respondents. For the evaluation survey, which was completed anonymously, the 48 villagers who completed the survey were labelled Villager 1 to Villager 48. For the three phases of interviews - two weeks, four months and one year post-programme - the villagers were given pseudonyms as presented in Table 7.1.

Table 7.1 List of respondents during the three phases of interviews: Two weeks, four months and one year post-programme

Pseudonym	Gender	Village	Participation in Interview
Johan	Male	Lawa	Two weeks and four months post-programme
Osman	Male	Lupak	Two-weeks post programme
Fikri	Male	Lawa	Two weeks, four months and one year post-programme
Azizah	Female	Lupak	Two weeks, four months and one year post-programme
Samsudin	Male	Tuhu Lupak	Two weeks, four months and one year post-programme
Zarina	Female	Lupak	Two weeks and four months post-programme
Satar	Male	Tuhu Lupak	Two weeks and four months post-programme
Fauziah	Female	Lawa	Two weeks and four months post-programme

The following findings are derived from the evaluation survey and interviews. The presentation begins with the villagers' perceptions about waste management.

7.3 Perceptions about Waste Management

The environmental education programme seemed to have changed perceptions of some of the villagers based on the interviews conducted two weeks later. According to them, their perceptions about waste management, particularly about ways to manage waste properly, have changed. When asked if participation in the programme had made any difference to their perceptions of waste management, one of the villagers, Satar, responded "yes, my perceptions have changed. It educated the villagers on how to change ways of managing waste" (Interview, Two Weeks Post-Programme). However, they believed that the knowledge also needed to be disseminated to other villagers by those who have attended the programme, as a villager, Samsudin, commented "for me, there are some changes. The experience needs to be disseminated to other communities" (Interview, Two Weeks Post-Programme).

One of the villagers highlighted the importance of external or other people's perceptions of their own village or homes. Johan expressed that "we give awareness to other villagers of how important the environment is, especially on cleanliness, health, and other people's perception of our own village or homes" (Interview, Two Weeks Post-Programme). During the follow-up interview carried out four months after the programme implementation, when asked whether it was important to give a good impression to others about cleanliness in their village, Samsudin responded "yes it is important because outsiders will remember what we do" (Interview, Four Months Post-Programme). To the same question, another villager, Johan, remarked "people's impression is important because if our village is dirty, it will tarnish the name of the village" (Interview, Four Months Post-Programme). Other people's perceptions seemed to matter presumably because villagers wanted to maintain a good reputation, especially within a small community.

7.4 Education and Awareness

This section discusses the importance of the environmental education programme, awareness, cleanliness and health, community activities, guidance from relevant organisations and information-sharing.

7.4.1 Importance of the environmental education programme and waste management issues

The environmental education programme seemed to have benefited the villagers who attended it. Most of the villagers (7/8) who were interviewed stated that the programme was useful, appropriate and important. One of the villagers, Johan, remarked “for me, the programme on 12th was very useful because it gave me, my family and the local community the awareness of the importance of looking after the environment, especially on cleanliness, air quality and others” (Interview, Two Weeks Post-Programme). He also reiterated the importance of creating awareness, particularly among the younger generation, by saying:

For me, this environmental education programme is very important for our surrounding communities, especially for the younger generation who do not care about the environment. In my opinion, we must give awareness to them from time to time, and not only once, but often, to give them awareness, guidance, advice and others to ensure they have an attitude towards a clean environment (Interview, Two Weeks Post-Programme).

Another villager, Osman, commented “for me, the programme was good. Environmental cleanliness is needed for villagers because not all are aware about the environment. We, as village heads, should share about ways to look after the environment” (Interview, Two Weeks Post-Programme). Fikri shared similar views by commenting “for me, the programme was very appropriate and very good for the local communities” (Interview, Two Weeks Post-Programme). Samsudin also commented that “the programme was good” (Interview, Two Weeks Post-Programme). One of the villagers, Satar, thought the examples given in the workshop were useful to him. He stated “we need to improve at home first, then only in plantations. I’ll follow the examples given during the talk [workshop]” (Interview, Two Weeks Post-Programme).

The programme may have made villagers more aware of the issue of waste. It was likely that some of the villagers already had prior knowledge and experience on

waste management, but that the programme further raised their awareness. When asked whether his participation in the programme made any difference to his perceptions of waste management, Fikri remarked the following:

Yes, it has, although courses as such are addition to my existing experiences and responsibility. For me, cleanliness should start at home. It means it starts with ourselves and subsequently to be emulated by family members and the rest of the community (Interview, Two Weeks Post-Programme).

One of the villagers noted that the programme was the first environmental education programme conducted in her village. Azizah commented that the programme was good and that “it was the first time such a programme has been carried out in my village. We’ve had regular meetings with MPOB in terms of giving out seedlings and other matters, but not on environment” (Interview, Two Weeks Post-Programme). Some of the villagers suggested the programme be organised in their village again. For example, Samsudin stated “if possible, please organise it again” (Interview, Two Weeks Post-Programme), and Fauziah commented “the programme was good for local communities. If possible, organise it once a year” (Interview, Two Weeks Post-Programme). Their responses indicated a need for follow-up activities to motivate and reinforce positive changes on their waste management practices. However, this could not be carried out within the period of the research due to limited time and resources.

On the other hand, one of the villagers thought it may be difficult to implement the actions in villages. Zarina felt that this could be due to existing attitudes that might be difficult to change. She thought the programme was “okay” but “it’s a little bit difficult in villages. There are people who are not responsible. If everyone’s responsible, the river would be clean. When you talk about fronds, they can be turned into compost” (Interview, Two Weeks Post-Programme). Acknowledging that attitudes are hard to change, if people knew how to turn fronds into compost to save money, they might be more inclined to do composting.

The findings from the interviews about the importance of the programme supported the responses in the evaluation survey, as shown in Table 7.2. Most villagers (44/46) agreed or strongly agreed to the statement “the environmental education programme was beneficial for me” (B1). When asked to respond to the

statement “I am now more aware of the importance of the environment” (B2), there was also a strong agreement amongst the villagers (see Table 7.2). The villagers’ understanding of impacts of waste seemed to have improved after the workshop in November 2013 as 41 villagers of the 44 who responded agreed or strongly agreed to the statement “I understand better the impacts of waste on health and people, plants, animals, rivers and oceans” (B3). In terms of the role of community, all who responded agreed or strongly agreed to the statement “I understand that my community has an important role in improving waste management in own village” (B4).

Table 7.2 Villagers' and smallholders' responses to a list of statements regarding their experience after the implementation of the environmental education programme (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

No.	Statement	Response					N	Did not respond
		1	2	3	4	5		
B1	The environmental education programme was beneficial for me.	2	0	0	16	28	46	2
B2	I am now more aware of the importance of the environment.	0	0	0	29	19	48	0
B3	I understand better the impacts of waste on health and people, plants, animals, rivers and oceans.	0	2	1	26	15	44	4
B4	I understand that my community has an important role in improving waste management in own village.	0	0	0	28	17	45	3
B5	I don't believe waste management in my village can be improved.	3	22	4	12	2	43	5
C1	I believe waste management in my plantation can be improved.	0	0	0	25	6	31	1

The majority of the villagers were more inclined to agree that waste management in their village or plantations could be improved. The results in Table 7.2 showed that 25/43 disagreed or strongly disagreed to the statement "I don't believe waste management in my village can be improved" (B5). For the same statement, 14 villagers of the 43 agreed or strongly agreed. While the majority agreed that waste management in their village could be improved, some seemed to be unsure or did not believe that could happen. In terms of improvement in plantations, all

smallholders who responded agreed or strongly agreed to the statement “I believe waste management in my plantation can be improved” (C1).

In the evaluation survey, when asked “if you believe that waste management can be improved at your home and/or in your village, please list the actions you want to carry out to do this”, one of the villagers stated “prepare a special disposal site, conduct waste awareness and cleaning-up activities” (Evaluation survey, villager 5), and another villager wrote “cleaning-up activities, to control disposal of waste, to prepare a site for waste disposal, and to organise awareness campaigns on waste disposal” (Evaluation survey, villager 39).

When asked if they thought waste management could be improved at home or in the village, some of the villagers suggested environmental actions and activities to be organised for the communities. Examples of the activities were cleaning-up, “Clean Village” and “Clean Plantation” Competitions and environmental debates. During the panel discussion, some government departments offered their assistance to the villagers in terms of seed money as well as advice to organise environment-related events. One villager, Johan, gave a detailed suggestion of possible activities as follows:

We can also organise competitions such as “Clean Village” if we get some funding. The village that wins will be an example and possibly give a motivation to others. In plantations, we could also organise a competition on “Clean Plantation”. It’s been proven that a clean and tidy plantation could increase productivity and fertility of oil palm. Another suggestion is to organise a debate competition on the environment for adults, youth or students. Awareness could be improved through this activity (Interview, Two Weeks Post-Programme).

In the follow-up telephone interview with the seven villagers in March and April 2014, it was of interest to find out whether there had been any progress after the programme implementation in November 2013. They were asked “Looking back on your attendance at the waste education programme, what effect has it had for you? Why? Did you feel you learned anything?” Most of these villagers interviewed responded that they had learned about proper waste disposal and problems of waste management during the programme in November 2013. One of them, Fikri, responded “of course there have been effects. Examples have been given to the communities to prioritise on waste management. The obvious

example for me is waste disposal” (Interview, Four Months Post-Programme). Another villager, Fauziah, remarked “it gave me awareness. I learned about proper disposal of waste” (Interview, Four Months Post-Programme), and Samsudin stated “for me, I have learned a bit on how to manage waste. What you conveyed to us during the programme, we convey to others” (Interview, Four Months Post-Programme). Azizah commented that she felt she learned something, “especially not throwing waste into the river” (Interview, Four Months Post-Programme). Interestingly, one of them, Zarina, expressed that “there is no need for others to campaign about cleanliness to us, simply because we should know what to do already” (Interview, Four Months Post-Programme).

7.4.2 Environmental guidance and information-sharing

Some villagers expressed the view that relevant government departments and politicians were responsible to give guidance and environmental-related courses to villagers or hold discussions with them. When asked “if you believe that waste management can be improved at your home and/or in your village, please list the actions you want to carry out to do this” in the evaluation survey, one of the villagers responded “to be updated and participate in talks by Department of Environment” (Evaluation survey, villager 35). When the smallholders were asked “if you believe that waste management can be improved in your plantation but you think it will be hard to make the changes, please explain why you think this”, one of them responded “need guidance from MPOB” (Evaluation survey, villager 20) and another remarked “it can be improved if an officer shows proper ways to manage a plantation” (Evaluation survey, villager 48).

Many of the surveyed villagers believed that it was important to reach out, guide, give advice and examples, and share information with other villagers, including family members. One of the villagers highlighted the importance of having personal awareness first. In responding with ideas for improvement in waste management, one of the villagers stated “to instil awareness through education - start with self, then family, friends and neighbours” (Evaluation survey, villager 20). Other villagers responded “explain to family members” (Evaluation survey, villager 1), “I believe waste management can be improved through giving advice to family members, warn family not to throw waste indiscriminantly, and throw in

proper places” (Evaluation survey, villager 23), and ‘advise family members, explain the impacts of pollution on next generation, discuss with community members about actions to be taken together” (Evaluation survey, villager 29).

As important as it was to share environmental information with other communities, it seemed it was more crucial to start with family members first. This could be that family members were less difficult to approach compared to other villagers. During the interviews, when asked specifically “have you shared anything you learned in the waste education programme with your family members and/or friends?”, Johan remarked:

At this stage, I’ve given a bit of sharing and guidance to my family about how to maintain cleanliness in our surroundings, especially not to throw waste everywhere, to avoid smelly pollution, if possible we use a proper place to dispose of waste, and not to burn waste. Burning waste pollutes our environment (Interview, Two Weeks Post-Programme).

To the same question, Azizah stated “if with friends, not yet, but I have done so with family members” (Interview, Two Weeks Post-Programme), and Samsudin remarked “yes. Firstly, I chatted with family members then with friends or neighbours” (Interview, Two Weeks Post-Programme). The response given by Satar was “yes I have informed my family members about waste problems. There is a need to manage waste properly. I approach my family first then other villagers” (Interview, Two Weeks Post-Programme). Another villager, Fikri, responded “yes I started with my family members before others” (Interview, Two Weeks Post-Programme). However, one of the villagers interviewed admitted that she had not shared information with others after the programme implementation because “everyone has been busy” (Interview, Two Weeks Post-Programme).

The importance to emulate other villagers’ good practices was also expressed by some villagers through the interviews. When asked “what have you seen in other people’s actions regarding proper waste management to convince you to improve your own waste management practices?”, Azizah responded “if others have good practices, then it’s good to emulate” (Interview, Two Weeks Post-Programme), while Fauziah briefly stated “follow whatever is good” (Interview, Two Weeks Post-Programme).

During the follow-up telephone interview with the villagers in March and April 2014, one of the questions asked was “have you tried to share information gained about waste management practices with others?” The villagers, except for one, indicated that they have shared information about waste management practices with family members and friends. Fikri responded “yes, I have with families and close friends only” (Interview, Four Months Post-Programme) and Samsudin stated “I have shared with my families and friends through discussion” (Interview, Four Months Post-Programme). To the same question, Satar remarked “I have, and we did cleaning-up together after the big flood” (Interview, Four Months Post-Programme), and Zarina reiterated “I only share with my family members, and they do understand. We dispose of waste accordingly like I said before” (Interview, Four Months Post-Programme). Fauziah responded she has not shared information with anyone. Beaufort is one of the flood-prone areas in Sabah. Beaufort, amongst a few other districts, was badly hit by flood in February 2014, during which Padas River water level rose to 9.2 metres exceeding the 8.60-metre danger level (Bernama, 2014; Daily Express, 2014a). Satar, during the interview, raised the issue of cleaning up with other villagers after the flood in their village.

It seemed that the sharing was well-received by most family members. However, sharing with others proved to be challenging as they were not interested. Johan stated that “I have shared with my family members and it is well-received. Unfortunately when I share with others, it falls on deaf ears” (Interview, Four Months Post-Programme). Azizah explained:

Yes, with my family members. I have shared with my friends too but they are not interested and asked me “what’s the use?”. I have suggested among housewives to call the government agency to give demonstration on how to make candles from used oil but they are not interested. They told me “we can buy candles at the shop!” (Interview, Four Months Post-Programme).

When contacted in November 2014, Azizah informed that she had “suggested to them [friends] again about making the candles from used oil” and a similar response was received to “just buy [candles] from the shops” (Interview, One Year Post-Programme). She felt demotivated when talking to other people who showed lack of interest to manage waste better.

One of the more vocal villagers, Johan, expressed that it was vital for local politicians to go to villages and emphasise the importance of environment to the people and work out solutions for waste management. He stated:

There is an urgent need for local politicians to go to villages and emphasise the importance of environment to the people. The people and the politicians must also see waste management issues through a similar lens for things to work out (Interview, Four Months Post-Programme).

Another villager, Zarina, suggested that environmental issues be included in political talks in villages by politicians. She stated “if we practice cleanliness, we will be healthy. We need the village leaders and politicians to work together. I suggest environmental issues be included in political talks” (Interview, Two Weeks Post-Programme).

Guiding plantation workers was also seen as important. Johan’s comment about the situation in plantations was “when it comes to other plantations, I have observed that some of the smallholders engage foreign workers to work in their plantations. These workers totally have no idea about proper waste management practices. The owner should train them accordingly” (Interview, Four Months Post-Programme).

7.4.3 Summary of education and awareness

Although most villagers seemed to have benefited from the environmental education programme carried out in November 2013 and found it useful and important, a one-off programme was not sufficient to maintain the motivation of the villagers. Their responses indicated the need for reinforcement through follow-up activities. Due to limitation of time and resources, follow-up activities could not be implemented within the time-frame of the research.

The majority of the villagers agreed that waste management in their village or plantations could be improved. Efforts such as guidance, meetings, environmental-related courses from relevant government departments and politicians, outreach and sharing of information with others were seen as important by some villagers. This indicated the importance of leadership that could provide guidance for improvement in waste management practices.

Persuading others to improve practices seemed to be a challenging task for some villagers due to a lack of interest.

The next section presents findings related to waste behaviours.

7.5 Waste Behaviours

This section discusses issues related to waste behaviours such as attitudes and behaviours and limited waste management options in the local communities.

7.5.1 Attitudes and behaviours

Some of the challenges indicated by the participants in terms of attitudes and behaviours among the communities on waste management practices included lack of awareness and understanding, irresponsible and poor attitudes, indifference, ignorance and lack of actions. During an interview two weeks after the programme implementation, Johan highlighted a lack of understanding, irresponsible and poor attitude, indifference and ignorance by villagers as part of challenges in waste management through the following statement:

There are many challenges, especially dealing with the communities. Some of them don't understand and some do it on purpose, especially the younger generation. They will just throw waste out of car windows. That's a very challenging issue, no matter how we try to create awareness on cleanliness to them (Interview, Two Weeks Post-Programme).

However, he also added that “we are slow to take action and we don't care about what others do. For example, if someone throws rubbish on the road, we just look at them. That is our carelessness” (Interview, Two Weeks Post-Programme). Azizah highlighted the lack of understanding and action by expressing that “the problem is some people understand, but some don't. Some say why should we do it when others don't?” (Interview, Two Weeks Post-Programme). When contacted about a year after the programme implementation, Azizah informed that “there's no change at all”, “everyone's doing their own thing” and “some villagers are still throwing waste into the river” (Interview, One Year Post-Programme). The lack of interest and care towards the environment as highlighted by Johan and Azizah raised two issues of how to handle situations when one witnesses others throwing rubbish inappropriately and the trickling effect of negative attitude. The response

by Azizah gave the impression that when negative attitude towards the environment was practised by some villagers, others would be influenced by them.

The issue of waste disposal in the local river as highlighted in Chapter Five revealed some uncertainties amongst the villagers. As reported, while the majority of the villagers did not think waste was thrown into the river, some felt that it did happen or were not sure. However, based on the interview with villagers in November 2013, one of them indicated that waste was still being disposed into the river. Azizah expressed the following:

Villagers are still throwing waste into the river. We live by the river. We know that. Some of the waste will get stuck in front of our house, by the river. We have to push them off the bank of the river to let them flow (Interview, Two Weeks Post-Programme).

Azizah, who had previously claimed that through the programme she had learned about river pollution from waste disposal, was contradicting her own awareness as instead of scooping the waste in front of her house, she pushed it back into the river. It then becomes someone else's problem to solve.

In terms of willingness to contribute time and effort to improve waste management in their village or home, there seemed to be an inconsistency in the villagers' responses. In the evaluation survey, as shown in Table 7.3, when asked to respond to the statement "I will contribute my time and effort to improve waste management in my village" (B6), 43 out of 44 villagers agreed or strongly agreed. On the other hand, whilst the majority of the villagers (31/40) responded disagreed or strongly disagreed to the statement "I will not improve my own waste management practices at home" (B7), three were unsure and the remaining six agreed with the statement. It is possible that statement B7 was misunderstood by some of the villagers or they felt that their existing efforts in waste management at home were sufficient for their family. A similar response was found among smallholders. When asked to respond to the statement "I will not improve waste management practices in my plantation" (C2), 24/30 smallholders disagreed or strongly disagreed with it. Six of them agreed or strongly agreed to statement C2. This could indicate they were satisfied with the current waste management practices in their plantations or could have misunderstood the statement.

Most of the villagers, including smallholders, indicated that they were willing to share their experiences to improve waste management with others. As shown in Table 7.3, all of the 46 villagers who responded to the statement “I will share my experience to improve waste management practices with other villagers” (B8) agreed or strongly agreed to it. All 32 smallholders also agreed or strongly agreed to the statement “I will share my experience to improve waste management practices with other smallholders” (C3). Most villagers were willing to continue learning about waste management as 46/47 responded agreed or strongly agreed to the statement “I will continue learning how to improve waste management practices” (B9). Their responses indicated a willingness to learn but it seemed that they needed guidance from others, as highlighted in Section 7.4.2.

Table 7.3 Villagers' and smallholders' responses to a list of statements regarding their experience after the implementation of the environmental education programme (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

No.	Statement	Response					N	Did not respond
		1	2	3	4	5		
B6	I will contribute my time and effort to improve waste management in my village.	0	0	1	33	10	44	4
B7	I will not improve my own waste management practices at home.	10	21	3	6	0	40	8
B8	I will share my experience to improve waste management practices with other villagers.	0	0	0	30	16	46	2
B9	I will continue learning how to improve waste management practices.	0	0	1	32	14	47	1
C2	I will not improve waste management practices in my plantation.	4	20	0	5	1	30	2
C3	I will share my experience to improve waste management practices with other smallholders.	0	0	0	21	11	32	0

These findings were supported by written comments by some villagers about the importance to reach out to others, as explained in Section 7.4.2. During the interview with some villagers two weeks post-programme, their responses indicated the importance of sharing with others in the communities, but families were prioritised. The findings of interviews four months post-programmed indicated that sharing was well-received by family members but proved to be difficult with other villagers because of lack of interest.

7.5.2 Limited waste management options

The villagers through interviews, the panel discussion and the evaluation survey expressed their concerns about the lack of environmentally friendly options, i.e. lack of waste disposal and recovery facilities and services, as well as alternatives for proper disposal, in their villages. In the evaluation survey, the villagers were asked “if you believe that waste management can be improved at your home and/or in your village but you think it will be hard to make the changes, please explain why you think this”. One of the villagers responded “the government has not provided rubbish bins” (Evaluation survey, villager 19). Another villager responded in the evaluation survey that “there is no place to dispose of waste, and the relevant authority did not provide a proper place” (Evaluation survey, villager 26). Azizah, during her interview, commented that “the council should provide us with big collection bins in villages and collect accordingly” (Interview, Two Weeks Post-Programme). As highlighted in Section 5.2.2.1 based on data collected in June 2013, 27 villagers of the 29 who responded in the community survey stated that there were no domestic waste collection services provided by the local authorities in their villages. In terms of agricultural waste, 24 villagers of the 25 who responded indicated that there were also no collection services for this type of waste.

The existing reported practices by villagers who wanted to improve their waste management but could see no alternative were to bury or burn various types of waste. One said “I believe [it can be improved] but there is no alternative now. I have to burn” (Evaluation survey, villager 27) and another also said “I burn waste or bury them” (Evaluation survey, villager 37). Another villager stated that “waste such as plastic and bottles must be buried and pesticide containers in plantation must be buried” (Evaluation survey, villager 21). During the interview, Satar, stated that “we bury waste at home” (Interview, Two Weeks Post-Programme). Interestingly, one of the smallholders admitted to burning oil palm fruit bunches in the plantation and claimed it served as fertiliser. He stated “to place fronds within 12 feet from the oil palm trees; when the fronds decompose, it would act as fertiliser; dried fruit bunch can be burned within the plantation as fertiliser” (Evaluation survey, villager 29).

Some villagers expressed their willingness to improve their own waste management practices. They understood the need to dispose of waste accordingly, such as segregating waste, preparing proper bins or conducting cleaning-up activities. When asked about ways to improve waste management at home, village or plantation, Fikri responded “as what we’ve learned during the programme, we need to make changes in our ways. We need to dispose of waste accordingly, such as the containers, plastic and others. Existing system is burying waste” (Interview, Two Weeks Post-Programme). During the evaluation survey, a few villagers listed actions they wanted to carry out to improve waste management at home or village. One of the villagers stated “prepare a special disposal site, conduct waste awareness activities, cleaning-up activities” (Evaluation survey, villager 5). Another wrote “prepare a rubbish bin, segregate waste” (Evaluation survey, villager 31) and “to prepare a place for food waste” (Evaluation survey, villager 46). Another villager stated “Starting today, I will make an effort to improve waste disposal at home and in my village” (Evaluation survey, villager 43).

Despite the lack of facilities and services, some of the villagers, especially those who owned vehicles, were already making an effort to send garbage bags to the nearby town (Beaufort) centre’s collection bins. At least one of them, Zarina, had been doing this regularly prior to the environmental education programme. She explained:

Yes but actually, we’ve been taking our waste to the town centre even before the programme was carried out. Every time we go to town, we send our waste bags there. For example, I will boil fish gut first before disposing to avoid foul smell. If we throw into the river, we ourselves consume the water, don’t we? Do you know that the bins in town are also filled up all the time? The council should collect it for disposal every afternoon (Interview, Two Weeks Post-Programme).

In a similar way, Azizah stated “we place waste in a big garbage bag and we send to the town centre’s main collection bins” (Interview, Two Weeks Post-Programme). Another villager responded in the evaluation survey “my family has been practising packing waste such as paper, plastic, food, etc. in a big bag, and baby’s diapers in another, and both bags will be sent to Beaufort everyday” (Evaluation survey, villager 28).

Some villagers reiterated the importance of proper management of plantation waste and finding ways for improvement. One of the villagers, Johan, expressed that “in plantations, I guide my workers to arrange the fronds in a proper place so they are not strewn everywhere. They can be a hazard because of the thorns” (Interview, Two Weeks Post-Programme). Another villager, Azizah, remarked “In plantations, it would be good to have that shredding machine as discussed in the panel discussion. If we have that, then we can shred the fronds, we can make them into compost” (Interview, Two Weeks Post-Programme). Other villagers listed the actions they wanted to carry out to improve waste management in their plantations. One of them wrote “build a hut to keep pesticide containers, liaise with the local council for waste collection” (Evaluation survey, villager 5). Another stated “purchase shredder machine to shred fronds and to use as animal feed” (Evaluation survey, villager 21).

During the follow-up interviews by telephone in March/April 2014, most of the villagers indicated that unfortunately, waste management practices in the village remained unchanged. One of the villagers had already been pro-active in looking for alternatives to the limited waste management options in her village. When asked “what do you think of the current situation of waste management in your village?” during the follow-up interview, Fikri stated that “so far, I am not satisfied with the current situation. Like I said, changes occur in stages” (Interview, Four Months Post-Programme). He added that “as far as I know, in plantations, the empty pesticide containers are arranged together. One of my friends told me that recently there is a company that collects the empty containers. However, I haven’t experienced it myself” (Interview, Four Months Post-Programme). Azizah felt that there was “no change at all in the village” (Interview, Four Months Post-Programme), and Zarina remarked “it’s hard for me to answer that too. For me, it looks the same” (Interview, Four Months Post-Programme), and Johan agreed that “nothing has changed so far” (Interview, Four Months Post-Programme).

Based on the responses of two villagers from the same village four months after the programme implementation, it seemed there was some progress in the process of requesting for services from the local council. Samsudin said “as far as I know, the village leader of Tuhu Lupak has submitted request for waste collection centre

and service to the Beaufort District Council but there's no feedback yet" (Interview, Four Months Post-Programme). This was confirmed by Satar (Interview, Four Months Post-Programme). However, there was no information about similar requests from other villages. When contacted in November 2014, Samsudin and Fikri informed that they have yet to receive a response from the local council regarding their requests for waste collection centres to be provided to Tuhu Lupak and Lawa villages. Samsudin expressed:

We have sent a letter to the local council but we haven't received any feedback from them whether it's approved or not. We have done a follow-up discussion through our Village Development and Safety Committee meeting. The minutes of meeting were already sent to the local council (Interview, One Year Post-Programme).

Based on these responses, it seemed they felt they have done their part at the community level to obtain assistance from relevant authorities. It also indicated a certain level of dependency on the government sector to improve waste management in their villages.

7.5.3 Summary of waste behaviours

In terms of attitudes and behaviours, the challenges perceived to improve waste management practices included lack of awareness and understanding, irresponsible and poor attitudes, indifference, ignorance and lack of actions. Based on the interviews, three issues related to attitudes and behaviours emerged. Firstly, even for villagers who gave the impression that they were more environmentally-aware than others, there seemed to be a contradiction between awareness and action, for example, in the case of Azizah as mentioned in Section 7.5.1. Secondly, ways to handle situations when witnessing others throwing rubbish indiscriminantly and thirdly, the trickling effect of negative attitude.

There also seemed to be an inconsistency in the villagers' responses in terms of willingness to contribute time and effort to improve waste management in their village or home. However, some villagers expressed their willingness to improve their own waste management practices. They understood the need to dispose of waste accordingly such as segregating waste, prepare proper bins or conduct cleaning-up activities.

Most of the villagers, including smallholders, were willing to share their experiences to improve waste management with others. However, the interviews indicated that it was easier to share information with families rather than with other villagers due to the lack of interest.

The villagers have expressed their concerns about the lack of environmentally friendly options, i.e. lack of waste disposal and recovery facilities and services, as well as alternatives for proper disposal in their villages. The existing reported practices by most of the villagers were to bury or burn various types of waste. Despite the lack of facilities and services, some of the villagers, especially those who owned vehicles, were already making an effort to send garbage bags to the town centre's collection bins. Based on the findings of interviews four months and a year post-programme, unfortunately the local council has yet to provide the waste collection services to the villages as requested.

The next section presents findings about issues of co-operation and support.

7.6 Co-operation and Support

The importance of co-operation and family support, and formation of teams or committees in villages were among the key concerns of the communities.

7.6.1 Importance of co-operation and family support

The importance of co-operation among stakeholders was highlighted. Most of the villagers also agreed that a supportive family was an important factor to ensure improvements in waste management practices. During the interview, one of the villagers, Zarina, said that “there should be a continuous co-operation among all” (Interview, Two Weeks Post-Programme). During the evaluation survey, the villagers were asked about their ideas and thoughts on whether waste management could be improved in their village or at home. One of them wrote “I believe waste management can be improved when everyone co-operates in the village, including village heads, Village Development and Safety Committee, and Beaufort District Council” (Evaluation survey, villager 34). The same villager also added that “co-operation of head of family is needed to implement and improve at home”

(Evaluation survey, villager 34). Another villager responded that waste management can be improved in the village but was not easy because “it’s difficult for villagers to work together” (Evaluation survey, villager 32). In terms of co-operation among villagers, villager 32 seemed to be less positive about working with other villagers, while villager 34 wrote it in a more positive way. Their previous experiences working with different villagers could have resulted in these opinions. When asked about family support for waste management during the interviews, some of the villagers agreed it was important. Johan expressed the following:

I am very grateful to my family especially my wife, who is still working as a teacher. She always supports my efforts to maintain cleanliness especially reminding the kids and grandchildren, to follow cleanliness rules in school and dispose of waste accordingly (Interview, Two Weeks Post-Programme).

Furthermore, Osman stated about his family support that “yes, they do. They are supporting me. It’s difficult on my own” (Interview, Two Weeks Post-Programme), Fikri responded “Up to now, yes, they’ve been supportive” (Interview, Two Weeks Post-Programme) and Azizah stated “yes, they do support” (Interview, Two Weeks Post-Programme).

Four months after the programme was implemented, the villagers were asked during the telephone interview whether any further collaboration had been established with the local authority or other government departments on waste management. Based on their responses, there was no further collaboration established with relevant government departments. Azizah responded “There hasn’t been any, as far as I know. Nobody cares about it anymore” (Interview, Four Months Post-Programme). Both Fikri and Fauziah commented “none that I know of” (Interview, Four Months Post-Programme). Zarina expressed “I don’t think there is so far” (Interview, Four Months Post-Programme). Johan stated during the interview that he had a discussion with the village leaders but “I was told to wait. There is no collaboration until now” (Interview, Four Months Post-Programme). Again, as mentioned in Section 7.5.2, they seemed to be dependent on the government departments to create further collaboration since their first meeting in November 2013.

7.6.2 Formation of committee

During the panel discussion, a suggestion to form a new committee was raised by one of the villagers. The committee could provide an avenue to hold regular meetings or discussions and facilitate collaboration with relevant departments and fund-raising for environmental activities. During the interview after the programme implementation, one of the villagers, Johan, expressed the following:

We need to form a voluntary action committee among the villagers as I've stated during our programme in Lawa Village. If there is no committee, our work will not be organised. We can hold regular discussions with the villagers about the importance of the environment to us. We can also organise programmes such as cleaning-up activities once a month, taking turns in different villages. We shouldn't depend totally on the government. We need to contribute to our government too, for example, giving awareness to the communities (Interview, Two Weeks Post-Programme).

However, there was already an existing body called the Village Development and Safety Committee operating in villages. One of the villagers, Osman, who was also a village head, when asked if he had a team focussing on cleanliness, he replied "yes there is" (Interview, Two Weeks Post-Programme). Any decision whether to form a new committee or improve the operating mechanism of existing teams needed to be made and agreed upon by the communities themselves.

Four months after the programme implementation, the villagers were interviewed again about the same issue. Most of them responded that as far as they knew, a village committee or team dealing specifically with waste management had not been formed. Samsudin said he had heard of a plan of formation of a committee. Another villager had suggested the formation of the committee to relevant leaders but did not receive a positive response. When asked "do you know if there is a new committee in the village to look into waste management?", Fauziah responded "I'm not sure because no one has contacted me" (Interview, Four Months Post-Programme). Other villagers, Fikri, Zarina, Satar and Azizah replied that they thought nothing had been done (Interview, Four Months Post-Programme). Johan indicated that he had "suggested the formation of the new committee to relevant leaders. However, there is no positive response from them" (Interview, Four Months Post-Programme). Unfortunately, Osman, a head village and who could potentially provide information on this matter, was not available during the period of interview in March/April 2014.

7.6.3 Summary of co-operation and support

Co-operation with relevant stakeholders and family support was identified as important by the villagers to ensure improvements in waste management practices. Four months after the programme was implemented, there was no further collaboration established with relevant government departments. The villagers also seemed to have a certain degree of dependency on the government to collaborate further with them to improve waste management.

A suggestion to form a new committee that could provide a platform to hold regular meetings or discussions and facilitate collaboration with relevant departments and fund-raising for environmental activities was raised. However, there was already an existing body called the Village Development and Safety Committee operating in villages. The decision whether to form a new committee or improve the operating mechanism of existing teams needed to be made and agreed upon by the communities themselves. Four months after the programme implementation, any village committee or team dealing specifically with waste management had not been established.

The next section presents findings about the challenges of change in the communities in terms of improving waste management practices.

7.7 The Challenges of Change

This section discusses the challenges of change, including how change takes time, the communities' priorities for change, as well as some positive changes that have occurred.

7.7.1 Change Takes Time

Most of the villagers who were interviewed expressed that a change of attitude and waste management practices were slow to progress. Adjustment was also needed to change existing ways and routines. Johan said that “at this stage, changes happen little by little together with family members at home first, things cannot change drastically” (Interview, Two Weeks Post-Programme). Satar had

similar views when he stated “there are challenges. It is not easy to change drastically. As people, we need gradual change” (Interview, Two Weeks Post-Programme). Fikri commented that “It’s just that in the beginning, we need some adjustment to change our ways” (Interview, Two Weeks Post-Programme).

Some villagers felt this was because of people’s attitudes. During the evaluation survey, one of the villagers thought that although waste management could be improved, “it is difficult because of attitudes of other villagers” (Evaluation survey, villager 27). Zarina responded that “some people don’t care although cleanliness is everyone’s responsibility” (Interview, Four Months Post-Programme). She also commented that “good things take time to achieve. We should be teaching kids about cleanliness when they are young, whether at home or at school” (Interview, Four Months Post-Programme).

During the follow-up telephone interviews with the villagers in March/April 2014, they were asked what was necessary to bring about change in their communities. Among the challenges encountered to bring about change were lack of seriousness about change among villagers, and village leaders were passive in their duties. To enable change to happen, the villagers suggested actions such as distribution of awareness resources, village leaders taking a more significant role in the community on waste issues, a follow up waste programme in the villages, a committee to discuss waste problems and more hands-on activities. Azizah commented “to bring about change, the village leaders must call for meetings with villagers and discuss about environmental activities, for example, for housewives during weekends. It’s too bad that they are inactive and not assuming their roles!” (Interview, Four Months Post-Programme). Another villager, Fauziah, remarked:

For me, to bring about changes, there is a need to distribute awareness pamphlets. The village leaders also need to meet up with villagers to seek cooperation. The problem is that sometimes the villagers are not serious in changing practices. The village leaders should be responsible to bring about change (Interview, Four Months Post-Programme).

Satar commented “to bring about changes, there should be a committee to discuss the waste problems. The village leaders should be responsible, including all the villagers” (Interview, Four Months Post-Programme). Samsudin commented “for me, there should be a follow up waste programme in the villages to remind everyone again. The village leaders are responsible to bring about changes in

villages” (Interview, Four Months Post-Programme). Another villager, Johan, expressed:

To bring about change, relevant government departments should give constant awareness talks to the villagers. If the new committee is formed, then that will be the platform to organise and implement activities. The village leaders should be responsible to bring about change together with other relevant government departments (Interview, Four Months Post-Programme).

When contacted in November 2014, Samsudin expressed that “it is not easy to change communities” and that he couldn’t “do drastic changes” (Interview, One Year Post-Programme). He has been using the information given during the environmental programme held in November 2013 as his guidelines for waste management. Fikri admitted that “initially, there were some impacts, but perhaps there should be a follow-up [action]” (Interview, One Year Post-Programme).

7.7.2 Priority for change

In terms of priority for change in waste management practices, those who responded expressed that it should start at home, then their plantations. Self-awareness should start first, and subsequently be emulated by family members and the rest of the community.

When asked “have you changed your ways in managing waste at home, in your village and/or on plantation?”, Osman responded “of course. I start with cleanliness at home then plantations. People look at cleanliness at home first. If we start with plantations, and our home is neglected, people will not believe us” (Interview, Two Weeks Post-Programme). Osman felt that the way to achieve this was that “we need to call for discussions among villagers. We start with cleanliness at home first, then plantations” (Interview, Two Weeks Post-Programme). Fikri also stated “for me, cleanliness should start at home. It means it starts with ourselves and subsequently be emulated by family members and the rest of the community” (Interview, Two Weeks Post-Programme). He also added that “it starts at home first especially in disposing waste. Later on, I’ll slowly start in the plantation such as managing containers. Before this, the containers were not kept properly” (Interview, Two Weeks Post-Programme). Satar responded “yes we have started at home and in the plantation. I plan to make compost in the plantation. We bury waste at home” (Interview, Two Weeks Post-Programme).

7.7.3 Positive change in waste practices

Some villagers indicated that they had initiated changes and reported slight improvement in waste practices, especially at home. Awareness about the environment was indicated as well. For example, some reported that they had started using reusable bags or previously-used plastic bags when shopping.

During the post-programme interview, the villagers were asked if they have seen any change in what friends or family say or do about waste. Fikri responded “a little bit. As the head of family, I need to give guidance in managing waste such as plastic bags” (Interview, Two Weeks Post-Programme). In terms of her own ways of managing waste, Fauziah responded “for now I start at home. For example, the use of plastic. I either bring a reusable bag or used plastic when shopping” (Interview, Two Weeks Post-Programme).

Data gathered during the interviews four months after the programme implementation indicated that there were some improvements and changes in waste management practices at home, including using reusable bags or plastic when shopping, and burying kitchen waste for compost. Fikri stated that “I have started at home because for me, it has to start from ourselves. Example is to prioritise proper disposal of waste” (Interview, Four Months Post-Programme). Fauziah remarked that “when I go shopping, I always bring my own bags. I also bury kitchen waste” (Interview, Four Months Post-Programme). Another villager, Azizah, responded “now I bring my own shopping bags when I go out. There’s a 20-cent charge for each plastic bag in supermarkets in Beaufort now” (Interview, Four Months Post-Programme). In addition, Satar stated that “I have started at home with my family members, for example, we bring own bags when we go shopping” (Interview, Four Months Post-Programme). Similarly, Johan remarked “at a personal level, my family and I will bring our own reusable bags when we go shopping” (Interview, Four Months Post-Programme).

In terms of changes in practices at the village level, there were mixed responses received. Fikri stated “In terms of village, there’s no obvious effect of my actions”

(Interview, Four Months Post-Programme). Samsudin mentioned how a recent flood, highlighted by Satar in Section 7.4.2, had worsened the waste problem in his village, saying “after the big flood, the waste problem worsened in the village. We have to re-plan our waste management again. It’s the same with the plantations” (Interview, Four Months Post-Programme). Another villager, Azizah, expressed her disappointment that “at village level, I have tried to campaign amongst friends about waste management but there is no support. People are unconcerned about the whole thing” (Interview, Four Months Post-Programme). Another villager, Satar, admitted that “at village level, I haven’t done anything” (Interview, Four Months Post-Programme).

At the plantations, there were some changes among the smallholders in terms of their waste management practices. Fikri stated “in my plantation, I prioritise on proper use of pesticide and proper disposal of waste” (Interview, Four Months Post-Programme). Fauziah remarked that “in our plantation, we collect the fronds and leave them to decompose” (Interview, Four Months Post-Programme). Fauziah added that “in other plantations, I notice they also collect the frond and left to decompose” (Interview, Four Months Post-Programme). Another villager, Satar, stated “in own plantation, I cut the fronds into pieces to make compost” (Interview, Four Months Post-Programme). Azizah responded “in my own plantation, we just arrange the fronds along the walkways. There’s no news about the shredding machine” (Interview, Four Months Post-Programme). The idea to obtain a shredding machine for the fronds was suggested during the programme in November 2013 for the villagers to think about and discuss among themselves.

7.7.4 Summary of the challenges of change

Most of the villagers who were interviewed expressed that a change of attitude and waste management practices were progressing slowly. Adjustment was also needed to change existing ways and routines. Some villagers also expressed change was difficult and good things took time to achieve. Even a year after the programme was implemented, change was happening slowly and impacts of programme seemed short-lived.

Some challenges identified to bring about change included a lack of seriousness among villagers, and that village leaders were passive in their duties. Some

suggestions for improvement given by the villagers were distribution of awareness resources, village leaders taking a more significant role in the community on waste issues, a follow up waste programme in the villages, a committee to discuss waste problems and more hands-on activities.

In terms of priority for change in waste management practices, most villagers expressed that it should start at home, then in their plantations. Some villagers have initiated changes and reported slight improvement in waste practices, especially at home. In terms of changes in practices in the village level, there were mixed efforts. At the plantations, there were some changes in waste management practices.

7.8 Chapter Summary

The environmental education programme seemed to have benefited the villagers. There were favourable perceptions about waste management, particularly on ways to manage waste properly. However, they believed the knowledge needed to be disseminated to others in the communities.

Based on the responses of the villagers, although the programme was useful, appropriate and vital, they indicated that conducting only one programme was not sufficient as constant reinforcement was needed through follow-up activities.

Most villagers agreed that waste management in their village or plantations could be improved. However, they indicated the importance of leadership from government departments and politicians to provide guidance. It was also a challenging task to persuade other villagers to improve practices due to the lack of interest.

Three issues related to attitudes and behaviours emerged. Firstly, the issue of contradiction between awareness and action. Secondly, looking for ways to handle situations when witnessing others throwing rubbish indiscriminantly. Thirdly, the trickling effect of negative attitude.

There also seemed to be inconsistency in the villagers' responses about their willingness to contribute time and effort in waste management. However, some villagers expressed willingness to improve their own waste management practices.

The villagers expressed their concerns about the lack of environmentally friendly options, i.e. lack of waste disposal and recovery facilities and services, as well as alternatives for proper disposal in their villages. However, based on the findings of interviews a year post-programme, it was unfortunate that the local council has yet to provide the waste collection facilities to the villages as requested. Despite the lack of facilities and services, some of the villagers were already looking for alternatives, such as sending garbage bags to the town centre's collection bins.

Co-operation with relevant stakeholders and family support was identified as important by the villagers. However, there has been no further collaboration established with relevant government departments on waste management. Dependency on government to initiate further collaboration seemed to be expected by the communities.

One possible way forward was for the communities to decide whether to form a new committee or improve the operating mechanism of existing teams. Four months after the programme implementation, the village committee or team suggested to deal specifically with waste management had not been established.

The general response of the communities about change in attitude and waste management practices was it was slow to progress. Even a year after programme implementation, change was happening slowly and impacts of programme seemed short-lived.

Some of the suggestions that could effect change in villages were distribution of awareness resources, village leaders taking a more significant role in the community on waste issues, a follow up waste programme in the villages, a committee to discuss waste problems and more hands-on activities. Most villagers expressed that change in waste management practices should start at home, then in plantations. At a personal level, some villagers have initiated changes and reported slight improvement in their waste practices, especially at

home. There were mixed efforts at the village level, and some reported changes in the plantations.

The final chapter presents the discussion and conclusions of this research.

Chapter Eight: Discussion and Conclusions

8.1 Chapter Overview

This final chapter presents the discussion and conclusions of the research, research implications, recommendations and suggestions for further research. The responses in this chapter have drawn heavily on findings presented in Chapters Five, Six and Seven; in which four broad themes of perceptions of waste, environmental policies, education and awareness, and waste behaviours were found to be interconnected when dealing with waste management.

8.2 Discussion

The environmental education programme in this research was developed through a process of understanding current policies for community waste management, acknowledging perceptions of the communities and their knowledge about existing waste management practices in their villages, and by co-constructing the programme with these communities. The subsequent evaluation of this educational programme indicated the challenges of changing attitudes and behaviours towards better waste management, and helped to identify how to improve future programmes.

The main research question, “How can an environmental education programme on waste management practices be developed with local communities in Sabah?” is answered in detail through the discussion of subsidiary research questions in the next sections. The subsidiary research questions are as follows:

- a. What are the current policies in place for community waste management?
- b. What are the perceptions of local communities about the policies, processes and practices of waste management in their area?
- c. What education programme can be designed and developed for sustainable waste management in local communities?
- d. How do local communities respond to the implementation of a co-constructed waste education programme?

8.2.1 What are the current policies in place for community waste management?

The findings related to the research question on the current policies in place for community waste management are discussed in this section. These were obtained through literature review in this research and data collected from the government representatives. Discussion in this section is presented in two parts:

- a. community waste management policy; and
- b. waste management policy in smallholder plantations.

In the context of this research, the terms ‘policy’, ‘regulation’, ‘guidelines’ and ‘law’ were all used to indicate the range of formal or official documents related to waste management. A policy is a type of guideline with no legal implications, while laws and regulations have legal consequences if enforced.

8.2.1.1 Community waste management policy

This study found few policies, regulations or guidelines on waste management for communities in Sabah. Among those that were found were the Uniform (Anti-Litter) By-Laws 2010, the Solid Waste Management Master Plan Study in Sabah and the Sabah Environmental Education Policy (SEEP).

During the interviews with the government officers in June 2013, only one specific regulation pertaining to waste management for local communities was mentioned, namely the Uniform (Anti-Litter) By-Laws 2010, which is enforced by the local authorities in Sabah, although with limitations. Other government officers indicated that their organisations had some broader policies or guidelines on waste management, such as regulations to control open burning and the Sabah Environmental Education Policy (SEEP). As highlighted in Section 3.4.1, there were existing federal and state regulations or guidelines with relevance to waste management, but there was no federal or state legislation that covered all facets of solid waste management. By virtue of the various regulations available for waste management, it seemed to indicate that waste management was given some attention by the relevant government bodies; however, enforcement appeared to be lacking.

As stated in Section 5.3.1, the government officers did not mention the Solid Waste Management Master Plan Study in Sabah that was published in 2007 for the Ministry of Local Government and Housing Sabah. This could indicate that either they were not aware of its existence, that they overlooked it, or did not associate it with community waste management. The Master Plan has a policy framework with four main thrusts, one of which is awareness and public participation. In the context of the policy, the aim is to create awareness among the public through mass media or other channels on issues to be considered in solid waste management planning; whilst public participation means to involve people in the preparation of the planning process (Chemsain Konsultant, 2007a, p. 63). In relation to the awareness and public participation sections in the document, it seemed to indicate a strong emphasis only on participation of the public in the planning process of the plan and some awareness campaigns, and less on the actual process of behavioural change of the people towards better waste management. Some of the strategies that were recommended for public awareness, training and education included a general solid waste management information campaign, school environmental awareness campaign and capacity building (Chemsain Konsultant, 2007c, p. 53). However, progress towards the implementation of this Master Plan could not be determined in this research.

Coordination to implement the various regulations or guidelines on waste management seemed to be lacking, especially in local communities. Based on the findings of this research, although policies on waste management were available, gaps were identified in the provision of efficient waste collection services in Sabah, especially in rural areas. This finding supports others (e.g. Herat, 2015, p. 1) who have claimed that in developing countries rates of waste collection remain low, and transportation of waste inefficient due to lack of resources. This also corresponds to the outcomes of a study carried out in Thailand in which Hiramatsu et al. (2009, p. 959) identified that municipal waste management systems were complicated and that some residential areas did not receive waste collection services. Closer to home, Chemsain Konsultant (Chemsain Konsultant, 2007c, p. 12), in its report prepared for the Ministry of Local Government and Housing in Sabah, highlighted the difference in provision of solid waste collection between rated areas – areas where residents pay tax to receive services such as

waste collection from the local authorities - and those unrated in Sabah. Those living in unrated areas do not pay taxes for services.

The enforcement of various policies or guidelines was seen by the interview participants as inadequate. One of the government officers stated that there was a lack of enforcement by those agencies given the power to enforce the regulations. The lack of enforcement and implementation of waste management policies, interwoven with the attitudinal and behavioural barriers identified by the officers such as complacency, ignorance, dependency on government initiatives, lack of support, understanding, knowledge and awareness, made further improvement in waste management practices more challenging in their view. Therefore, by reducing the barriers through education (social and cultural) and improving facilities and enforcement (technical), waste management could theoretically be improved. Active negotiation and engagement between the local communities and the local authority could help in the provision of waste collection services in the villages. To a certain extent, these findings concur with MacRae (2012, p. 79) who stated that an interaction between social, cultural, technical and economic factors was imperative to further aid the success of waste management models. The findings also support the study by Hiramatsu et al. (2009, p. 959) which found most residents they surveyed in Thailand were not aware of waste problems and treatment.

8.2.1.2 Waste management policy in oil palm smallholder plantations

Three documents were found in relation to agriculture-related waste management guidelines for oil palm plantations focussing on independent smallholders. These were generic guidelines called the *RSPO Principles and Criteria for Sustainable Palm Oil Production: Guidance for Independent Smallholders under Group Certification* prepared by the Roundtable for Sustainable Palm Oil (RSPO) in 2010 (RSPO, 2010), the *Code of Good Agricultural Practice for Oil Palm Estates and Smallholdings* (Malaysian Palm Oil Board (MPOB), 2008), and the *Malaysian Sustainable Palm Oil (MSPO) Part 2: General principles for independent smallholders* (Department of Standards Malaysia, 2013). In the context of waste management, these three documents have a similar focus, that is,

for smallholders to identify waste in plantations and dispose of it in a responsible manner.

Through the interviews, one of the government officers indicated the importance of looking after the environment through the implementation of the *Code of Good Agricultural Practices for Oil Palm Estates and Smallholdings*. He believed that based on the present scenario in Sabah, smallholders do practise proper waste management. He indicated that certification for Malaysian and international standards, such as Code of Practice (COP) (Malaysian Standard) and Roundtable for Sustainable Palm Oil (RSPO) (International standard), was available for oil palm smallholders. Policy and regulations on waste management for smallholders were seen to be embedded in the certification process. In relation to waste management, the *Code of Good Agricultural Practices for Oil Palm Estates and Smallholdings* has outlined ways to manage waste; for example, details on how to manage empty pesticide containers. However, the *Malaysian Sustainable Palm Oil (MSPO) Part 2: General principles for independent smallholders* gives general guidelines; for example, it states that smallholders needed to ensure waste from smallholdings is disposed of appropriately in accordance to local and national legislation. The *RSPO Principles and Criteria for Sustainable Palm Oil Production: Guidance for Independent Smallholders under Group Certification* require waste to be identified, and for a waste management and disposal plan to be developed by the smallholders under group certification. Based on their publication years, these documents were developed at different times and with a similar purpose that echoes best environmental practices towards sustainable oil palm plantations. The purpose, similarities or differences of the documents may need to be explained clearly to the smallholders, as their perceptions about existing policy show below.

8.2.2 What are the perceptions of local communities about the policies, processes and practices of waste management in their area?

The findings related to the research question on the perceptions of local communities about the policies, processes and practices of waste management in

their area are discussed in this section. These were drawn from the community survey and observations in the villages before the implementation of the environmental education programme, and from post-programme interviews with some of the villagers. Discussion in this section is presented in two parts:

- a. perceptions on policy; and
- b. perceptions on processes and practices by local communities.

The smallholders, who were part of the local community, responded to questions in the community survey giving their opinions and perceptions from the perspective of a villager. They also responded to a special section in the community survey to gauge their opinions as oil palm smallholders. Most villagers who participated in the survey were smallholders and other villagers identified themselves as a teacher, a government staffer, a housewife or having a leadership role in the village.

8.2.2.1 Perceptions on policy

When asked in the community survey whether they were aware of any policy or regulation on waste management in their village, a majority of the villagers indicated that they were not aware of any. One of the respondents who reported being aware of regulations wrote that indiscriminant dumping of waste was not allowed. Overall, there seemed to be little awareness of any waste management regulations and this could be influenced by the non-availability of waste collection services in the villages. It would appear that no such regulations had been emphasised or the actual documents were not available to the villagers.

There were mixed responses among the oil palm smallholders regarding the value of policy, guidelines or laws for managing waste such as fertiliser or pesticides. There appeared to be a lack of knowledge and awareness about the importance and relevance of waste management-related policy, guidelines or laws. One of the reasons for this could be a lack of emphasis on the importance of managing plantation waste as compared to the planting process and increasing crop yield. It could also be that there was a poor understanding of the relevance of any waste policy to the respondents' lives, such as if their plantation waste is managed properly, it could contribute to a healthy environment and to their quality of life.

The oil palm smallholders also reported a lack of provision of proper waste management services for their plantations. At the time of data collection, there were neither scheduled waste collection centres nor services requested by, or provided for, the smallholders for scheduled collection of waste. During the focus workshop, the smallholders responded they had not requested services when asked if they had ever arranged for companies to collect the empty pesticide containers. Therefore, the reported practice of managing fertiliser containers by smallholders was reusing or burying them. Under the Malaysian Environmental Quality (Scheduled Waste) Regulations 2005, pesticides and herbicides were listed as scheduled waste; meaning that ideally these would have to be disposed of properly according to the law, such as having licenced contractors to collect them. However, the regulation was possibly not effectively enforced in rural areas due to limitations such as lack of staff and funding of the enforcing agency. At the same time, the existence of this regulation and the need for compliance could also be unknown to the smallholders whose focus may be on crop yield and sustaining their daily lives. With this knowledge on the current situation of waste management in plantations, awareness and clear explanation need to be provided more effectively to the smallholders. Emphasis on ways to manage their plantation waste needs to be given by the relevant authorities.

This study discovered that little has been described about waste management practices by smallholders in the literature, even with the existence of the three guidelines mentioned earlier. This supports the findings by Vermeulen and Goad (2006, pp. 5–6) that stated that most of the literature reviewed on oil palm smallholders was on production processes, land ownership, technical assistance or crop pricing.

In the context of this research, the existing waste management regulations did not seem to matter much to the communities, and this could be because they were not enforced in their villages. The situation could remain the same due the lack of enforcement and limitation in waste collection services, or community environmental education could be made more comprehensive by educating the communities on impacts of improper waste practices on the environment, creating awareness on the purpose of regulation and to encourage actions towards better

waste practices. Education is a long-term process and can take time to achieve change. On the other hand, enforcement of regulations results in an immediate impact, for example, a person could immediately be penalised for dumping rubbish into a local river if caught by the enforcement officers. In a situation like this, awareness is a form of deterrent could be created immediately. Although impacts of education on people may take a longer time to observe compared to the impacts of regulation, the educative impacts are more lasting once environmental attitudes and behaviours become integrated into people's daily lives.

8.2.2.2 Perceptions on processes and practices by local communities

One of the common perceptions among the villagers was the importance of cleanliness in the context of the environment. It seemed that they related cleanliness to tangible, day-to-day activities. The villagers seemed to take other people's impressions or perceptions of their village seriously as they wanted to maintain a good reputation for their village. However, there appeared to be a discrepancy between how they perceived cleanliness and the reality of littering. Based on observations, plastic bottles and bags were scattered around in the village. A gap between attitude and behaviour could be observed in this situation. To an extent, this finding concurs with Ballantyne and Packer's study about visitors having a heightened awareness of conservation issues but not many actually translated intentions to adopt environmentally responsible behaviours into real actions (2011, p. 201). Another explanation of why there appeared to be a discrepancy is the amount of effort, sacrifices and changes the villagers might feel they needed to make in order to make a difference, even though they might highly value cleanliness. Among the barriers to positive behaviours as emphasised by Kollmuss and Agyeman (2002, p. 257) were lack of knowledge, lack of internal incentives, lack of external possibilities and incentives, lack of environmental consciousness as well as old habits. In the context of this research, the lack of knowledge was addressed during the workshop by providing information about the importance of the environment, and impacts of waste on health and the environment. The lack of internal incentives was only addressed to a certain extent by the evidence that some of the villagers started using reusable bags or sharing environmental information with family members. The lack of external incentives was evident as there were no waste collection services provided for the

villages to help them manage waste. Lack of consciousness could cause the discrepancy between how villagers perceived cleanliness and the reality of littering. Old habits could be difficult to overcome because of the significant amount of effort and sacrifice required to effect change. Assuming that Kollmuss and Agyeman based their ideas on western contexts, it is interesting to note that some findings from this research support their ideas about barriers to action, and showed human beings operate similarly across cultures.

As highlighted by Andrews and Entine (n.d.), people were likely to change their behaviours when they were offered behaviour choices that were low cost in terms of time, energy, money and materials. The gap between attitude and behaviour could also be due to situational factors as highlighted by Hines et al. (1987, p. 7) who concluded that social pressure, economic constraints or lack of opportunities could hinder action-taking. In this research, social pressure was evident in Azizah's comment that she felt demotivated by her experience to encourage other villagers to make candles from used oil, and villagers also discussed the lack of waste collection opportunities. Introducing a behaviour change tool such as social norms, incentives and prompts as emphasised in the community-based social marketing (McKenzie-Mohr, 2011, p. 44) could encourage the villagers to embark on waste recovery projects to make candles from used oil. The use of social norms, for example, training Azizah to make the candles first and showcasing her products could trigger interests from other villagers to do the same.

As highlighted in the literature, environmental problems exist in many parts of the world which are symptoms of un-sustainability (Osbaldeston & Schott, 2012, p. 258), and it appears in this study that villagers were not connecting these symptoms to their own livelihoods. For example, while not mentioned by any of the villagers during the community survey or focus workshop, and only highlighted by two officers during the interview, it is of interest to consider the issue of biodiversity impacts and waste management. The villagers appeared to be more focussed on localised issues and what affected them on a daily basis and seemed disconnected from the bigger picture of how waste could affect biodiversity and ecosystem integrity.

However, the villagers seemed to perceive waste management as an important issue, and appeared to practise waste reduction or recycling, although apparently favouring economic over environmental considerations. They seemed to prefer recycling over waste reduction because it could provide monetary benefits, although such recycling services within the rural area appeared to be limited. Their preference to recycle could be because they did not perceive waste reduction as an economic return in the long-term, or they could justify their purchasing habits through recycling. Altering consumption patterns might encourage preference towards reduction of waste rather than recycling. This preference to recycle concurred with the villagers' stated aspiration to have a clean village and to gain economic benefits through recycling. This aspiration seemed to indicate a tendency towards pro-environmental behaviour motivated by economic goals (in this case, monetary gain through recycling), rather than environmentally-responsible behaviour for the sake of the environment. As described by Gatersleben (2013, p. 133), pro-environmental behaviour can present benefits to the environment but may not necessarily be motivated by environmental goals. This is an important consideration when understanding how to engage such communities in waste management. There is a need to understand this situation as it could be triggered by financial concerns of the community members. Although these members may be motivated by monetary gains through recycling, any environmental education programme could focus on these potential gains while enhancing the development of environmentally-responsible behaviours for the sake of environment, for example cycling to work because it is healthier (Gatersleben, 2013, p. 133).

The findings showed a weak link between traditional knowledge and methods of waste management. Traditional ecological knowledge would have emphasised sustainable resource use and waste minimisation, for example, the aboriginal ecological philosophy that taught attitudes towards the environment as well as responsible stewardship and sustainable lifestyles (Beckford et al., 2010, pp. 246–247). This sort of knowledge would have been effective for the small amount of organic waste generated in earlier times, but inadequate to deal with the different types of waste generated today. Methods such as burying or burning may have worked in the past in their villages when waste was only organic, but these methods are no longer appropriate considering the more varied types of waste and

their impacts on the environment. Jambeck et al. (2015, p. 770) highlighted that historically, waste management by burying or burning was sufficient for biodegradable waste; however, the rapidly growing amount of less degradable plastics in the waste stream requires a change of perspective of how modern waste should be managed and treated.

In the community survey, the majority of the villagers seemed to be dependent on the government to provide waste management services but at the same time, they were willing to work together for effective waste management. Most of the villagers thought waste had economic value if well-managed, but they also felt they faced time management issues to manage their waste properly. It seemed that the villagers had feelings of uncertainty of how they could deal with waste in their villages.

Most of the villagers were concerned that there were no domestic waste collection services provided by the local authority in their area. The data obtained from the community survey indicated that many villagers would like the rating area of the local authorities to be expanded, and waste collection and community collection centres for villages to be provided, for they saw these as crucial in having a healthy environment. The lack of waste collection services seemed to be an unjust situation for the communities because they were left to manage waste in their villages due to the collection services limited only to the town area. At the same time, the local authority encountered limitations to provide the waste collection services to all people in the district due to resource constraints. As highlighted in the literature, improper waste management could affect human health and the environment through degradation of water, soil and air quality (Withgott & Brennan, 2011, p. 618). The importance of the link between waste management and healthy environment was therefore highlighted in the co-constructed educational programme theme “Healthy Environment, Healthy People, Healthy Future”.

Some villagers raised key waste issues such as health problems, indiscriminant dumping, foul smells, pollution, safety and waste accumulated after or during festivities. The reported domestic waste disposal practices in the villages seemed to indicate that burying was prevalent, burning occasionally occurred and that

disposal of waste did not occur in waterways. However, the issue of waste disposal in the local river revealed some inconsistencies in the data. This issue is elaborated further in Section 8.2.4.

In terms of the oil palm smallholders' perceptions, some of them seemed to think there were waste management problems in the plantations; while a majority of smallholders perceived that the plantations were well-managed. It was likely that as far as they understood, and based on their knowledge, the majority did not observe any conditions that they could relate to waste problems in the plantations.

8.2.3 What education programme can be designed and developed for sustainable waste management in local communities?

An understanding of current ideas about waste management from the literature, and the perspective of government officers and the perceptions of the villagers helped to shape the design of the environmental education programme on waste management practices in local communities. Discussion about the design and development of this programme in this section is presented in four parts:

- a. Role of education
- b. Knowledge development
- c. Participation
- d. Co-construction process

8.2.3.1 Role of education

The government officers perceived an education process for waste management, either formal, non-formal or informal, as important. There were also perceptions among the officers and villagers that environmental information should be reinforced to the public and awareness campaigns should be continuously carried out in local communities. These findings align with one of the theoretical principles derived from the literature about the importance for people to acquire awareness and knowledge of the environment, as one of the key elements in bringing about change. As emphasised by Jensen (2002, p. 329), knowledge is still an important precondition, amongst other elements, for the “development of

competence leading to action and behavioural adjustments in relation to the environment”. Education is “a process not a place” and it is also a process to make sense of the global phenomena by understanding the local issues (Fagan, 1996, p. 147). The *Tbilisi Declaration* has clearly specified the importance of developing awareness and knowledge, to build a society that is environmentally responsible (UNESCO, 1978, p. 26). The government officers also highlighted numerous community programmes focussing on waste management that have been carried out by government agencies in Sabah to create awareness, convey information and train local communities. The importance of awareness among communities is supported by a study carried out by Patterson, Linden, Edward, Wilhelmsson and Lofgren (2009, pp. 388–389) in five coastal villages about the importance of marine resources and conservation and also by another study by the Tambuyog Development Centre in the Philippines regarding the marine ecosystem (UNESCO Institute for Education, 1997, p. 8). However, despite these awareness campaigns, challenges remain; for example, the officers believed there was still a lack of effort in extensively promoting waste education. The lack of effort could be due to inadequate skills, lack of motivation or interests among those conducting the educational programmes. At the same time, focussing the educational efforts to better empower the communities to act could improve the community programmes. Although awareness campaigns are relevant, to continuously implement them without evaluating their effectiveness in practice seems to indicate there is a lack of responsibility or concern to take on board what is needed to be done. Therefore, education together with an understanding of barriers and needs could render a lasting impact towards the improvement of waste management in villages.

Considering a second theoretical principle, an adult preference for learning can be related to the feeling of being part of a bigger picture or a contribution to their own self-identify (Heimlich & Horr, 2010, p. 61). This is related to the process of transformation and being empowered to address their own issues in the community (Connolly, 2011, p. 133; Merriam, 2011, p. 31). In relation to this research, adults were directly involved so their views, interests, expectations and priorities could be captured to develop a more holistic programme that they could own for their village. However, empowerment did not happen collectively in the community within the timeframe of this research.

One of the important ideas from early discussions with the government officers and communities was the connectedness of awareness, attitude and responsibility to act towards better waste management, as well as continuous guidance, lifelong education and capacity building. The importance of education to bring about change is reiterated by Andrews, Stevens and Wise (2002, p. 168) who stated the power of education is that knowledge could be an instrument to transform an individual, and not merely being transferred to the individual. The findings also concur with Stevenson and Stirling (2010, p. 232) who stated that “engaging in environmental education is a lifelong process as learners constantly seek information and meaningful understanding”. Although awareness, education and responsibility were found to be important from the perspectives of the officers, Venkataraman (2008, p. 9) cautioned that “the challenge of environmental education remains to foster a sense of responsibility and environmental stewardship” in the learners. Through the environmental education programme, in an attempt to address this challenge, the importance of the environment and ecosystem services were emphasised to the villagers. The impacts of improper waste management were highlighted as well as actions that could be taken to reduce impacts. Discussions were carried out to reiterate the importance of improving waste management which was everyone’s responsibility.

Based on the research findings, there were attitudinal and behavioural barriers to improving waste management, such as complacency and lack of understanding, as identified by the government officers. However, the majority of the villagers seemed to believe it was their responsibility to care for the environment. It appeared that there were concerns about the barriers such as complacency or lack of understanding of others, but at the same time there was also a genuine concern towards the environment. As highlighted earlier, theoretically, education through campaigns or programmes could reduce these attitudinal and behavioural barriers. The findings also appeared to indicate that there was a lack of awareness by the villagers of educational activities related to waste management implemented in the villages. One of the reasons for this could be that community environmental education programmes had yet to be expanded to their area by the relevant government departments, because of lack of funding, or the area was not in the priority list of the relevant government departments. Therefore, the timing of this

research was appropriate to develop and conduct the community environmental education programme focussing on waste management.

8.2.3.2 Knowledge development

In the community survey, most of the villagers agreed to participate in an education programme if there was an opportunity to learn how to manage waste better. Their responses to the survey questions indicated a willingness to participate in waste management activities and develop knowledge and improve practices on waste management. Capacity building was also perceived to be important from the officers' perspective and this concurs with one of the theoretical principles that highlighted the importance of helping people acquire skills towards solving environmental problems. Knowledge is developed and enhanced through education, capacity building and training. To sustain change, training needs to be carried out together with awareness-raising (UNESCO Institute for Education, 1997, p. 8).

In designing the educational programme and being mindful of a role of an educator as a provider of knowledge (E. W. Taylor, 2006, p. 301), knowledge development revolved around the holistic issues on the environment, biodiversity, health, waste and its impacts, in response to information gathered from the villagers. For example, the range of benefits provided by ecosystems to the people was explained, and that the ability of this generation to have effective and efficient ways to deal with waste would contribute positively in the long term. Evidence of how a polluted environment and waste can affect people's health was also presented to connect with the villagers' concern for their health.

8.2.3.3 Participation

The government officers and villagers have highlighted the importance of participation of local communities and relevant stakeholders such as leaders or government organisations in environmental education programmes. In the context of the community participation in this research, those who attended were present throughout the programme implementation, although it was cautioned in the literature that in any non-formal education, a nominal level of learner participation was expected due to its voluntary nature (E. W. Taylor, 2006, p. 292).

Participation, another theoretical principle of community environmental education derived from the literature, emphasised the importance of providing opportunities for people to participate actively in environmental protection. The *Tbilisi Declaration* has clearly specified the central importance of participation along with awareness, knowledge, attitudes and skills to build a society that is environmentally responsible (UNESCO, 1978, pp. 26–27). The literature has also highlighted that participation is about readiness of the community to take part in any programme, and that people are likely to participate in their communities when they feel a strong sense of attachment, when they feel strongly about an issue that affects them and their families or they feel they have something worthy to contribute (Clayton & Myers, 2009, p. 189; Dalziel et al., 2007, p. 14). Active participation of the communities could lead to them being empowered to address local issues to meet their needs (Connolly, 2011, p. 133).

8.2.3.4 Co-construction process

The co-construction process was designed to merge the ideas of the villagers and the researcher towards the development of the environmental education programme. It is acknowledged that the process was not a comprehensive co-construction process. However, the process was more than a consultative exercise because the interaction with the villagers was conducted actively about their aspirations for the village and plantation, it reflected on their problems as well as obtained their suggestions about what might be carried out for their communities. Working with local communities through a co-construction process has the capacity to respond to local environmental issues, and involving adults when planning an environmental programme was related to the feeling of being part of a bigger purpose (Heimlich & Horr, 2010, p. 61) and was appropriate to capture their needs to assure a meaningful programme (Van Meter, 1973, p. 2). The non-formal setting and ambience during the focus workshop were successful in engaging villagers' interests and motivations. The assumptions by Knowles (1980, pp. 44–45) regarding the rich reservoir of experience and immediate application of knowledge by adult learners were evident during the focus workshop through the fruitful discussions and decisions. Discussing their shared aspirations and goals was an important process to co-construct the environmental education programme because it enabled people to work better together. The villagers

agreed that their aspiration was “a clean village and to gain economic benefits through recycling”. For their plantations, they aspired to “create well-managed plantation surroundings and to gain economic benefits through recycling”. Shared aspirations and goals is one of the theoretical principles of community environmental education. These goals were included as the foundation for co-constructing the environmental education strategies for their villages.

A comprehensive co-construction process could have given more space and time for villagers to discuss their strengths, assets, opportunities, barriers, needs and aspirations for their communities. If more villagers participated in the process, the reservoir of experiences would be bigger to give a holistic picture of the community profile. If more time is given to the process, the interactions of the community could have been further observed to identify potential champions among them. On the other hand, direct involvement of villagers in the design, delivery and the evaluation of the programme could have given them more ownership and better commitment to ensure the success of the programme, provided the champions could be identified among the community to be part of the process in the beginning. However, practical limitations can hinder the full expression of this form of co-construction and future education programmes would need to consider this.

Based on the findings from Stage One data and the literature, the key ideas that became the foundation of the development of the environmental education programme were as follows:

- Acknowledging the villagers’ ideas
- Healthy Environment, Healthy People, Healthy Future
- Cleanliness and importance of waste management
- Lack of waste collection services, and awareness of guidelines
- Connecting awareness, attitude and responsibility to act
- Barriers to improving waste management

Acknowledging the villagers’ ideas concurs with the literature that stated environmental education should focus on local contexts of which educators in each country need to find balance “across their own social, economic and

environmental situations” (N. Taylor, Littledyke, et al., 2009, p. 325). The process was also learner-centred to a certain extent because the villagers chose how they could improve and set their goals during the focus workshop.

The unifying theme of ‘Healthy Environment, Healthy People, Healthy Future’ was derived from the villagers’ perceptions as well as the literature related to environmental importance, health, cleanliness and sustainability (Clover, 2000; Huckle & Sterling, 1996; World Commission on Environment and Development, 1987). The theme was meant to further reinforce the aspirations of the communities for their villages and plantations, and to highlight the importance of continuous improvement through lifelong learning and being learner-centred.

Cleanliness, health and importance of waste management were reiterated during the programme as these issues were mentioned many times by the government officers and villagers. Their focus on cleanliness and health could be that being healthy was their main concern, as improper management of waste could produce hazards to health (McKenzie et al., 2008, p. 451). In this research, creating awareness and knowledge among the villagers on issues related to waste management was a vital step towards improving their daily practices. As highlighted earlier, awareness and knowledge are key principles of community environmental education.

A panel discussion that included government representatives who had roles in environmental education and waste management was incorporated as part of the environmental education programme. They potentially had the ability to assist change in the local communities, as argued by Blair (2008, p. 49) that collaboration between relevant authorities, stakeholders and local communities could increase the success rate of a programme. The panel discussion was an attempt to address the existing waste management challenges encountered by the villagers in terms of lack of waste collection services and awareness of guidelines.

To emphasise the connectedness of awareness, attitude and responsibility to act, the presentation during the programme included highlights of current initiatives in waste education and other community environmental programmes in Sabah. The importance of community empowerment was also reiterated to the villagers. The

connectedness of awareness, attitude and responsibility is strongly linked to the gist of the *Tbilisi Declaration* about fostering clear awareness on the holistic aspects of the environment, providing opportunities to acquire knowledge, values, attitudes and commitment, and finally creating a new pattern of behaviour towards environmental protection (UNESCO, 1978, p. 26). Being responsible together for the environment is about environmental stewardship. Various sectors of society make choices that reflect their sense of responsibility and therefore, their actions could affect environmental quality (EPA Innovation Action Council, 2005).

From an educational approach, the overall development of the environmental education programme attempted to address the attitudinal and behavioural barriers and lack of knowledge in improving waste management practices among the communities in Lawa and Lupak. Addressing the barriers could effect change in practices among the communities.

8.2.4 How do local communities respond to the implementation of a co-constructed waste education programme?

The final stage in this study was to evaluate the implementation of the co-constructed education programme. It aimed to understand how the local communities responded to the implementation of the programme.

In discussing how the local communities responded to the programme implementation the following structure is used:

- Usefulness of the programme
- Inconsistency of ideas
- Creating a social movement
- Lack of leadership
- Lack of services
- Challenges of change

8.2.4.1 Usefulness of the programme

Based on the findings from the evaluation survey and post-programme interviews with the villagers, the environmental education programme seemed to have

benefited them. There were favourable perceptions about ways to manage waste properly. However, the villagers also stated knowledge dissemination to other people in the communities was important to create a greater impact. The findings have highlighted that the villagers thought it was more crucial to share environmental information with family members first. However, no further evidence could be derived from the data about any sharing that actually occurred with other members of the communities.

Although the villagers found the programme useful, appropriate and important, they indicated conducting only one programme was not sufficient because they felt that constant reinforcement was needed through follow-up activities. This indicates that post-programme actions or resources are important reminders of any intentions to adopt environmentally-responsible behaviours (Ballantyne & Packer, 2011, p. 201; International Union for Conservation of Nature and Natural Resources, 1980, sec. 13).

During the panel discussion, the villagers indicated their aspiration to live without the impacts of pollution. They also highlighted current key waste challenges faced in their villages. The panel discussion presented an appropriate avenue for the local communities and government representatives to discuss and find solutions to waste management issues encountered by the local communities. The outcomes of the panel discussions indicated the usefulness of such programmes as an avenue to create rapport and collaboration between the communities and relevant government departments, and could pave the way for potential collaboration in the future. However, at the time of the post-programme interviews with some of the villagers, further collaboration with the relevant government departments had not materialised. Collaboration is one of the key principles of community environmental education as highlighted in Chapter Two. The literature also highlighted that for any environmental-related programmes to be effectively implemented, involvement and co-operation from local authorities or other bodies is imperative. As stated by Tilbury and Wortman (2008, pp. 89–90), “government agencies, particularly at federal and state levels, where most funding originates, can play a significant role in realigning community education by shifting existing funding to support more learner-centred, action-oriented, futures-focussed, and holistic programmes”.

8.2.4.2 Inconsistency of ideas

Based on the findings, there was an issue of inconsistency between awareness and what was known. For example, while the majority of the villagers did not think waste was thrown into the river, some felt that it did happen or were unsure. This inconsistency may indicate that those who were involved in the survey might not be representative of those who throw things into the river. There was an interesting observation by one of the villagers who was interviewed after the programme implementation. Azizah, who seemed to be a strong advocate for a clean environment and had given positive remarks about the environmental education programme, contradicted her own awareness by stating that when waste got stuck in front of her house by the river, instead of removing it, she pushed it back into the river. There appeared to be a gap between awareness and behaviour in this case. The findings from the evaluation survey also indicated that there was an inconsistency in the villagers' responses on their willingness to contribute time and effort in improving waste management. This finding could be based on what Crompton (2010, pp. 8–9) has stated about how people make decisions based on either the intrinsic or extrinsic values they hold, of which some values are more significant than others at motivating people to engage with bigger-than-self problems, such as environmental protection through improvement in waste management. However, some villagers did express willingness to improve their own waste management practices. As highlighted by Hines et al. (1987, p. 7), a person who has positive attitudes and a sense of obligation towards the environment could also be discouraged from taking actions due to situational factors. In the case of Azizah, it could be at that point in time, she was presented with an opportunity that was easier and more convenient for her to push back the waste into the river, rather than removing it and taking it to the town rubbish centre.

8.2.4.3 Creating a social movement

Based on the post-programme interviews, some of the villagers also seemed to experience challenges in persuading and engaging other villagers to improve waste management practices, due to a lack of interest. This is one of the challenges in community education. There are “many reasons, based on shortcomings or fears, which prevent people from participating in a community”

(Skinner, 2009, p. 90). Dalziel et al. (2007, p. 25) summarised the key barriers that stop people from participating as lack of time, fear, confidence, lack of incentives and motivation to contribute. In the context of this research, convincing other villagers seemed to be a difficult process and appeared to demotivate the villagers who were initially motivated in improving waste practices in the communities.

Social movement towards change could occur when education reaches out to people from all levels of society, and by enabling individuals to become active citizens and agents for social change (Bates & Lewis, 2009, p. 24; Clover, 1996, p. 93). Social movement is about engaging and involving the rest of the community towards specific causes such as improving waste management. The most ideal situation is to involve the whole village to participate in a community environmental education programme. However, this process is impractical because of space limitation or it could be ineffective to convey clear messages to a large group of people. Therefore, empowering a smaller group to be agents of social change could be a better alternative, although this did not appear to be successful in bringing about change in this research.

8.2.4.4 Lack of leadership

The villagers indicated the importance of guidance and leadership from government departments and politicians to improve waste management in local communities. It was indicated by the government officers that the solid waste management training that has been conducted for some community leaders would be conveyed to other villagers. The emphasis by the communities on leadership is in line with one of the key principles of community environmental education which highlighted that consistent leadership is critical to guide and motivate people. Community environmental education is characterised by being local, collaborative, informed and active to be effective, and that the most effective environmental education projects are created in response to local concerns and consistent leadership (Andrews & Entine, n.d.). However, the lack of environmental leadership or access to decision makers was identified as one of the challenges in promoting environmental behaviour (Smith & O'Sullivan, 2012, p. 484). There is a need for bolder leadership and active engagement with the

communities when dealing with specific problems (Crompton, 2010, p. 8). In the context of this research, there seemed to be a lack of guidance and motivation from existing community leadership to improve waste management. On the other hand, it could also be that the leaders felt limited by the administrative barriers of their jurisdiction as village leaders, for example, they could not intervene in the decisions of local council but could only suggest or request waste collection services.

8.2.4.5 Lack of services

The reported lack of environmentally-friendly options such as waste disposal and recovery facilities and services, as well as alternatives for proper disposal in their villages, was a serious concern among the villagers. Unfortunately, even after paving the way for an opportunity to collaborate through the panel discussions, the local council has yet to provide waste collection facilities to the villages or implement any educational activities at the time of the final post-programme follow-up interviews in November 2014. However, despite the limitations, some of the villagers were already being resourceful by looking for alternatives such as taking garbage bags to the town centre's collection bins. At the time of planning for data collection in early 2013, the area chosen for this research was still located outside the rated area of Beaufort District Council. According to a report prepared by Chemsain Konsultant (2007c, p. 12), "collection of solid waste is limited by the distinction between rated and unrated areas" in Sabah and this is due to challenges such as lack of manpower and transportation facilities.

There was also an initial proposal by some of the villagers for a new committee that deals specifically with waste management or to improve the operating mechanism of existing teams in the local communities. However, this had not been established at the time of post-programme interview in November 2014. This could be due to the lack of motivation and the failure to translate the intentions into real actions, a transition that has been noted as problematic in the past (Ballantyne & Packer, 2011, p. 201).

8.2.4.6 Challenges of change

Based on the evaluation survey, most villagers agreed that waste management in their village or plantations could be improved. As a general response from the communities about change in attitude and waste management practices after the programme implementation, they indicated that it was slow to progress. Even a year after programme implementation, change seemed to be happening slowly and impacts of the programme appeared to be short-lived. It seemed that changes at a personal level were easier to effect than at a community level. There were mixed efforts at the village level, and some reported changes in the plantation management such as proper use of pesticide and proper disposal of waste and cutting the fronds into pieces to make compost. Significant changes in structures, attitudes and values are required to attain sustainable communities (Roseland, 2012, p. 307) which requires persistence and can take a long time (L. Brennan & Fien, 2013, p. 263). However, transformation of behaviour is still the ultimate aim of any community environmental education because being educated is about the ability “to learn, to adapt, to reason and to change” and not just possessing knowledge or understanding (Bates & Lewis, 2009, p. 43). As highlighted in the *Tbilisi Declaration*, one of the goals of environmental education is to “create new patterns of behaviour of individuals, groups and society as whole towards the environment” (UNESCO, 1978, p. 26). Fagan (1996, p. 147) also reiterated that education is “a process not a place”, and is about “stretching the boundaries of comfort, change and challenge”. Although changing behaviours takes time, strategies need to be implemented, reflected upon and revised until significant changes can be observed. To effect change, individuals or groups within a local community need to be make a conscious decision to improve waste management in their village, because any actions would depend on one’s conscious decision to act and “should be directed at solving a problem” as well being responsible for the actions taken (Jensen, 2002, p. 326; Jensen & Schnack, 2006, p. 483).

Based on the findings from the post-programme interviews, some of the villagers suggested possible ways to effect change such as distribution of awareness resources, village leaders taking a more significant role in the community on waste issues, a follow up waste programme in the villages, a committee to discuss waste problems and more hands-on activities. The villagers’ suggestion to distribute awareness materials is supported by the study of Ballantyne and Packer

(2011, p. 201), who suggested post-visit action resources were important to remind visitors of their intentions to adopt environmentally-responsible behaviours. Another example to address the issue of resources is through website development by incorporating various types and sources of information that are of interest to the local communities (Aguayo, 2014, p. 397). However, it may not work in the particular community involved in this research because internet connection seemed limited. The impact of the poster about waste management prepared and distributed to the villagers involved in this research was not known. The suggestion to conduct follow up waste programmes in villages was also supported by literature that stated “the need for environmental education is continuous because each new generation needs to learn for itself the importance of conservation” (International Union for Conservation of Nature and Natural Resources, 1980, sec. 13). However, the follow up waste programmes need not necessarily be conducted by external organisations when the community is empowered enough to conduct its own.

Most of the smallholders also indicated that change in waste management practices should start at home, then in plantations. The priority given for home over plantations indicated the values and importance of families, instead of work.

To summarise and respond to the main research question “how can an environmental education programme on waste management practices be developed with local communities in Sabah?”, a waste education programme was co-constructed and implemented in the villages based on the literature and data gathered in the process of understanding the perceptions, needs and current situations of community waste management through the lenses of the government officers and local communities. Although the programme was implemented and the communities responded positively to a certain extent, some limitations were found.

This leads to a discussion of the relevance and practicality of the key principles of community environmental education derived from the literature in the light of the implementation of the waste education programme.

8.2.5 The relevance of the community environmental education theoretical principles

This research has developed a short term programme aimed at empowering the local communities through the perspective of environmental education to facilitate the process of improving their waste management practices. The combination of theoretical elements of community environmental education derived from the literature guided the development of the programme.

As this research dealt with adults within communities, the theoretical principles of environmental education together with community education derived from the literature were combined to develop the environmental education programme with and for the communities. In the context of this research, the term community environmental education was defined as a process to empower communities, to impart and instil knowledge, skills, attitudes, motivations and commitment among the communities to work towards environmental solutions and problem prevention in order to live sustainably. The relevance and practicality of the key principles of the community environmental education model, as shown in Figure 8.1, were analysed throughout the programme development process. All things considered, it is concluded that some aspects of the theoretical model were relevant and effective and others were less so.

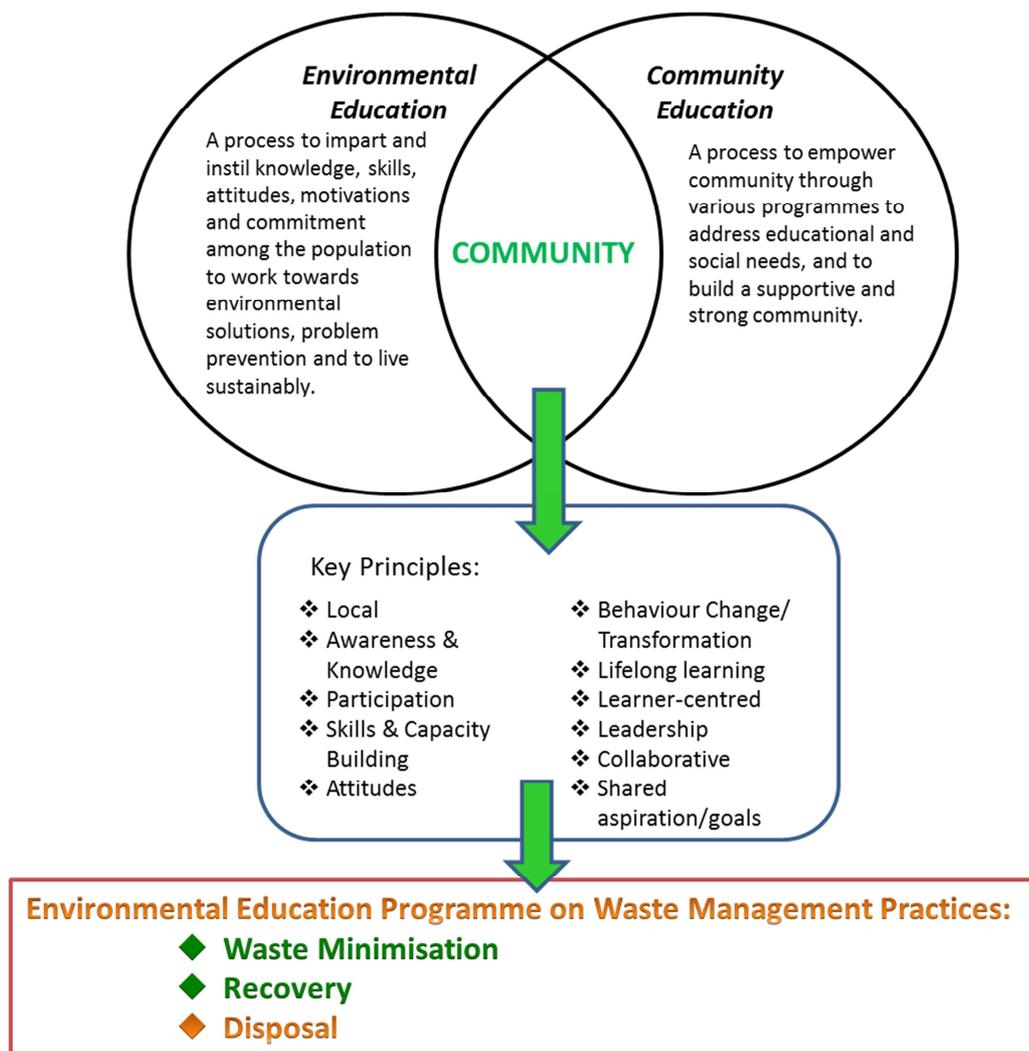


Figure 8.1 Overall model of environmental education on waste management practices with local communities

There was evidence that being local, creating awareness and knowledge, encouraging participation, and having shared aspirations and goals were effective in the process of programme development and implementation in this research. The model was effective in terms of being local because the environmental education programme development and implementation acknowledged the villagers' ideas through co-construction, it was bounded by local context and was responding to local environmental issues (N. Taylor, Littlelyke, et al., 2009, p. 325; Tilbury & Wortman, 2008, p. 84; Young & McElhone, 1986, pp. 1–2). The environmental education programme also attempted to create a connection between local issues and the global phenomena (Fagan, 1996, p. 147) by showing the villagers the bigger picture of impacts of pollution. However, the long-term

impact of whether the villagers clearly understood the connection between local and global issues was not apparent during the research.

Creating awareness and improving knowledge, another key principle in community environmental education, was the core activity in the research through devising and implementing the programme. In the context of the research, it was a highly important process to create awareness and knowledge (UNESCO, 1978, p. 28; UNESCO Institute for Education, 1997, p. 5; United Nations, 1992, Chapter 36.5.k) about waste and its impacts to the environment and society. The principle was relevant as one of the key reasons of the educational programme was to create awareness and improve knowledge, and the villagers seemed to have gained information about waste and its impacts during the programme implementation. However, it was revealed through the findings of the research that in order to bring about long-term behavioural change, other factors need to be taken into account, such as barriers to positive actions and provision of waste infrastructure. Intrinsic and extrinsic values need to be acknowledged as well as the use of tools such as social norms and prompts.

The importance of community environmental education has been emphasised in many global environmental documents such as the *Tbilisi Declaration* and *Our Common Future* (UNESCO, 1978, pp. 26–27; World Commission on Environment and Development, 1987, pt. II). In this research, community involvement began when they were invited to participate in the community survey and focus workshop. Through the programme, the villagers were given an opportunity to participate in discussions and in the evaluation survey post-programme implementation. Although participation was encouraged strongly throughout the research, the decision to actually engage and participate actively depended on the villagers. For example, 100 villagers were invited for the community survey but only 37 attended to complete the survey. As Clayton and Myers (2009, p. 189) and E.W. Taylor and Caldarelli (2004, p. 452) have argued, participation is about the readiness of the community to be part of the programme as it is a voluntary participation in the case of community environmental education. Therefore, when engaging with communities, one of the fundamental steps is to explore their readiness to participate in any programme. This could give an indication whether there are barriers to participation such as lack of time, fear,

confidence, lack of incentives and motivation to contribute (Dalziel et al., 2007, p. 25). In this research, the attempt to explore the villagers' readiness to participate was carried out in two ways. Firstly, a brief situational analysis was conducted prior to the commencement of this research. Although the visit to the villages and discussion with three villagers were brief, there was an indication that a community environmental education programme could be carried out in the villages through this research. The situations were appropriate for a waste programme to be conducted because the villages were outside the rating area of the local authority, and rubbish was observed along the river and road during the visit. Secondly, another indication was gauged in the community survey in which the villagers had concerns about a clean environment and the majority were willing to participate in an environmental education programme.

Participation was also observed when the villagers were presented with an avenue to discuss their shared aspirations or goals that were practical and achievable for their communities, which could enable them to work better together. Living within a community with a mutually supportive web of relationships with shared values and identity, collective actions would be required to achieve shared goals (Andrews et al., 2002, p. 166; Etzioni, 1996, p. 127; Sarason, 1974, p. 1). While this key principle was relevant in this research, strong community co-operation was not observed. Although they agreed on a shared aspiration and goal during the focus workshop, the commitment of the community was not clearly apparent; although a few villagers seemed to have strong, favourable views and perceptions towards the environment. In retrospect, there was a need to understand the communities' priorities for their villages and whether they were ready to embark on changes as a community. In addition, the programme was not entirely successful in gaining commitment from all the villagers because it was limited by time and no follow-up activities were conducted. Follow-up activities are always relevant in any environmental programmes, although in different ways. For example, if a community is already self-sustaining, a follow-up approach could be as simple as connecting with them through text messaging to find out progress. On the other hand, if a community is still needing technical support or advice, a face-to-face interaction would be more appropriate.

The key principles of lifelong learning and learner-centredness were encouraged in the workshop, especially when highlighting the importance of continuous learning. Self-directed learning was shown to have a significant role in lifelong learning (Merriam et al., 2007, p. 124) and in the context of this research, it was about keeping abreast with new information and current developments, even after programme implementation. The learner-centredness approach such as educators having consistent efforts to assess interest and needs of the learners (E. W. Taylor, 2006, p. 299) were addressed in this research by being mindful of the villagers' interests and needs related to waste management. For example, the villagers were encouraged to discuss their concerns about waste issues. Although these principles were relevant to this research, the actions related to individual continuous learning after the programme could not easily be determined given that environmental education is a lifelong process (Clover, 2000, p. 214; Stevenson & Stirling, 2010, p. 232). Longitudinal research work emphasising lifelong learning and learner-centredness in community environmental education could shed more light on how people might continue learning beyond programme implementation.

Behavioural change and transformation is the ultimate aim of any environmental education programme, as emphasised in the *Tbilisi Declaration* and other literature. In the context of this research, in terms of attitudes and behaviour change, as mentioned earlier, positive personal changes were reported, but as a community, changes were not evident. The principle of behavioural change and transformation was foundational, but transformation of behaviour as a community could not be determined fully within the period of this research. This situation was expected because of the limited timeframe of the research to conduct more than one intervention that was comprehensive and inclusive. It was also difficult to determine any forms of behavioural change at a community level because not all the villagers who responded to the evaluation survey were interviewed. The effort to effect change in waste management practices could be demanding for the villagers if they had other priorities to deal with.

Consistent leadership is one of the theoretical principles of community environmental education derived from the literature. In the context of this research, this principle was highly relevant; however, the results indicated that leadership

was present in the communities but in terms of waste management, it seemed to be weak. It could be that the leaders did not feel empowered enough to make changes in their village due to several reasons such as lack of time, limited administrative power and having other priorities in the village development. In retrospect, it would have been a helpful strategy to identify relevant village leaders and engage directly with them in the beginning of the study. This would have assisted to identify the barriers and challenges encountered as a community leader.

Collaboration is another key principle of community environmental education. In relation to this research, initially, collaboration seemed to be promising between the local community and relevant departments as was apparent during the panel discussion. However, it appeared to lose focus and momentum after the programme implementation as evident from the information gathered during the interviews with villagers in March/April 2014. The experience of this research was in contrast with the Coast Care Bay of Plenty case study which had successfully used the elements and characteristics of community development, community education and community-based environmental education, such as local participation, and collaboration, to produce effective outcomes of their environmental programmes (Blair, 2008, p. 45). The differences between this research and the Coast Care programme was that it was administered by two full-time skilled facilitators, and a strong collaboration between all statutory bodies was present. However, this research had a similar challenge to the other case study – Welcome Bay Catchment Care Group – in which there was an initial lack of support from major stakeholders. A successful collaboration could be impeded by a lack of support, lack of understanding, lack of vision or a low priority is given by the relevant authorities. As argued by Blair (2008, p. 50), a statutory authority still has a major role to empower citizens with appropriate skills and knowledge to take action for the environment. Although effectiveness of collaboration could not be ascertained at an early stage during a programme implementation, initial networking with the local communities and the relevant government departments could identify key persons who might potentially work well together in the long-term.

One of the research limitations was that skills and capacity building was not incorporated well into the educational programme design. Although it was important for communities to acquire skills to identify and solve environmental problems (UNESCO, 1978, pp. 26–27), the timeframe for the educational programme provided limited opportunity to acquire skills in waste management, for example hands-on activities (E. W. Taylor, 2006, p. 299) such as making compost effectively, managing empty pesticide containers or problem-solving workshops. The panel discussion provided an avenue for initial problem-solving discussion but not in-depth discourse on how to solve the waste management problems in the villages. The main constraint was limited time for the programme; in hindsight, more follow through may have helped to further engage that process. The initial favourable responses by the villagers gave an indication that further programmes post-research could be carried out in the future.

Based on the critique of the theoretical model, it can be concluded that it was possible to co-construct an environmental education programme with local communities; as in the case of this research, the villagers responded favourably. As explained in this section, there was clear evidence that the programme made a difference in the short-term. However, long-term outcomes of the programme were not apparent. It remains possible but untested here that the theoretical model could work effectively if all principles could be emphasised well in various stages of the programme design and implementation.

This critique of the theoretical principles and their application to this research leads to a refined model of community environmental education presented in the next section.

8.2.6 Community environmental education model

By combining the experiences, limitations and lessons in the programme development process in this research together with the theoretical principles, a model of community environmental education was derived, as shown in Figure 8.2. Although limitations have been observed in the programme development process in the context of this research, this model could be used to improve the education delivery to better educate local communities not only on waste

management but also in other environmental-related programmes in the communities. The model is described in the following sub-sections.



Figure 8.2 The community environmental education model derived from the research

8.2.6.1 Getting to know the community

The model illustrates the importance of local context and participation, and identifying the assets and strengths of communities in the beginning of the programme development. This is a process to get to know the community, gauge their perceptions, needs and current situations and acknowledge their ideas. Apart from their perceptions of waste management and the environment, the community survey must also address their perceptions on the connection between local issues and global phenomena. A community survey is carried out to find out more about their demographic background, perceptions about the environment or other issues occurring in their communities, and their current environmental practices. Apart from community surveys, building relationships is one of the vital elements for an effective engagement with the communities. One of the ways is to identify relevant village leaders and engage directly with them in the beginning of the study to identify the potential barriers and challenges encountered as a community leader. Some key elements of the asset-based community development, which

were not able to be tested during the research but considered critical, are included in this model.

The prerequisite to this stage is the initial interest, readiness and willingness shown by communities to participate or increase their awareness of environmental issues. Barriers to participation are identified at this stage. These processes are carried out through initial consultation with village leaders as protocols are important in communities. The recruitment of participants in any programme could be carried out based on consultation with village leaders or the Village Development and Safety Committee. The communities' priorities for their villages are identified to ensure that majority will focus on the shared aspirations and changes that need to be done later on.

8.2.6.2 Co-construction process

Being bound by local context, the co-construction process together with the communities is a vital step in developing a programme. A comprehensive co-construction process that includes deeper interactions, dialogues and critical reflections (Smidt, 2014, pp. 22–23) about strengths, assets, opportunities, needs, barriers, shared aspirations, physical space, institutions, local economy and aspiration are important to obtain a holistic perspective of the community. Acknowledging that time is a limiting factor, the process of co-construction needs to be given emphasis in the time schedule of programme development with communities.

Among the ways that a co-construction process could occur is through a discussion, dialogue or focus workshop whereby participants could carry out brainstorming and conversations in a less formal way. These avenues provide an opportunity to discuss the key elements of co-construction process highlighted above and possible programme contents that need to be agreed upon among villagers and educators. It is worthwhile to study the group's background in terms of culture and relevant local practices in order to avoid any misunderstandings or conflict. Further dialogues and critical reflections could be carried out until strengths and assets, problems, needs and aspirations are identified.

8.2.6.3 Programme planning and development

The programme is planned and developed based on the data collected in the community survey and focus workshops. Data collected are analysed, and key findings are used to develop the community environmental education programme. An evaluation survey is prepared beforehand and the survey is carried out after programme implementation. If required, interviews are carried out to gather more feedback on the short-term impact of the programme.

The implementation of the programme could include but not be limited to activities such as workshops, panel discussions, demonstration and other relevant activities that are deemed appropriate to improve awareness and knowledge and build capacity among the communities.

8.2.6.4 Conduct post-programme evaluation

The post-programme evaluation could be carried out through an evaluation survey, interviews, discussion or reflections. This is a process to obtain feedback on the process to enable educators to refine and respond to any concerns.

If there is a need to conduct a follow-up programme after the evaluation, the programme takes into account concerns raised during the evaluation process. Based on the evaluation, there might be a need to follow through with further reflections, dialogues and planning with the communities. This has the elements of participatory action research which emphasises the processes of reflection, observation, planning and action. As Grundy (1987, p. 145) explained, reflection “looks back to previous action through methods of observation which reconstruct practice so that it can be recollected, analysed and judged at a later time” and it also “looks forward to future action through the moment of planning”. In the context of environmental education in Sabah, the way forward would include more emphasis than before on the evaluation process of each implemented programme.

8.2.6.5 Collaboration and leadership

As shown in Figure 8.2, collaboration and leadership occur throughout the whole process. The presence of consistent leadership in any community is critical to

guide and motivate villagers. However, limitations of the power of village leaders to effect change are identified. When limited in power, collaborating with other parties could help achieve the goals of communities.

Collaboration with other organisations is as important because villagers could gain technical advice or financial assistance from relevant organisations. Any problems that may arise in terms of collaboration need to be highlighted and rectified. Initial networking with the local communities and relevant government departments could assist to identify key persons who might potentially work well with the communities in the long-term.

8.2.6.6 Lifelong learning and learner-centredness

In a particular community that has gone through the process of programme co-construction, the implementation of programmes by external organisations could eventually be reduced. Lifelong learning and learner-centredness are emphasised at this stage to encourage continuous learning and improvement individually, and as a community. Follow-up discussion and dialogues amongst the villagers could be carried out to encourage one another, or the communities could conduct their own programmes relevant to the needs at a particular time.

8.2.6.7 Empowered and self-sustaining community

The overall aim of any community environmental education process is transformation of behaviours towards an empowered and self-sustaining community. Being empowered holistically in terms of a strong relationship with each other, awareness, knowledge, behaviour and lifestyle change towards sustainable living is the ultimate goal. When a community's assets and strengths are nurtured, it could lead towards a self-sustaining community. In the context of environmental protection, a self-sustaining community would be able to make informed and appropriate decisions about how the people manage issues such as waste management, river protection or resource management within their community. By drawing on the assets and strengths of individuals in the community, for example expertise in composting or knowledge of managing pesticide containers in the plantations, the community is able to empower its members.

As highlighted earlier, through the findings of this research, it is possible to co-construct an environmental education programme with local communities. The development of an environmental education programme with the local communities through this research has opened a pathway for the communities to consider other alternatives to their waste management practices, including the possibility of creating collaboration with relevant stakeholders. This community environmental education model can be customised according to the local context and needs of the community.

8.3 Conclusions

Having discussed the findings in relation to the research questions and the theoretical principles of community environmental education, there are eight key conclusions to be drawn from the research with regards to community environmental education in Sabah, Malaysia.

1. The local communities had a genuine concern for the environment and desire to improve their waste management practices. However, they seemed to lack knowledge of environmental and waste management issues.
2. An attitude-behaviour gap was observed in the community members. It appeared that villagers appreciated a clean environment but showed uncertainties, and a lack of action, motivation and willingness to take the opportunities to improve their waste management practices. Factors such as lack of knowledge, emotional blocking of new knowledge, existing values prevent learning, lack of internal incentives, lack of external possibilities and incentives, lack of environmental consciousness, old habits, social pressure, economic constraints, and the amount of effort required appeared to impede translation of intentions into actual actions.
3. The local communities did not seem to be governed by any waste management regulations, while the smallholders had a vague awareness of the guidelines. The lack of enforcement of waste management regulations

in the communities could have caused the lack of concern and interest among the villagers about the significance of waste regulations.

4. The lack of waste collection services in the local communities has also affected their waste management practices. Availability of these services could provide support in improving waste management in the community, apart from individual's personal practices at home or their resourcefulness to take garbage bags to the town centre's collection bins.
5. Change in attitudes and behaviour seemed to be progressing slowly. However, changes on waste management practises at a personal level were easier to effect rather than as a community. Although creating change through education is a long-term process compared to the immediate impact of enforced regulation, the educative impacts are more lasting when environmentally-responsible behaviours are practised daily. Education enables local communities to become active citizens and agents for change provided the choices they make everyday are focussed towards environmental protection that could strengthen environmental stewardship. Alternatives that could be taken to encourage actions are by using community-based social marketing, acknowledging the influence of values and culture and by developing action competence.
6. The research indicated a tendency towards pro-environmental behaviour motivated by other goals; in this case, monetary gains or incentives. Other motivations to bring about change in a community could be identified. At the same time, the long-term economic benefits of a clean environment could be explained to the community.
7. The focus on a healthy environment, such as the importance of biodiversity and the issues of sustainability, are relevant in any environmental education programmes to create better understanding and awareness of the bigger picture of sustainable development. This could address both local and global environmental issues.
8. The theoretical principles of community environmental education model derived from the literature in this research - being local, awareness and knowledge, participation, skills and capacity building, attitudes,

behavioural change and transformation, lifelong learning, being learner-centred, leadership, collaboration and shared aspiration and goals – provided useful guidance but the implementation of the model had various constraints that need to be considered. The value of practically testing the theoretical model in the field lead to the refinement of understanding and implementation of community environmental education.

While acknowledging the challenges in the current processes and practices for community waste management, this research concludes that co-constructing an environmental education programme with local communities is meaningful when it takes into account the needs and expectations of the communities and current issues they face.

Through this research, the gap in literature about the smallholders' perceptions of the environment and waste management practices in Sabah was addressed to a certain extent by the contribution of data and findings. Before this research was carried out, the local communities did not appear to have been involved in the unique process of co-constructing an environmental education programme; therefore, this in itself is a contribution to the field of environmental education in the state. Acknowledging that there is no 'one-size-fits-all' solution to waste management challenges, the testing of the theoretical model in the field has resulted in a community environmental education model that could be further implemented and customised by other environmental educators in Malaysia.

8.4 Implications and Recommendations

The conclusions outlined in Section 8.3 raise some implications of this research for community environmental education in Sabah, Malaysia, and some recommendations are presented based on these.

1. Empowering communities

Implication: Community environmental education efforts to create awareness about the environment, including knowledge of regulation and connectedness between local and global issues, should focus on

empowering the communities towards environmental action and strengthening environmental stewardship.

Recommendation: The government, the private sector and non-governmental organisations that have roles in environmental education should focus more on empowering the people to act rather than just conducting programmes and creating awareness in the short-term. This would entail engagement and creating rapport with the communities by giving and improving knowledge, and providing skills for decision-making and problem-solving towards self-sustaining community. Nurturing a community's assets and strengths could also lead to a self-sustaining community that is able to deal with local issues and manage their resources wisely. Drawing on the strengths of community members and being able to share the knowledge or expertise with others could further empower the community. Although this holistic process requires time and funding, it is the way forward to further improve environmental education as aspired to in the *Tbilisi Declaration*.

2. Motivation to change

Implication: Attitudinal and behavioural changes take time but it is important to consider factors that would encourage and motivate the local communities to change and to narrow the attitude-behaviour gap.

Recommendation: Researchers should conduct more studies in exploring the motivations of people to change their attitudes and behaviours towards the environment in various contexts in Sabah. Findings from such studies could then be used by the government, the private sector and non-governmental organisations with roles in environmental education to further improve the effectiveness of their programme implementation.

3. Provision of waste collection services

Implication: The lack of waste collection services affected the local communities' waste management practices. They indicated that it was crucial for the local authority to expand its rating area and provide waste collection services to the communities.

Recommendation: It is crucial for the local authority to invest in funding an effective waste management system as a long-term health benefit strategy. If funding is a limitation, the local authority could collaborate with the private sector in the district. Health-related issues due to impacts of unmanaged waste could be reduced when an effective waste management system is in place. This waste management system could include a proper disposal site, schedule waste collection for plantations, waste collection for communities and a mechanism to enable the villagers to practice recycling. Therefore, provision of effective waste collection services together with promoting awareness and appreciation towards the availability of services are more likely to result in better waste management in local communities.

4. Relevance of using a model

Implication: The refined model presented in Section 8.2.6 is relevant to community environmental education in Sabah, Malaysia.

Recommendation: The principles within the refined model need to be emphasised in various stages of the community environmental education programme design and implementation. The community environmental education model derived from this research could be utilised and customised according to local conditions by other educators.

8.5 Suggestions for Further Research

This research has contributed to the study of community environmental education focussing on waste management practices through the programme development process. This section presents some suggestions for further research that could be undertaken under the broad topic of community environmental education. These suggestions are as follows:

- A study of the effectiveness of the process of community empowerment towards environmental protection based on the model derived from this

research. The outcome of this study could further improve community environmental education by taking into account the strengths, challenges, local conditions, time limitation and other factors that could enhance or impede successful implementation.

- A study to evaluate the process of narrowing the environmental attitude-behaviour gap in communities and assessing factors that could change behaviours in different cultures, settings and pressures. This study could further consider the reasons people are unwilling to change and what would genuinely encourage and motivate them to do so. For example, addressing issues whether their cultures encourage or impede changes in environmental behaviours, or whether personal or societal pressures prevent them from making changes. The outcome of this study could help other communities or educators to evaluate their own processes and explore alternatives to improve.
- Research on the tipping point of communities from having pro-environmental behaviour to being environmentally-responsible. This research could be a longitudinal study to observe phases when communities see beyond monetary or other incentives to fully embrace responsibility purely on environmental values. A comparison between rural and urban communities could be carried out to further explore this transition.

It is evident in this thesis that it is possible to co-construct an environmental education programme on waste management practices together with local communities. Although the process requires time, it is meaningful because it prioritises the strengths, assets, needs and expectations of the communities and current issues. While acknowledging the challenges in community environmental education and the provision of waste collection services, especially in a developing country like Malaysia, working with the local communities towards improving waste management practices could empower the communities to take action and take ownership of waste management practices in their villages. While this research is a small contribution to the field of environmental education in the

country, so much more remains to be done in terms of research and practices to effectively improve the delivery of environmental education. Engagement with, and empowerment of, the local communities is the way forward for strengthening environmental stewardship and community environmental education in Malaysia.

Appendix A: Ethical approval

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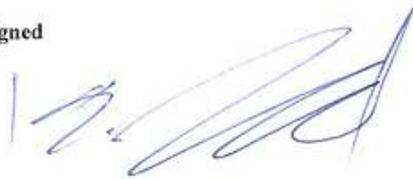
To: Susan Pudin
Date: 24 ~~Nov 2012~~ Oct 2012
From: Dr Karsten Zegwaard
Subject: Ethics Sub-committee Report on Ethics Proposal

The Faculty of Science and Engineering Human Research ethics sub-committee has considered your proposal Development of an Environmental Education Programme on Waste Management Practices with Local Communities in Sabah, Malaysia

The proposal as attached is approved. If you wish to vary the terms of the approved application in any way, please contact me to request an amendment.

We wish you all the best with your research!

Signed



Appendix B: Ethical approval for amendment

Dr Karsten Zegwaard

Chair, Human Ethics Committee
Faculty of Science and Engineering
Te Pōtaiao me te Mātauranga Pūkaha
The University of Waikato
Private Bag 3105
Hamilton, New Zealand

Telephone 64-7-838 4892
Email k.zegwaard@waikato.ac.nz



To: Susan Puddin
Date: 20-11-2014
From: Karsten Zegwaard
Subject: Ethical approval for amendment

Dear Susan,

The Faculty of Science and Engineering Human Research ethics sub-committee had approved your earlier ethics application in October, 2012, for your proposal on *Development of an Environmental Education programme in Waste Management Practices in Local communities in Sabah, Malaysia*.

We have received your request for an amendment to the application. The Chair of the Committee grants approval for the amendment, within the conditions you have outlined in your request letter.

It is noted that it is difficult to obtain written consent and is under the circumstances understandable. It is requested that you make, where possible, cellphone contact and have the participants acknowledge that phone call, and grant approval, by responding using a text message.

Please note that in future you must obtain approval for an amendment before commencement of data collection.

Yours sincerely

Karsten Zegwaard
Chair
Human Ethics Committee
Faculty of Science & Engineering

Signed

Appendix C: Community survey (Stage one)

Waste Management Questionnaire

Section A: Demographic

1. Your gender (please tick one):
 - Female
 - Male

2. Your age group (please tick one):
 - Below 21 years old
 - 21 – 30 years old
 - 31 – 40 years old
 - 41 – 50 years old
 - 51- 60 years old
 - 61-70 years old
 - Above 70 years old

3. Your occupation (please tick any that apply):
 - Housewife
 - Shop owner
 - Oil palm smallholder
 - Other agricultural occupation
 - Construction worker
 - Teacher
 - Health worker
 - Other government occupation
 - Other (please specify): _____

4. Name of your village: _____

Section B: Environment

5. When you think about the **environment**, which of the following is part of that thinking for you? (please tick any that apply)
 - Forest
 - Countryside
 - Village or town area
 - River
 - Air
 - People

6. a. How important is the environment to you? (please circle your answer)

Not all important 1 2 3 4 5 Very important

b. Please explain why you think this way.

7. Waste is any material or substance that is thrown away or unwanted. Here's a list of statements regarding the environment and waste. Please tick the appropriate box to show your response.

No.	Statement	Response				
		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
B1	I don't believe it is my responsibility to care for the environment.					
B2	I believe that any environmentally-friendly actions I take would benefit the environment.					
B3	I believe we must keep our environment clean all the time.					
B4	I would like to take part in activities to care for the environment.					
B5	Waste reduction is important to reduce pressure on the environment.					
B6	Recycling is a better option than waste					

No.	Statement	Response				
		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	reduction.					
B7	Disposal of waste on the land can have impacts on rivers and oceans.					
B8	Burying waste in the ground is a safe way to dispose of it.					
B9	Putting waste in the river is acceptable because it all washes out to sea.					
B10	Burning waste is not a good way to dispose of it.					

8. How long do you think it might take these materials to break down in the environment? Please tick your response.

Material	Response				
	Less than six month	Between 6 months and 5 years	Between 5 and 10 years	Between 10 and 50 years	More than 50 years
Plastic bags					
Plastic bottles					
Aluminium cans					
Glass bottles					
Paper/Cardboard					
Food/Garden waste					
Fertiliser bags					

Section C: Waste management in my village

9. Are you aware of any policy or regulation on waste management for your village?
(please tick your response)

- Yes
- No

If yes, please explain what it is.

10. a) Is there a waste collection service provided by the local authority in your village?
(please tick one response per column)

Response	Domestic waste	Agricultural waste
Yes		
No		
Don't know		

If any of your answer is YES, go to 10b, if not, go to 11.

b) How often is waste collected in your village? (please tick your response)

Response	Domestic waste	Agricultural waste
Everyday		
Three times/week		
Once/week		
Other <i>Please state:</i>		

Do you use these waste collection services provided?

Domestic waste:

- Yes
- No

Agricultural waste:

- Yes
- No

If No, please explain why this service is not useful for you.

11. What types of waste are generated at your home? (please tick any that apply)

- Food waste
- Garden waste
- Animal waste
- Paper/cardboard
- Plastic bags
- Plastic bottles
- Glass bottles
- Others (please state:)

12. Is there a traditional method to dispose of waste properly and safely in your village?

- Yes
- No

If yes, please explain.

13. Here's a list of statements regarding general waste management in your village. Please tick your response.

No.	Statement	Response				
		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
C1	I like my village to be clean of waste.					
C2	My village is not always clean of waste.					
C3	Some people throw waste anywhere they like in my village.					
C4	Waste is thrown into our local rivers.					
C5	Bad smells from waste is a problem in					

No.	Statement	Response				
		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	my village.					
C6	Burning of waste in the open air happens in my village.					
C7	Dumped waste can cause health problems.					
C8	As far as I know, villagers practice recycling.					
C9	I believe oil palm smallholders manage waste properly in their plantations.					
C10	It is the government's responsibility to manage waste properly.					
C11	Villagers should work together to manage waste in the village.					
C12	Waste actually has value if it is well managed.					
C13	It takes too much time and effort to manage waste properly.					

14. If there are waste problems in your village, in your opinion, what are the worst problems?

15. a. Here's a list of statements regarding your own waste management practices. Please tick your response.

No.	Statement	Response		
		Never	Sometimes	Always
C14	I practice waste reduction by only buying what I need and using it all.			
C15	I practice waste reduction by purchasing goods with minimal packaging.			
C16	I practise waste reduction by buying durable products.			
C17	I practice waste reduction by donating and/or selling old items.			
C18	I reuse things.			
C19	I do composting at home (example: food waste, garden waste).			
C20	I recycle things (example: papers, aluminium cans, glass bottles, plastic bottles)			
C21	I throw waste wherever I want to.			
C22	I dig a hole and bury waste.			
C23	I put waste into the river.			
C24	I burn waste.			

b. If you recycle things:

- i. What do you do with these things?
- ii. What would help you to recycle more?

16. a. Do you think waste management can be improved in your village?

- Yes
 No

b. If yes, in what ways do you think it can be improved?

If no, why not?

17. What waste management practices would you like to change in your village?

18. Have you ever taken part in any environmental education activities related to waste management practices?

Yes (please tick any that apply):

- Cleaning up the rubbish in the village
- Learning how to compost kitchen/garden waste
- Attending environmental talks
- Cleaning up the rubbish from the river
- Others (please state):

No

19. Would you participate if there is an opportunity to learn how to manage waste better in your village?

Yes

No

If yes, how would you like to learn? (please tick any that apply)

Through:

- Hands-on activities
- Talks
- Information sheets
- Others (please state:)

Section D: Please answer this section only if you grow oil palm

20. Are you aware of any policy or regulation on waste management for oil palm smallholders?

Yes

No

If yes, please explain what it is.

21. What types of waste are generated in your plantation? (please tick any that apply)

- Oil palm fronds
- Pesticide and fertiliser containers
- Fuel containers
- Others (please state :)

22. a. Here's a list of statements regarding general waste management in oil palm plantations. Please tick your response.

No.	Statement	Response				
		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
D1	I believe waste on smallholders' plantations are well managed.					
D2	There are waste management problems on smallholders' plantations.					
D3	Some smallholders seem to just throw waste anywhere they like.					
D4	Waste from plantations is thrown in rivers.					
D5	Bad smells from plantation waste is a problem.					
D6	Unmanaged plantation waste can cause health problems.					
D7	The guidelines for disposing of fertiliser and pesticide containers are useful.					
D8	The guidelines for disposing of used fuel and/or its containers are not useful.					
D9	Open burning of waste happens in plantations.					

No.	Statement	Response				
		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
D10	The cost of managing waste in my plantation is high.					

b. In your opinion, what are the most difficult waste problems in the plantations?

23. a. Here's a list of statements regarding waste management practices in a smallholder's plantation. Please tick your response.

No.	Statement	Response		
		Never	Sometimes	Always
D11	I dispose of pesticide and fertiliser containers according to guidelines.			
D12	I dispose of used fuel and/or its containers according to guidelines.			
D13	I dispose of plantation waste properly.			
D14	I compost oil palm waste.			
D15	I throw oil palm waste wherever is convenient in my plantation.			
D16	I bury oil palm waste.			
D17	I dump oil palm waste into the river.			
D18	I burn oil palm waste.			
D19	I reuse old fertiliser/pesticide/fuel containers.			

24. Do you think management of waste in your plantation can be improved?

- Yes
- No

If yes, in what ways do you think it can be improved?

If no, why not?

25. Have you had any training on how to manage waste on oil palm plantations?

- Yes (please tick any that apply):
 - Composting organic plantation waste
 - Disposing of fertiliser, pesticide and fuel containers
 - Attending talks or briefing
 - Others (please state):
- No

26. What waste management practices would you like to change for your oil palm plantation?

Appendix D: Interview questions (Stage one)

Interview Session **June/July 2013**

1. How long have you been in this organisation, and what are your roles?
2. What do you think about waste management in Sabah? Is it important? Why/why not?
3. What do you think about the current situation regarding waste minimisation, recovery and disposal?
4. What are your organisation's current policies and regulations in waste management focussing on rural local communities?
5. What are your organisation's current policies and regulations in waste management focussing on independent oil palm smallholder plantations?
6. Who is responsible for implementing these policies and regulations?
7. What are the challenges faced in implementing those policies and regulations?
8. Why do think these challenges occur?
9. Are the policies and regulations working well, and why/why not?
10. What is your impression of how rural local communities and/or independent oil palm smallholders manage their waste? Why do you think this is so? Who should be responsible for waste management in these areas?
11. How do you think waste management practices in rural local communities and/or independent oil palm smallholder plantations could be improved? How would this happen?
12. How does your organisation convey waste management information to rural local communities and/or independent oil palm smallholder plantations?
13. What do you think the role of education should be in waste management?
14. How could education occur? Should it occur through formal, non-formal or informal environmental education, and if so, how? Is there a role for traditional knowledge in the education process?
15. What role do you think waste management should play in sustainable development in Sabah? Is there any role for traditional knowledge in this?

Appendix E: Focus workshop programme (Stage one)

Focus Workshop with Local Communities Programme

Date: 25 June 2013 (Tuesday)

Venue: Meeting Room, Farmers' Organisation Authority Office, Beaufort

Time	Activities
9:00 am	Registration
9:10 am	Welcoming address and briefing about focus workshop
9:20 am	Summary of preliminary findings of interview and survey <i>(highlighting present regulations of community waste management & smallholders' oil palm plantations, role of education, present waste management practices in villages and plantations, villagers' view on potential environmental education programme)</i>
9:45 am	Tea break
10:00 am	Discussion: <ol style="list-style-type: none">What can we do?What are the appropriate education strategies for the villages and plantations?Some ideas based on literature review on community waste managementDevelopment of an environmental education programme – venues, dates, list of activities.
12:15 pm	Conclusion
12:30 pm	Lunch

Appendix F: Evaluation survey (Stage two)

Evaluation Questionnaire

Section A: Demographic

1. Name of your village: _____

2. Your gender (please tick one):
 - Female
 - Male

3. Your age group (please tick one):
 - Below 21 years old
 - 21 – 30 years old
 - 31 – 40 years old
 - 41 – 50 years old
 - 51- 60 years old
 - 61-70 years old
 - Above 70 years old

4. Your occupation (please tick any that apply):
 - Housewife
 - Shop owner
 - Oil palm smallholder
 - Other agricultural occupation
 - Construction worker
 - Teacher
 - Health worker
 - Other government occupation
 - Other (please specify):

Section B: Environmental Education Programme

5. After experiencing the environmental education programme today, please respond to the following statements. Please tick the appropriate box to show your response.

Statement	Response				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
B1. The environmental education programme was beneficial for me.					
B2. I am now more aware of the importance of the environment.					
B3. I understand better the impacts of waste on health and people, plants, animals, rivers and oceans.					
B4. I understand that my community has an important role in improving waste management in own village.					
B5. I don't believe waste management in my village can be improved.					
B6. I will contribute my time and effort to improve waste management in my village.					
B7. I will not improve my own waste management practices at home.					
B8. I will share my experience to improve waste management					

Statement	Response				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
practices with other villagers.					
B9. I will continue learning how to improve waste management practices.					

6. Below are three options; please select either 6a, 6b or 6c and answer it.

6a. If you believe that waste management can be improved at your home and/or in your village, please list the actions you want to carry out to do this.

6b. If you believe that waste management can be improved at your home and/or in your village but you think it will be hard to make the changes, please explain why you think this.

6c. If you don't believe that waste management can be improved at your home and/or in your village, please explain why you think this.

Section C: For independent oil palm smallholders (please answer this section only if you grow oil palm)

7. After experiencing the environmental education programme today, please respond to the statements below. Please tick the appropriate box to show your response.

Statement	Response				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
C1. I believe waste management in my plantation can be improved.					
C2. I will not improve waste management practices in my plantation.					

Statement	Response				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
C3. I will share my experience to improve waste management practices with other smallholders.					

8. Below are three options; please select either 8a, 8b or 8c and answer it.

8a. If you believe that waste management can be improved in your plantation, please list the actions you want to carry out to do this.

8b. If you believe that waste management can be improved in your plantation but you think it will be hard to make the changes, please explain why you think this.

8c. If you don't believe that waste management can be improved in your plantation, please explain why you think this.

Appendix G: Post-programme interview questions

(November 2013)

Evaluation Interview

Date:

Time:

Venue:

Name of respondent:

Village:

Pseudonym:

(Note to respondent: Interview to be audio-recorded).

1. It is now two weeks since the implementation of the environmental education programme on waste management practices. How do you feel about the programme?
2. Has your participation in the programme made any difference to your perceptions of waste management?
3. Have you shared anything you learned in the waste education programme with your family members and/or friends?
 - a. If yes, have you seen any change in what they say or do about waste?
 - b. If you haven't shared anything, what has prevented you from doing so?
4. Is your family supportive of improving waste management practices? Please explain.
5. Have you changed your ways in managing waste at home, in your village and/or on plantation? Please explain.
6. What are the challenges you face in changing your practices?
7. What have you seen in other people's actions regarding proper waste management to convince you to improve your own waste management practices?
8. How could you further improve your ways to manage waste at home, in your village and/or on plantation?

Appendix H: Post-programme interview questions

(March/April 2014)

Follow-up Phone Interview

Date:

Time:

Name of respondent:

Village:

Pseudonym:

1. Looking back on your attendance at the waste education programme, what effect has it had for you? Why? Did you feel you learned anything? (*e.g. gaining knowledge/awareness, skills, improved environment*)
2. Have you personally made any changes in your waste management practices (*e.g. using reusable bags, etc.*):
 - a. at your home?
 - b. village?
 - c. own plantation?

If yes, please explain those changes.

Have you observed any other changes in waste management practices (*e.g. using reusable bags, etc.*), in your village and/or on plantations?

(If not mentioned in response, ask:

- a. *Do you know if there is a new committee in the village to look into waste management?*
- b. *Is there any further collaboration established with local authority or other government departments that you know of?)*

3. a. What do you think of the current situation of waste management in your village? What is necessary to bring about change?
 - b. How do you think others think about waste management in your village? (*people in the village, people from outside the village*)
 - c. Do you think these views are important? Why?

(If respondents are unsure, ask a more “leading” question “Do you think it’s important to give a good impression to others about cleanliness in your village? Why?”)

4. Have you tried to share information gained about waste management practices with others? If so, what happened?
5. Has anyone tried to influence you regarding waste management practices? What happened?

Appendix I: Post-programme interview questions

(November 2014)

Follow-up Phone Interview (November 2014)

Date:

Time:

Name of respondent:

Village:

Pseudonym:

Give an introductory reminder of your previous interaction

1. After the conversations we had in March or April this year, have you noticed any changes in waste management in the village or in the plantations? (*e.g. progress on collaboration/request for waste collection services with the Local Authority, inviting government departments to conduct activities, meeting among villagers, formation of village committee, etc.*)
2. Have you made more changes in your waste management practices?
3. Have you tried to share the same information or more than you have shared before about waste management practices with others? If so, what happened?

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