

Promoting Positive Environmental Behaviours Through Community Interventions

A Case Study Of Waste Minimisation

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Table of Contents

EXECUTIVE SUMMARY.....	V
INTRODUCTION.....	1
1 WHAT ARE THE SOCIAL FACTORS AFFECTING ADOPTION OF WASTE MINIMISATION BY HOUSEHOLDERS?	2
1.1 A Model of Environmental Behaviour.....	2
1.2 The Traditional Focus on Changing Attitudes.....	3
1.3 Intervening at the Levels of Social Values and Worldviews.....	4
1.4 Fostering the Adoption of Social Values, Worldviews, and Attitudes that are Conducive to Waste Minimisation.....	5
1.5 Maintaining Waste Minimisation Behaviour	7
1.6 Waste Minimisation Internationally and in New Zealand: Findings on Behaviour, Barriers, and Predictors of Waste Minimisation Efforts	8
1.7 Rates of Waste Minimisation Behaviour:	8
1.7.1 Recycling.....	8
1.7.2 Re-use.....	10
1.7.3 Composting	10
1.7.4 Green purchasing.....	10
1.8 Reported Predictors and Barriers	11
1.8.1 Recycling.....	11
1.8.2 Composting	12
1.9 Summary.....	13
2 PROGRAMME DESIGN	14
2.1 General Principles.....	14
2.2 Community-Based Social Marketing.....	14
2.3 Evaluations of New Zealand Waste Minimisation Interventions	16
2.4 Issues Relating To Specific Types of Interventions	18
2.5 Summary.....	24
3 PROGRAMME EVALUATION	26
3.1 Common Methods of Programme Evaluation	26
3.2 Evaluation Designs	29
3.3 Commonly Used Indicators in Evaluations of Community-Based Waste Minimisation Programmes	30
3.4 Conclusion	32
4 REFERENCES	34

Executive Summary

The New Zealand Waste Strategy, launched by the Ministry for the Environment and Local Government New Zealand in March 2002, sets national targets for increasing the capacity of waste minimisation and management programmes. This strategy was developed as a result of the government's commitment to environmental sustainability as an imperative for the nation's environmental, social and economic well being. Regional and local governments will play a crucial role in developing and managing programmes to meet the national targets in ways that are tailored to the unique characteristics of the communities.

Many of the regional and local initiatives will be aimed at reducing solid waste produced by households. In order to be successful, these initiatives must be designed based on an understanding of the determinants of waste-reducing behaviour and techniques for persuading individuals to change their waste behaviour. The purpose of this report is to review social science research on waste behaviour with a focus on reducing household solid waste through recycling, re-use, composting, and green purchasing. Three aims are addressed:

- To identify the social factors influencing the adoption of waste minimisation by householders
- To identify the key components for strategies and programme designs most likely to lead to behaviour change
- To review techniques for monitoring and evaluating the effectiveness of waste minimisation programmes

Section 1 presents a model of environmental behaviour that delineates how institutional policies and constraints, social values, belief systems, attitudes, and social norms influence environmental behaviours. According to this model, social institutions (such as market structures, policies, and laws) shape the development of social values such as consumerism and ecological values of environmental integrity. These social values form the basis of general belief systems or worldviews, which in turn guide the development of specific attitudes about behaviours. Attitudes influence personal norms about appropriate behaviours, which in turn guide intentions and behaviour. Behaviours are also influenced by social norms (beliefs about how others regard the behaviour) and the availability of specific plans for carrying out the action. Behaviours (e.g. buying green products and voting for waste management laws), in turn, are critical for shaping institutional structures. This model captures the dynamic relationships among social factors, values, worldviews and attitudes, and behaviour. Moreover, it highlights the need for community-based interventions aimed at developing social contexts that will motivate waste minimisation behaviours among community residents. A review of the empirical research indicates that:

- Changes in higher-level social structures such as institutional policies, community organisations and social values will have more substantial and enduring effects on environmental behaviour than will changes in individual attitudes and social norms.
- Pro-environmental attitudes may be a necessary, but insufficient condition for achieving behaviour change over the long term. Interventions aimed at fostering attitudes favouring specific waste minimisation behaviours may effectively change attitudes without altering behaviour. Programmes must broaden information and advertising campaigns to include a focus on promoting more general values and worldviews of environmental sustainability. Social values and worldviews are stable knowledge structures, whereas attitudes are relatively weak and unstable; changes in social values and worldviews should therefore lead to more substantial

and enduring changes in behaviour. Programmes must also include mechanisms that enable recipients to develop clear plans for engaging in the recommended behaviour as well as mechanisms that promote the maintenance of the behaviour over time.

- Programmes can promote the adoption of values, world views and attitudes that are conducive to waste minimisation behaviours through the use of diffusion of innovations techniques and messages tailored to appeal to inherent motivations. These motivations include an inherent disposition toward self-enhancement, an aversion to waste things, a motivation to feel competent and to be a part of a thriving community, an aversion to fear-arousing issues, and a tendency toward inertia.
- Once individuals are motivated to adopt a behaviour, they require a set of mechanisms to initiate and maintain the behaviour. These mechanisms include prompts or cues to take action, specific steps and schedules for the action, feedback on the outcomes of their behaviour, and means for associating the behaviour with one's identity or self-concept.

A review of international and national research on waste reduction behaviours suggests that:

- Many communities have achieved moderate to high rates of recycling, although the intensity of recycling can vary substantially across community residents
- Innovative recycling programmes are targeting materials other than bottles, cans, and paper; for example, programmes for recycling diapers and tires hold considerable promise
- There is little empirical evidence on rates of re-use, although the modest evidence available suggests very high levels of interest and informal practice (such as through donations to charities, friends, or other family members)
- Composting rates tend to be moderate in the best circumstances, and highest in rural communities and in households with gardens.
- Green purchasing rates tend to be low and of only minor concern to shoppers. In the Waikato region, green purchasing rates are particularly low among men and individuals in farming occupations

Research reveals a wide variety of barriers to waste minimisation behaviours. Some barriers are common to all of the waste reduction behaviours high monetary costs, inconvenience or lack of time, lack of trust that they improve the environment, and apathy. In addition, the review identifies barriers that are unique to each of the waste minimisation behaviours (recycling, re-use, composting and green purchasing).

Section Two describes specific strategies for designing effective waste minimisation programmes. Four guiding principles for waste minimisation initiatives are:

Initiatives require a multi-factorial approach, with attention to a coordinated set of factors influencing behaviour (e.g. attitude change, provision of feedback and changes in policies)

- Programmes must appeal to underlying motivations of individuals
- Programmes should be delivered through community groups
- Programmes should contract with local businesses for work and resources whenever possible

Community-based social marketing is being used with appreciable success to promote environmentally responsible behaviours. This approach involves four key phases:

1. Identify specific barriers and benefits by conducting a literature review, focus group research and survey research.
2. Develop a strategy that utilises empirically-based techniques for overcoming barriers to the target behaviour
3. Pilot the intervention programme using established methods, a design that includes an intervention group and a comparison group and detailed evaluations of outcomes.
4. Evaluate the effectiveness of the intervention programme using established evaluation methods

Experts agree that all four steps are crucial to the development of successful and cost-effective programmes. Unfortunately, developers often make the mistake of omitting one or more of phases 1, 3, and 4 because of time or financial constraints, and they end up with programmes that fail to achieve the objectives and little information as to why they failed.

Waste minimisation interventions used in New Zealand are reviewed, and implications for designing new interventions are considered. Lessons learned from these interventions include the following:

- The success of a programme depends on strong relationships and high levels of communication between programme coordinators and both the local authority and the programme staff
- Supporting programme workers is crucial to the success of a programme. Efforts are needed to build and support 'champions' of the project, build a sense of competence in team members, provide feedback and show appreciation to team members, and encourage their participation in decision-making
- These interventions are likely to yield significant social benefits, such as an increased sense of community
- Evaluations of programmes need to assess a combination of environmental, social, and economic outcomes

Issues relating to specific types of interventions are considered in detail. These intervention strategies consist of:

- Instigating policies for monetary incentives
- Fostering ecocentric values and worldviews
- Education or media appeals to change attitudes and behaviours
- Attaining commitment to engage in the target behaviour
- Skills training for the targeted behaviour
- Monitoring and feedback programmes

- Negotiation initiatives for fostering participation and collaboration among stakeholders.

Section 3 discusses common methods for programme evaluation. A complete programme evaluation involves a sequence of five evaluations:

1. A structural evaluation assessing the organisational framework and components of the programme
2. A process evaluation assessing the extent to which the programme is providing the appropriate material to the target group and achieving the intended levels of acceptance from participants
3. Evaluability assessments to ensure that the conditions are appropriate for initiating impact and outcome evaluations
4. An impact evaluation assessing the extent to which the programme is meeting its objectives in terms of altering the factors that are expected to result in the intended outcomes of waste reduction
5. An outcome evaluation assessing the extent to which the programme has achieved its desired goals

Impact and outcome evaluations will be most effective if they assess changes at each step of the behaviour change process. Such evaluations would assess not only waste behaviour and waste outcomes, they would assess such factors as perceived barriers, social norms, competence, perceived consequences of behaviour, knowledge, sustainability worldviews and values, and endorsement of institutional and structural changes for waste minimisation.

A variety of evaluation designs are described. These include:

- Non-equivalent control group design, with pre-test and post-test assessments
- Single group, time series design
- Non-equivalent control groups, time series design
- Randomised controlled trial

The key strengths of an effective intervention design are the use of at least one appropriate comparison group and assessments of behaviours, waste outcomes, and other factors before the intervention begins and at critical time points following the onset of the intervention.

Finally, a number of behavioural and waste indicators are also reviewed. A combination of behavioural and waste indicators is necessary in order to gain a complete picture of an intervention's impact on waste reduction, recycling, and re-use.

Introduction

This report reviews social science research on waste minimisation with a focus on household solid waste in urban and rural communities. In particular, this review focuses on the social factors influencing the adoption of recycling, re-use, composting, and green purchasing. This report constitutes the first three stages of a seven-stage social research project conducted by Environment Waikato. These stages are to evaluate:

1. Social factors affecting adoption of waste minimisation by householders
2. Programme design: Identifying the key components of strategies and programme designs most likely to lead to behaviour change
3. Programme evaluation: Identifying how waste minimisation programmes are evaluated and monitored
4. Actual behaviour: What is already known about actual waste minimisation behaviour?
5. The role of consumer behaviour in promoting waste minimisation
6. Equity issues in the use of economic instruments
7. The level of public support for waste minimisation

In this report of the first three stages, emphasis is given to reviewing the literature in light of the implications for developing waste minimisation programmes in the Waikato region. Attention is also given to identifying information gaps and issues in need of further research. It should be noted that the focus of this research project is on household waste behaviour, and it does not address waste behaviour by businesses and organisations. Stage I provides a theoretical framework for understanding waste behaviour and the social factors influencing the adoption and maintenance of recycling, re-use, composting, and green purchasing. In addition, this section reviews international evidence regarding current levels of recycling, re-use, composting, and green purchasing, with particular attention to predictors and barriers of these behaviours. Stage II addresses research developments regarding strategies for designing effective programmes for increasing waste minimisation behaviours of community residents. Stage III reviews current methods and indicators for evaluations of waste minimisation programmes.

1 What are the social factors affecting adoption of waste minimisation by householders?

In order to effectively change waste behaviour, programmes must be designed so that they target the key determinants of behaviour and utilize persuasive appeals. Programmes will be most effective if they are based on a sound theoretical framework of behaviour. This section reviews the psychology of promoting environmentally responsible behaviour, considering theory and evidence on behaviour and persuasion in general and the environmental behaviours of recycling, re-use, composting, and green purchasing in particular.

1.1 A Model of Environmental Behaviour

Paul Stern and his associates have developed a theoretical model of environmental behaviour that serves as a useful framework for identifying and organising organizational, social, and psychological factors influencing waste minimisation behaviour (Stern, 2000; Stern, Dietz, and Guagnano, 1995). According to their model (see Figure 1), social institutions (including national laws, market and incentive structures, educational systems, and community structures and networks) shape the development of social values. Social values of particular relevance to environmental behaviour include consumerism, egocentric values of individualism or competitiveness, altruism, cooperation, and ecocentric values of environmental integrity (Brown and Cameron, 2000; Gardner and Stern, 1996). These generic value orientations guide the development of belief systems or worldviews. A worldview represents a general knowledge base through which new information is screened and interpreted that is, either incorporated into the worldview system or else rejected as false. Through this filtering process, new attitudes and beliefs about specific issues are formed (e.g. attitudes about recycling, composting, and buying green products). These attitudes influence personal norms, or a sense of obligation to engage in a particular action. Personal norms are also influenced by social norms, or perceptions of what others in one's social group expect and so on. Behavioural commitments and intentions are generated not only by personal norms and social norms, but also by the availability of specific plans or strategies for action (e.g. plans on where and when to buy a composting bin, where to place it in the yard, what to put in the bin and when, etc.). Behaviours (e.g. voting for waste minimisation policies, signing petitions, buying green products, modelling waste minimisation behaviours in the community) can significantly influence institutional structures and constraints, with these effects filtering on through the system.

Several additional features of this model reflect critical aspects of environmental behaviour. Firstly, the higher-level structures are more stable and less influenced by transient factors such as mood, social persuasion (e.g. advertising), or daily events. For example, a television advertisement about recycling is likely to have a short-term influence on behavioural intentions, but it is unlikely to alter social values. Secondly, although higher-level structures have more influence on lower-level structures than vice-versa (a dominant flow of influence indicated by the boldness of the arrows in the diagram), there are still likely to be recursive, 'upward' influences in the flow. For example, commitments to engage in a particular behaviour (e.g. to recycle) can lead to appreciable changes in attitudes. Thirdly, the model illustrates how changes in higher-level structures (e.g. institutional constraints, social values, worldviews) will have more substantial and enduring effects on environmental behaviour than will changes in lower-level structure (e.g. specific attitudes, behavioural commitments, and social norms).

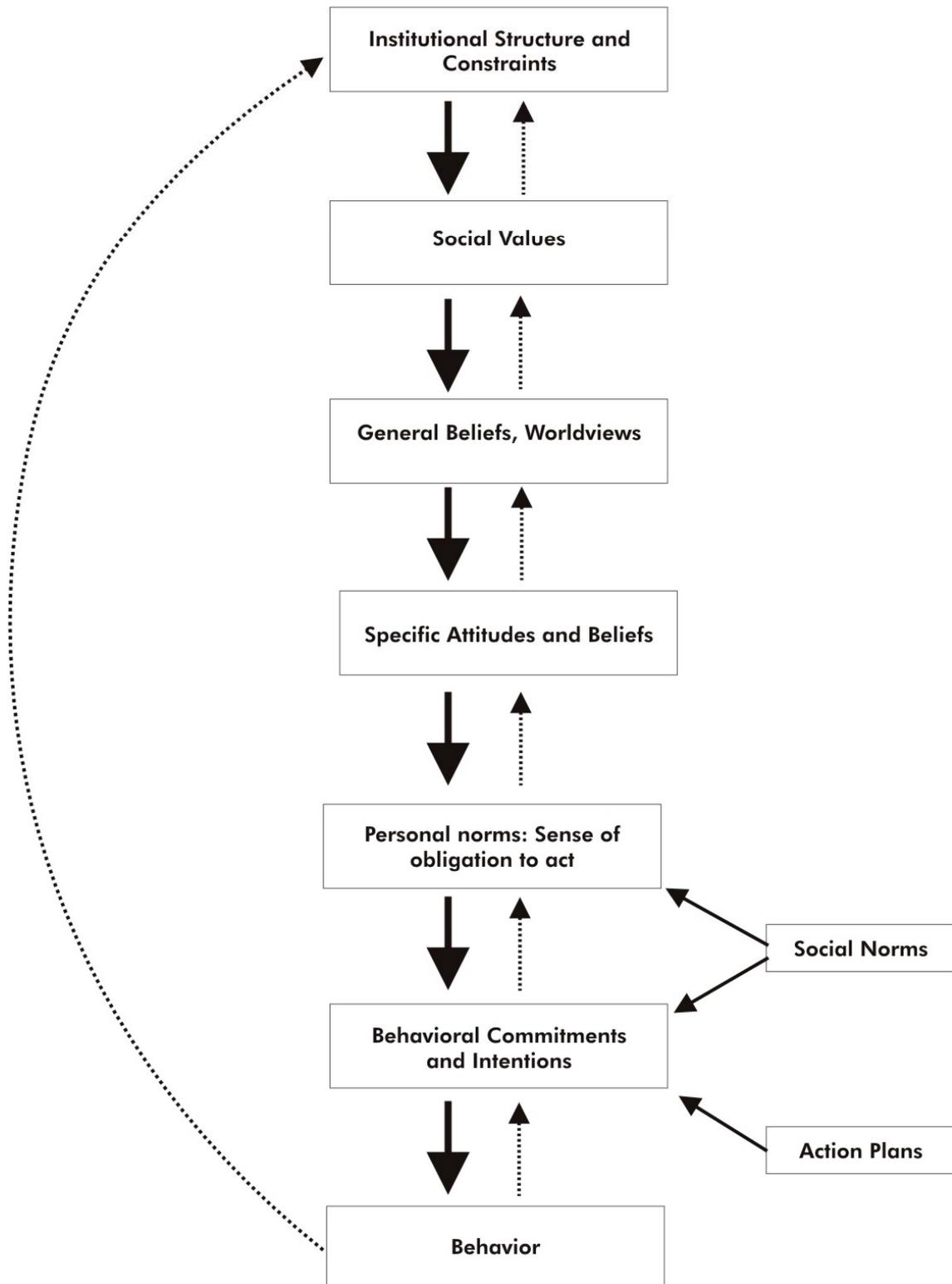


Figure 1: The roles of institutional structure, social values, worldviews, attitudes, and intentions in determining environmental behaviour. Adapted from Stern, Dietz, and Guagnano (1995).

1.2 The Traditional Focus on Changing Attitudes

To date, a substantial proportion of environmental interventions have focused on changing attitudes in order to promote the targeted environmental behaviour. Unfortunately, such efforts have met with only limited success. Although efforts often alter attitudes (at least in the short term), they often do not change behaviour (Gardner and Stern, 1996).

Such efforts are likely to suffer because attitude changes will be unstable and transient if they are not supported by a consistent worldview and if they are created in the absence of social norms and specific action plans. Moreover, contextual factors such as the availability of services and characteristics of the community will strongly influence the extent to which an environmental behaviour is enacted (Eero, Grendstad and Wollebaek, 2001). As Stern (2000) notes, the attitude-behaviour relationship is strongest when contextual factors are neutral and it approaches zero when context is strongly in favour of or opposed to behaviour. For example, a study of kerbside recycling found that when recycling bins were provided to residents, resident attitudes about the costs and benefits of recycling did not predict recycling behaviour (Guagnano, Stern and Dietz, 1995). Favourable attitudes about waste minimisation are unlikely to promote green purchasing if green products are unavailable, difficult to identify, or very expensive. Similarly, waste minimisation attitudes would not predict green purchasing if markets stocked only green products.

Attitude change appears to be a necessary, but insufficient condition for behaviour change (Brown and Cameron, 2000; Gardner and Stern, 1996). The formation of stable, long-term attitudes that motivate pro-environmental behaviour requires a sound knowledge base. This knowledge base must include the information needed to form an understanding of the adverse consequences for valued conditions or objects if pro-environmental behaviour is not undertaken, and a clear understanding of how to engage in the environmental behaviour and that one is able to engage in that behaviour (leading to a belief of high self-efficacy - that one has the ability to engage in the behaviour). For example, pro-recycling attitudes will require a knowledge base that includes an understanding that not recycling will have adverse consequences on conditions valued by the individual (e.g. destruction of valued open spaces because of new landfills) and an appreciation that feasible steps taken by the individual will reduce or prevent those adverse consequences (e.g. that recycling papers, cans, and bottles each week will appreciably reduce the need for landfills).

1.3 Intervening at the Levels of Social Values and Worldviews

If interventions aimed at changing attitudes are likely to achieve only modest success, then at what level should agencies and groups intervene? According to the proposed model, changes in organizational and institutional policy and structure will have the greatest and most stable influence as they will shape social values, worldviews, attitudes, and behaviours. Unfortunately, such changes in institutional policy are difficult to achieve because they generally require public support and action (e.g. signing petitions and voting for changes). The question then becomes one of persuading individuals to engage in these pro-environmental behaviours. It is likely that efforts to establish long-term waste minimisation behaviour will be most successful if they incorporate efforts targeting social values and worldviews. Such targeted efforts need not be in isolation of efforts to change attitudes or promote institutional policy changes; however, these efforts are likely to be critical to maximise success.

Considerable evidence indicates that consumeristic (materialistic), egocentric (self-interested), and competitive social values are negatively associated with environmentally responsible behaviour whereas ecocentric (valuing preservation of the environment and ecological sustainability), cooperative, and altruistic values are positively correlated with environmental actions (Cameron, Brown, and Chapman, 1998; Brown and Cameron, 2000; Gardner and Stern, 1996; Stern et al., 1995).

Similarly, research focusing on pro-environmental worldviews such as the new ecological paradigm has established that this worldview supports and predicts pro-environmental behaviour, including waste minimisation efforts (Dunlap, Van Liere, Mertig, and Jones, 2000; Ebreo, Herschey, and Vining, 1999). This worldview incorporates views that there are limits to growth, the balance of nature is fragile,

humans are not exempt from the constraints of nature, ecological crises with catastrophic effects on humankind are possible, and that plants and animals have as much right as humans to exist.

In addition to these generic environmental principles, more specific principles are likely to be critical to fostering waste minimisation behaviour in that they are counter to commonly held views. One such principle is that of stewardship - the understanding that individuals are responsible for the care, use and preservation of the land and resources for present and future generations (e.g. see *lifeafterwaste*, 2002). Related to this principle is the understanding that any product consumed becomes one's responsibility for the entirety of the product's existence - including its fate upon disposal. As Stone (2002) notes, a key barrier to waste minimisation efforts is the prevalent notion that waste is 'somebody else's problem' and that once thrown away, somebody else takes it away and deals with it. Promotion of the concepts of stewardship and responsibility for products over the complete cycle (purchase, use, and disposal) can be expected to enhance the public's adoption of waste minimisation efforts.

1.4 Fostering the Adoption of Social Values, Worldviews, and Attitudes that are Conducive to Waste Minimisation

Identifying strategies for shifting values and worldviews is a significant social challenge. A number of approaches have been developed for promoting changes in worldviews and attitudes, although there is little empirical evidence regarding methods for altering social values. Insights provided by diffusion of innovations theory and social research on motivation and persuasion can be useful.

Diffusion of innovations. Diffusion of innovations theory focuses on the processes by which new ideas and concepts spread within a community or social network (Rogers, 1995). Recognising that social networks typically have individuals with particular powers of influence, diffusion of innovations approaches target these social leaders and enlist their cooperation in advocating and modelling the innovation concepts and actions. A diffusion of innovations intervention would provide guidance and resources to the targeted innovators, who in turn would collaborate in developing efforts to publicise and disseminate information and resources. Diffusion of innovation strategies have been used to evoke changes in waste minimisation behaviour. For example, programmes have targeted key community leaders to promote the target behaviours, and recycling initiatives have included a focus on establishing 'block leaders' to pass along information and oversee the activity (Burns, 1991; see Guerin, Crete and Mercier, 2001). Such programmes, of course, rely on the success in recruiting and persuading social leaders to accept and advocate the innovative concepts. Moreover, others must believe that the social leaders will not benefit financially, politically, or otherwise from others adopting these views any more than anyone else in the community would benefit.

As an example of a diffusion of innovations approach for waste minimisation efforts, we might consider efforts to promote ecocentric values, a stewardship view of the land, and pro-recycling attitudes in a small community. Two or three leaders of the local farming group might be identified as effective innovators, and they would be invited to work with the project team in developing and communicating information and materials within the community.

Even a brief consideration of this scenario brings to awareness the crucial need for the innovators to accept the proposed views. Moreover, innovators will more easily spread the new concepts through the network if the messages are developed in ways that maximise their acceptance. Persuasion techniques can be critically useful in achieving these aims.

Motivation-based persuasion. Persuasion messages for fostering waste minimisation support and behaviour will be most effective in if they directly address and build on the audience's current motivations and goals. Programmes can present ecocentric worldviews and the concepts of waste minimisation in ways that are consonant with the principal motivations of individuals, including those holding egocentric and consumeristic worldviews. Relevant motives identified in the social science literature are:

1. People hate to sacrifice. As noted by Oskamp (2000) and Kaplan (2000), individuals generally are self-interested: They want to move toward improving their lifestyles rather than cutting back on desired amenities and reducing their material quality of life. This self-interest is not selfishness per se, nor is it purely individual self-interest. It instead reflects a general motivation for oneself and others to attain more satisfying and comfortable lifestyles. Individuals are highly responsive to the economic incentives and costs of proposed initiatives (Cameron, Brown, and Chapman, 1998) as a consequence, as financial benefits are a direct and easily appreciated type of self-enhancement. In order to foster ecocentric values and worldviews, it is important to frame the ideas in terms of the lifestyle benefits afforded by such orientations and related actions. Individuals gain pleasure and intrinsic satisfaction in achieving goals. Emphasising the lifestyle benefits and goals of an ecocentric, stewardship orientation (e.g. the benefits of the 'simplified lifestyles' being promoted in the popular press) rather than the need to give up daily comforts and amenities will help to meet the motivation for a satisfying lifestyle and toward improving their quality of life.
2. People hate to waste things. (DeYoung, 2000). Individuals generally harbour an aversion to wasting resources such as money, food, and materials that can provide additional value in some capacity. Framing messages in terms of wasting valuable resources, particularly in terms of direct losses to the individual (e.g. monetary or other costs to the individual from wasting resources) can reinforce the attractiveness of ecological sustainability and stewardship principles.
3. People like to feel competent. (DeYoung, 2000; Geller, 1995; Kaplan, 2000). They want to feel that they effectively behave in accordance with their beliefs and principles. It is difficult to maintain an investment in an ecocentric worldview and a stewardship orientation when experiencing the depressing sense that one cannot adequately promote sustainability or act as an effective steward. Messages that evoke a sense of competence in acting according to these views (e.g. by including examples of simple actions that can have significant beneficial effects) will be more easily accepted than messages that either lack such information or else paint a helpless, doomsday picture of individuals' inability to foster sustainability. Evidence for the importance of competence in sustaining waste minimisation efforts is provided by Coral-Verduggo (1997), who found that pro-environmental beliefs predicted self-reports of recycling, but only beliefs about one's recycling competence predicted observed recycling behaviour. Other evidence indicates that people who actively reframe their perceptions of recycling as personally satisfying (because it enables them to do something to improve the environment) were more likely to engage in recycling practices over the long term (DeYoung, 2000). Competence motives can be effective in maintaining behaviour change. Minimisation behaviours become intrinsically reinforcing once one feels competent in carrying them out (DeYoung, 2000).
4. People want to contribute to and be a part of a thriving community, to be 'needed'. (Kaplan, 1990; DeYoung, 2000). Ecocentric and stewardship views incorporate principles of community involvement and the importance of an individual's contributions, and so messages can be tailored to emphasise these features.

5. Fear elicits avoidance motivations, leading individuals to turn their attention away from the fear-arousing issue. Messages that present shocking and highly fear-arousing information will not be effective, as individuals will not attend to them or else they will be motivated to reduce their fear by negating the validity of the message. One study found that information about the seriousness of environmental problems simultaneously enhanced concern and a sense of helplessness (Levin, 1993). There is strong evidence that fear communications are effective only if they are combined with a clear plan for taking action to prevent the feared event (Leventhal and Cameron, 1994). Messages need to present information in a manner that prompts concern (but not extreme fear) and offers a plan of action that will alleviate the threatened consequences.
6. People tend toward inertia. Shifts in worldviews and lifestyle changes typically occur only in response to dramatic events or crises. Conducive situations for accepting new worldviews are likely to involve a pivotal event or an opportunity to make an important choice. For example, individuals may be more likely to adopt an alternative world view about ecological sustainability and stewardship if there are significant new initiatives or programmes with specific start dates on the horizon (thereby pushing them to consider these issues in order to make decisions about how to react and whether or not to act in accordance with the initiatives or programmes).
7. People typically have faith in the ability of technology to solve societal problems. Historically, environmental groups have looked upon this motivation to 'believe in technology' as a detrimental characteristic, as it can be used as an excuse for not engaging in environmentally responsible behaviours (for example, individuals may not worry about reducing transportation use to conserve fossil fuels because they trust that technology will develop fuels in time to avert a crisis). Yet this trust in technology can be used to the advantage of waste minimisation efforts. Messages can highlight the advances in recycling technology, 'greenfills', and other waste management technologies as a means of garnering enthusiasm and acceptance of waste minimisation views and programmes.

Attention to these basic motivational principles when constructing messages can lead to subtle changes in how information is presented, yet these changes can dramatically increase the persuasiveness of the messages.

In general, waste minimisation campaigns are likely to be most effective if they describe and encourage an ecocentric worldview and stewardship as a conceptual framework, then lead on to information about target waste minimisation behaviours in terms of (a) adverse consequences if these actions are not taken; and (b) specific plans and steps for taking action, with an emphasis on how these actions will be effective in achieving the waste minimisation goals. Feedback that others in the community ascribe to the worldviews and engage in the target behaviours (social norms) will further fuel the acceptance of the worldviews and social obligation.

1.5 Maintaining Waste Minimisation Behaviour

Key principles of behavioural self-regulation can be utilised to enhance the maintenance of behaviour over time (Leventhal and Cameron, 1984). Once individuals are motivated and committed to engaging in a behaviour, they require a set of mechanisms to sustain adherence:

- Prompts or cues to action are needed to trigger behaviour. Such prompts may be a simple reminder (e.g. a brief advertisement or billboard) or a visual cue (e.g. seeing recycling bins along the street or a green purchase symbol). Such prompts are unlikely to change attitudes or commitment, but they can effectively trigger action among those who are willing to take action.

- Individuals require specific action plans with specific goals and concrete steps in order to take action.
- Provision of feedback on an individual's behaviour is crucial for refining and improving behaviour. Individuals are motivated to be competent in their actions, and information on how well they are doing to meet target goals serves as an intrinsic incentive to improve and maintain efforts. Feedback is particularly influential in the early stages of behaviour adoption. As an example, individuals might be provided with analyses of their weekly waste and feedback on the proportion diverted to recycling or composting. Given that such efforts are too labour-intensive in many (but not all) instances, an alternative might be to guide individuals in conducting waste analyses on their own and provide them with feedback on where they stand in terms of standard waste rates and target waste rates.
- Sustained behaviour is enhanced when the behaviour is linked to one's self-identity. Individuals who define themselves as a green purchaser or a composter are more likely to maintain these behaviours over time, particularly if they project this identity to others by signing petitions, identifying themselves as such in surveys, or signalling this identity through stickers or indicators put on wheellie bins or in public places. More attention to these self-regulation strategies will be given in Section II: Programme Design.

1.6 Waste Minimisation Internationally and in New Zealand: Findings on Behaviour, Barriers, and Predictors of Waste Minimisation Efforts

Recent years have witnessed a growing body of evidence on the use of the four primary behaviours relating to individual-level waste minimisation: recycling, reuse, composting, and green purchasing (which typically refers to choosing products that are made out of recycled material, use minimal packaging, and are believed to pose minimal harm to the environment). The majority of these studies used self-report measures of behaviour. Self-report is widely regarded as providing over-estimates of actual behaviour, although the over-estimates may not be great. For example, Gamba and Oskamp (1994) compared self-reported recycling rates with observations of recycling behaviour over a two-month period and found that self-reported recycling rates were over-stated by only 3%. Similarly, a check on self-reported waste minimisation behaviours in a London survey indicated an over-reporting rate of 10% (Warmer Bulletin, Jan 2002).

International rates of behaviour use will be considered first, followed by research on barriers to minimisation behaviours and factors predicting behaviour use. Because the four behaviours under consideration differ appreciably and research indicates that different environmental behaviours are predicted by unique and distinctive patterns of factors (Brown and Cameron, 2000; McKenzie-Mohr, Nemeroff, Beers, and Desmarais, 1995), each will be considered separately. To date, more research has focused on recycling behaviour than on any of the other waste minimisation behaviours. The research findings are illustrative and based on searches of recent studies rather than exhaustive searches of studies. In particular, only minimal attention is given to studies of behaviour rates published prior to 1995.

1.7 Rates of Waste Minimisation Behaviour:

1.7.1 Recycling

Internationally, surveys indicate that recycling is the most common of the waste minimisation behaviours. The proportions of population samples reporting that they recycle are very high. In the mid-1990's, for example, 90% of respondents in a Los

Angeles survey reported that they recycled (Oskamp, 1995). Similarly a recent study assessing actual recycling behaviour of residents in Bradford, UK found that 90% participated in a new kerbside-recycling programme, rates that resulted in diversion levels of over 40% (Warmer Bulletin, Nov 2001a). Recycling rates vary according to the type of waste material. For example, a survey of recycling behaviour in 15 European countries found that although 63.8% recycled in the past year overall, only 43.4% overall reported that they recycled paper (Guerin et al., 2001). Of the 15 countries, the highest recycling rates were in the Netherlands (86% recycled in the past year, 77% recycled paper) and Germany (88% recycled in the past year, 67% recycled paper) whereas the lowest recycling rates were in Ireland (39% recycled in past year, 12% recycled paper) and Greece (22% recycled in past year, 19% recycled paper).

The intensity of recycling behaviour also varies dramatically. Surveys asking whether or not individuals recycle within a lengthy time period are likely to yield overly optimistic statistics that overlook the intensity of recycling. A survey conducted in Canada found that 85%-90% of respondents reported that they recycled, but the top 50% of the recyclers contributed 80% of the recycled materials (Poole, 1992). A survey of London residents provides a more sensitive view of the variation in recycling habits within an urban community (see Warmer Bulletin, Jan 2002) The findings revealed that 75% of the households claimed to recycle at medium or high rates, and 59% reported that they had increased their recycling behaviour over the past few years. Although recycling of paper and glass was high (between 50% and 70%), only 20% reported recycling any other kind of material. Responses to questions about recycling attitudes indicated that many young people are apathetic about recycling and do not regard it as an important issue. Based on these findings, the researchers concluded that commitment to recycling is very fragile: Most people are aware of need (if only vaguely), but it is a low priority.

On the North Island of New Zealand, statistics indicate moderate rates of recycling, with higher rates in areas where kerbside recycling services are provided. A survey of recycling participation in North Shore City indicates that 86% of households participate in the community's kerbside recycling programme, with an average of 57% of households putting out a recycling bin in any given week (Kennedy, 2000). A 2000 telephone survey of the Waikato Region found that 37% of participants reported that they always recycled bottles, cans, paper, or plastic materials; an additional 24% reported that they often did so, 22% reported sometimes doing so, and 16% reported never recycling (Environment Waikato, 2001). A kerbside-recycling programme was not in operation at the time of the survey. A 1998 telephone survey of residents in the Franklin District (which does not have a kerbside recycling programme) revealed that 69% reported recycling; of those who did not recycle, 63% reported that they would consider recycling at a school or transfer station (Conner, 1998). On the other hand, 73% reported burning rubbish and 33% reported burying rubbish in a farm dump.

Research on recycling behaviour generally focuses on recycling bottles, cans, and paper, primarily because recycling programmes take these materials. Innovative efforts to reduce waste by recycling other kinds of materials are likely to be of increasing interest and importance in the near future. Two programmes that deserve mention in this respect are disposable diaper recycling programmes, such as a programme initiated in The Netherlands (Warmer Bulletin, Nov 2001b), and programmes for managing waste tyres, such as the scheme organised by the European Association for Tire Recycling (Warmer Bull, Nov 2001c). The diaper-recycling programme involves the placement of bins outside childcare centres, and a local recycling firm is hired to extract wood pulp and plastic from the diapers. The recycling costs are equivalent to the price of paying another firm to incinerate the waste. Each child uses approximately 6,000 diapers by 30 months of age, and environmentalists estimate the decomposition rate of these diapers to be 500 years. This programme is promising in its potential to appreciably reduce waste. Tyre recycling programmes also have considerable potential, as tyres can be converted into energy or rubber crumb (used in road surfaces, playground surfaces, stemming for

explosives, and other products). Both programmes appear to have garnered acceptance from community members, although assessment is needed to determine the actual acceptance and usage rates.

1.7.2 Re-use

In contrast to the interest and reported use of recycling, there is relatively little evidence on rates of re-using materials. This behaviour can be difficult to discern and assess systematically. Yet some types of re-use appear to be popular in New Zealand. Anecdotal evidence suggests public support for donations of used clothing and items to charities, garage sales and second-hand sales of goods through newspaper advertisements and circulars, second-hand bookshops and clothing stores throughout communities, and the accepted practice of taking away goods left on kerbsides for pick-up during annual collections of large inorganic objects. Systematic research is needed to identify usage rates and willingness to increase re-use in response to re-use campaigns.

Given the general motivation of individuals in our society not to let things go to waste, it is not surprising that people seem to prefer to have their discarded items donated to charities or passed along for use by others rather than having them thrown away. Such motivations are reflected in the findings of a survey of two communities in the UK (Warmer Bulletin, Nov 2001d), in which 94% reported that they would give clothes to charity, and the findings of a Canadian survey (Scott, 1999) in which 97% reported donating used clothing and furnishings. In the household waste survey conducted in London (Warmer Bulletin, Jan 2002), most respondents claimed to donate or pass on clothes to charity or others, yet most reported that re-use of products was minimal and not considered to be an important issue. In the Waikato region, 17% of survey respondents reported that they always decide for environmental reasons to re-use something instead of throwing it away; 38% often do, 37% sometimes do, and 9% never do (Environment Waikato, 2001).

1.7.3 Composting

Composting rates tend to be associated with levels of gardening interest and practice in communities, with higher composting rates in areas with high gardening rates. In a suburban area in Canada, for example, research indicates that 78% of residents grass-cycle or mulch, and 61% of residents have a compost pile. In contrast, a survey of residents of a suburban area in Scotland (Warmer Bulletin, Sep 2001) revealed that only 30% of residents compost. Those residents who do compost fail to compost approximately 25% of kitchen waste. Composting is likely to be the most difficult of the waste minimisation behaviours to promote, particularly in urban and suburban areas. Statistical modelling techniques suggest that 55-60% rates of composting participation may be the highest achievable target for a typical suburban community (Warmer Bulletin, Sep 2001).

In the North Island of New Zealand, surveys indicate that 67% of residents in Franklin District compost (Conner, 1998) and 59% of rural household respondents in the Hauraki District compost (Hauraki District Council, 1998). In the Waikato region, 50% of those surveyed reported that they always compost and 15% said that they often compost food or garden wastes; 13% sometimes and 21% never compost (Environment Waikato, 2001). In this latter survey, composting rates were higher in older (aged 60 years and over) and rural residents, and lower among residents earning \$60,000 and over.

1.7.4 Green purchasing

Available evidence indicates that green purchasing rates are relatively low, and green purchasing appears to be of only limited importance to residents. There appears to be some variability in interest levels across populations and regions. In Ireland, 50% of shoppers surveyed reported that they considered environmental factors when they shop (Warmer Bulletin, Nov 2001d). In contrast, findings from a London survey

revealed that only 12% of respondents make shopping choices on the basis of environmental considerations (Warmer Bulletin, Jan 2002). In this survey, environmental factors ranked 7th in importance in product selection behind (in descending order of importance) product quality, cost, flavour, special offers, convenience, and brand. Contrary to the principle of waste minimisation, many respondents admitted that they bought more than they needed in order to take advantage of special offers. In the Waikato region, 20% of residents surveyed reported that they always buy products that they think are better for the environment; 25% often do, 33% sometimes do, and 19% never do (Environment Waikato, 2001). This survey found that women were significantly more likely than men to buy green products, and respondents in farming occupations were less likely than others to buy green products.

1.8 Reported Predictors and Barriers

Much of the research on waste reduction behaviour has focused more on identifying factors that predict these behaviours than on establishing behaviour rates alone. Predictors of waste minimisation efforts generally include higher levels of environmental concern (DeYoung, 1990; Gamba and Oskamp, 1994; Scott, 1999). Relatedly, behaviours are positively associated with aesthetic and pollution concerns. For example, recycling is positively associated with beliefs that a community needs to reduce landfill space in order to lessen the aesthetic and pollution impacts of landfills (Scott, 1999). Beliefs that waste minimisation efforts will reduce costs (e.g. disposal expenses) and perceptions of social pressure to engage in action are also associated with higher levels of waste minimisation behaviour (Scott, 1999).

Institutional and societal factors may also predict waste minimisation behaviours. An international survey (Guerin et al., 2001) found that recycling rates of countries were predicted by the proportion of the population who were members of environmental groups (a potential indicator of social norms), the instigation of waste policies, and the development of deforestation (conditions that may highlight the seriousness of environmental problems).

This body of research also points to some key factors that act as barriers to taking action, even when environmental attitudes are positive. Some barriers are particularly relevant to recycling, composting, or green purchasing, and so the barriers unique to each of these behaviours will be considered in turn (there is no direct empirical evidence on barriers unique to re-use). In addition, some factors serve as generic barriers for all four behaviours. These barriers include:

- High monetary costs of engaging in the behaviour
- Inconvenience and lack of time
- Lack of trust that these behaviours actually improve the environment
- Apathy and low motivation to engage in behaviours.

With respect to apathy and low motivation, it is important to note that apathy can arise from either lack of understanding about the environmental issue or a sense of futility and hopelessness. Individuals may be aware of the environmental problem but feel that any actions they take won't matter (Kaplan, 2000).

1.8.1 Recycling

A number of studies have identified additional barriers to undertaking recycling. These include:

- Lack of knowledge concerning what materials can be recycled. One survey conducted in New York City revealed that the majority of respondents could not correctly identify which of 12 items were recyclable (Warmer Bulletin, Nov 2001e).

Similarly, a study of Canadian residents found that not knowing what to recycle was a critical barrier to action (Scott 1999).

- Lack of knowledge regarding to the recycling process. Canadian residents surveyed reported that they were reluctant to recycle because they did not know what happened to the material after it was picked up, and they had doubts as to whether the products were actually recycled (Scott, 1999).
- Lack of feedback on the results of recycling efforts. Two studies found that people wanted information about the effectiveness of the recycling efforts including information about the proportion of waste diverted from landfills, cost savings, and the extension on the longevity of landfills (Scott, 1999; Warmer Bulletin, Jan 2002).
- Lack of appreciation for their efforts. Individuals want to feel that their recycling efforts are appreciated by the community and programme organisers (Warmer Bulletin, Jan 2002).
- Difficulty storing recyclables. Urban and suburban residents, particularly those living in apartments or multiple-unit dwellings, can find it difficult to store recyclable material due to a lack of space.
- Difficulties travelling to recycling centres. Many residents who find it difficult or inconvenient to travel to recycling facilities. In the Waikato region, 79% of survey respondents agreed that they would recycle more if convenient recycling facilities were available, and 72% reported that they would dispose of things properly if they knew where to take them (Environment Waikato, 2001).

1.8.2 Composting

Community residents report a variety of specific barriers to initiating and maintaining composting (McKenzie-Mohr et al., 1995; Warmer Bulletin, Jan 2002). These barriers include:

- Perceptions that composting is an unpleasant task. Individuals often feel averse to collecting food remains and managing a compost pile. Residents are particularly averse to composting during cold and rainy seasons.
- Worries about odours, flies, and vermin (e.g. rats).
- Perceptions that one doesn't generate a sufficient amount of suitable waste to maintain a compost pile. Residents tend to believe that composting requires more food waste than it actually does.
- Lack of knowledge about how to compost. Many residents report that they do not know how to begin or maintain a compost pile. In a recent survey, fewer than 20% of residents reported seeking help or advice on composting (Warmer Bulletin, Jan 2002).
- Beliefs that composting is not important. Residents often fail to understand why composting matters, particularly when they perceive that food waste constitutes a small proportion of their waste.
- Lack of space. A substantial proportion of community residents report that they do not have space for a compost pile.
- Lack of gardening interest and activity. Residents with small or no gardens see little reason to engage in composting because they have no use for the compost

- Having small children or living alone. Households with older or grown children and with two or more persons are more likely to compost, possibly because residents in these households have more time for composting, higher amounts of food waste, and higher rates of gardening activity
- Illness or moving house. These events disrupt composting and often lead to discontinuation of the activity
- Lack of success in composting. Residents who attempt composting often discontinue the practice because the material fails to break down or becomes slimy

Green Purchasing. Surveys of residents in the US and UK (Herrick, 1995; Warmer Bulletin, Jan 2002) reveal the following barriers to green purchasing:

- Perceptions that green products cost more.
- Perceptions that green products are of inferior quality.
- Low awareness of which products have recycled content.
- Suspicion of manufacturers' environmental claims. Consumers often doubt that products labelled as environmentally friendly truly do require or waste fewer resources. In the Waikato region, 71% of respondents reported that they were not convinced by such environmental claims about products (Environment Waikato, 2001).
- Difficulty in quickly identifying products when shopping.
- Beliefs that packaging is impossible to avoid. Heavy packaging of products is seen as an inevitable part of marketing, and as the responsibility of businesses.

In addition to these attitudinal barriers to purchasing green products, financial concerns of business to use green marketing strategies may be inhibiting growth of green marketing. Mathur and Mathur (2000) found that company announcements of green marketing strategies led to a significant drop in stock values within 20 days of the announcements. Investors appear to be sceptical of the profitability of green marketing, and businesses are likely to respond to stock depreciation's by curtailing green marketing efforts. Interestingly, announcements of new green products, new hiring of pro-environmental managers, and recycling initiatives had no impact on stock values.

1.9 Summary

The pattern of social, contextual, and psychological factors determining waste reduction behaviours is complex, and a variety of barriers to these behaviours exist. Nevertheless, these behaviours are reliably associated with patterns of factors that can be altered through intervention. By understanding the basic motivations and the social and contextual influences determining behaviour, we can identify which factors are the critical targets of waste reduction campaigns. The strategies for designing waste reduction programmes discussed in the next section draw heavily on the principles presented here.

A number of information gaps remain in the literature on determinants of waste reduction behaviours. More research is needed to explore the rates, predictors, and barriers of re-use and green purchasing. Moreover, there is little information on waste behaviour differences between urban, suburban, and rural communities. Research focusing on specific social groups in New Zealand (such as young rural residents or Maori residents) is also warranted.

2 Programme Design

In this section, theory and research findings are applied to inform strategies for designing programmes aimed at enhancing waste minimisation behaviours of community residents. The section begins with a presentation of four general principles for developing programmes. Next, community-based social marketing is defined and considered as an approach for programme design. A review of current waste minimisation interventions is then provided, with attention to implications for programme design. A number of intervention approaches are reviewed, with attention to critical steps for enhancing success.

2.1 General Principles

Four guiding principles for designing waste minimisation programmes can be derived from social science research and practical experience. First, there is consensus among environmental researchers that waste minimisation efforts require a multi-factorial approach. Rather than focusing only one or two factors (e.g. attitude change or provision of feedback), programmes need to address a number of potential factors in order to achieve maximum success. Multi-factorial approaches are indicated by the behavioural model presented in Section I. Programmes will achieve the greatest success if they target factors at many or all levels of the process delineated by this model. Multi-factorial approaches are also indicated by evidence that waste minimisation behaviours have multiple determinants rather than only one or two causal factors (Gardner and Stern, 1996).

A second guiding principle is that programmes must appeal to underlying motives of individuals. As discussed in Section I, information and education will have the greatest impact if it is presented in ways that highlight how the target behaviours serve intrinsic motivations for quality of life, competence, avoiding wastefulness, connecting with community, and other motives. Attention to these underlying motivations should be emphasised when preparing any programme materials.

Thirdly, waste minimisation initiatives should be delivered through community groups, such as grass-roots activist groups (Colquhoun and Snow, 2002). Non-profit community organisations can carry out public education and promotion using their established networks and contacts. Not only will such efforts benefit from the reputations of the organisations, they will aid in overcoming potential resistance to regional councils (who may be identified with rates and approval/rejection of consent applications).

Finally, waste minimisation programmes should contract with local businesses for work and resources (Colquhoun and Snow, 2002). These measures not only help to further fuel the local economy, they significantly enhance the local buy-in. For example, a recycling programme in Kaitia provided revenue to local business through subcontracts for construction, haulage, advertising, and vehicle maintenance.

2.2 Community-Based Social Marketing

Environmental psychologist Doug McKenzie-Mohr has developed a general approach for designing community intervention programmes for promoting sustainable behaviour (see McKenzie-Mohr, 2000; McKenzie-Mohr and Smith, 1999; more information is available at www.cbsm.com). This approach incorporates many of the social science factors presented in Section I of this report, and it presents a systematic strategy for developing interventions that are specially targeted to the specific community, social context, and type of behaviour. Community-based social marketing involves four phases of intervention development:

Phase 1. Identify specific barriers and benefits. As noted in Section I of this report, barriers to behaviour are likely to be specific to the particular behaviour and to the

social context. Some barriers may be individual in nature (e.g. lack of knowledge, apathy) whereas others may be community-based (e.g. lack of recycling facilities or programmes). The particular pattern of barriers must be identified in order to develop a tailored intervention programme. This phase involves three steps:

- Review relevant articles and reports
- Conduct focus groups to obtain qualitative information and to explore attitudes, behaviours, benefits and barriers in depth
- Based on the information about barriers and benefits identified in the focus groups, develop and administer a survey to obtain quantitative data (ideally using a random sample of community residents).

McKenzie-Mohr and associates note that this first step is crucial but, unfortunately, it is the step most likely to be skipped in intervention development. Planners are likely to believe that they can already identify the barriers to the target action and so these information-gathering efforts are unnecessary. Moreover, programmes are often under significant time and financial constraints, and these information-gathering efforts may seem difficult to justify. Yet failure to take this crucial step is likely to result in a programme of substantially diminished effectiveness and with little evidence to identify why it wasn't more successful. Moreover, the survey results can provide important baseline data for assessing the intervention's effects on perceived barriers and benefits and related attitudes. Finally, the survey data can assist in prioritising attention to barriers in order to develop the most cost-effective intervention strategy.

Phase 2. Develop a strategy that utilises empirically based tools for overcoming barriers and, in turn, promoting the targeted behaviour. In addition to designing the intervention materials to overcome barriers (e.g. providing free composting bins to residents, establishing a kerbside pick-up of green waste, etc.), the intervention must incorporate information and persuasion strategies that will elicit the targeted actions. More specifically, the intervention must incorporate tools for (a) eliciting commitment to engage in the target behaviour; (b) reminding individuals to engage in the behaviour (prompts); (c) developing awareness of community norms supporting the behaviour; (d) creating effective communications; and (e) creating incentives to engage in the behaviour. Specific tools for achieving these goals will be described later.

Phase 3. Pilot the intervention programme. Programme piloting involves randomly assigning individuals or households to one of two groups: one group that receives the intervention, and a comparison group that does not receive the intervention. Behaviour is closely evaluated (often in much greater depth than will be done during the intervention phase itself) to ensure that the intervention significantly increases the target behaviour. If not, then the intervention can be revised and piloted again. Although this step may appear to be time-consuming, it ensures the establishment of a cost-effective programme in the long run.

Phase 4. Evaluate the effectiveness of the programme. Programme evaluation is crucial for ensuring the sustainability of the programme, both in terms of achieving optimal levels of behaviour change and in terms of accruing continued community support and funding. Moreover, evaluations contribute systematic evidence of intervention effectiveness to national and international efforts to control waste.

In general, community-based social marketing provides a useful package for designing waste reduction interventions. To date, there is promising evidence that this marketing approach is effective (see McKenzie-Mohr, 2002) although this approach is relatively new and warrants further research.

2.3 Evaluations of New Zealand Waste Minimisation Interventions

Dr. Leslie Stone recently conducted a detailed, qualitative evaluation of a sample of seventeen waste management initiatives selected on the basis of their representativeness of 65 current and recent waste management initiatives in New Zealand (Stone, 2002). Of the seventeen initiatives, nine targeted community residents (as opposed to businesses). These nine included two local government recycling programmes (kerbside recycling), five community or not-for-profit programmes (three involved kerbside recycling, four involved drop-off facilities, and three emphasised education and community outreach); and two businesses turning waste into products (compostable waste to products and re-conditioning old computers for use in schools and community groups). Interviews were conducted with contact people (programme leaders or workers) for eight of the community-focused interventions; it was not possible to interview the contact person for the ninth intervention. The findings from these interviews include the following:

- The primary drivers or motivating factors for the programmes generally constituted a mix of environmental, economic, and social factors rather than a predominant influence of one type of factor (e.g. economic benefits). Economic factors were most important as drivers for programmes conducted by local authorities.
- All programmes reported beneficial environmental, economic, and social outcomes.
 - All programmes were felt to have moderate-high success in environmental outcomes
 - Six of the eight programmes were felt to have moderate-high economic benefits
 - Seven of the eight programmes were felt to have moderate-high social benefits
 - In four of the eight programmes, the ratings for social benefits were higher than the ratings for social factors as initial drivers, suggesting that the social benefits of the programmes were greater than anticipated.
- Key factors responsible for success were:
 - Support of the local community, local authorities and industry
 - Careful planning
 - Good staff
- Key factors impeding success and contributing to failure were:
 - Poor communication between the programme's board and the day-to-day operators
 - Lack of local authority support
 - Lack of funding

In general, the success of a programme is believed to depend on strong relationships between the programme coordinators and both the local authority and the programme staff.

Stone offers the following conclusions and recommendations:

- Developing programmes need to:
 - Be part of an integrated set of projects that cover all aspects of waste minimisation and have integrated goals. One programme will not solve the waste problem, and a coordinated approach will strengthen community awareness, waste reduction values, and commitment
 - Define appropriate criteria for success that are relevant to the project

- Set realistic targets
 - Design monitoring strategies that will provide data to assess progress toward specified goals and targets
 - Use feedback from monitoring efforts to refine programme on a continuing basis
 - When transferring programmes to different regions, consider differences in contextual factors (needs, interests, etc.)
- Supporting people is crucial. Their passion and commitment for the programme requires consistent attention and nurturing. Specific actions for initiating and sustaining support include:
 - Frequent acknowledgement and communication of respect
 - Building champions. Most programmes had champions who were seen as largely responsible for the programme's success. Programmes need to identify methods for recognising and supporting champions, and they should have back-up 'champions' or groups in case a champion leaves the project
 - Methods for nurturing relationships between the programme team and the target audience, supporting organisations, and those involved with related activities
 - Building competence of team members by training them to use and evaluate feedback from monitoring efforts, and encouraging their participation in decision-making
- Programmes must be systematically and comprehensively evaluated in order effectively move toward sustainability goals. Recommendations for programme goals, indicators, and evaluation methods include the following:
 - When evaluating costs and benefits, include assessments of the economic, environmental, and social costs and benefits
 - Move away from using economic viability as the primary determinant of success
 - Assess changes in social values
 - Assess the extent to which the programme shifts the audience's focus up the waste hierarchy; for example, assess whether people make changes in what they buy and how they use resources

Two community programmes will be providing considerable insights regarding waste minimisation efforts in the near future: X-Treme Waste in Raglan and the Auckland Big Clean Up (it should be noted that X-Treme Waste may or may not have been evaluated in Stone's study; respondent anonymity precludes identification of the programmes considered in that study). X-Treme Waste involves a solid waste management programme, kerbside recycling services, a rural drop-off plant, an information campaign to promote the goal of zero waste to landfills, the development of a financial management and reporting system, and improvements in methods for processing solid waste. Available statistics indicate that 74% of the community's waste is being diverted away from landfill. In addition, the programme has led to the creation of 13 part-time jobs, over \$175,000 spent in local businesses or for wages and contracts, and an increase in the goods re-used or donated to community services (X-Treme Waste, 2001).

The Auckland Big Clean Up is a large-scale, multi-component, community campaign that was launched in early 2002 with the aim of improving the environmental quality of the Auckland region. Waste reduction is one of the nine targets, and the regional waste reduction campaign is scheduled to run in the latter part of 2002. The marketing campaign aims to raise awareness of the waste problem, provide simple, direct solutions and, where possible, offer incentives for specific behaviours (e.g. discounts on car tune-ups). The campaign is being systematically evaluated throughout its course, with a baseline survey and other indicators being used as benchmarks so that progress and the effects of programme components can be tracked over time (Goddard, 2002; Auckland Regional Council, 2002). The baseline survey revealed that

71% of Auckland respondents view reducing the amount of rubbish as a major issue, and 48% report that they engage in almost all waste reduction behaviours (recycling, composting, etc.). The impact and outcome evaluations of this programme will provide valuable information regarding waste reduction behaviour in a major region of New Zealand.

2.4 Issues Relating To Specific Types of Interventions

Waste minimisation interventions may utilise one or more of the following tactics:

- Instigating policies for monetary incentives
- Fostering ecocentric values and worldviews
- Education or media appeals to change attitudes and behaviours
- Attaining commitment to engage in the target behaviour
- Skills training for the targeted behaviour
- Monitoring and feedback programmes
- Negotiation initiatives for fostering participation and collaboration among stakeholders.

Key principles and suggestions for each of these intervention tactics will be considered in turn.

Policies for monetary incentives. One means of fostering waste minimisation behaviours is to introduce taxes or other monetary costs for waste. For example, quantity-based garbage collection fees can be introduced as a means of motivating efforts to recycle or reduce waste. Generally, price-controlling strategies of this nature tend to be successful in altering environmentally responsible behaviour (Geller, 1989). For example, the introduction of quantity-based garbage fees in 23 small communities (population < 50,000) effectively increased recycling rates (Recycling Council of Ontario, 1994, cited in Scott, 1999).

A basic problem with these attempts is difficulty in garnering public support for these measures particularly when the policy imposes a disproportionate hardship on poor members of society and thus conflicts with social equity goals (Brown and Cameron, 2000). Quantity-based garbage fees typically are contentious and receive only limited support. A survey conducted in four communities within the greater Toronto region revealed that only 44% were in favour of a quantity-based garbage fee structure, and only 20% reported that they would recycle more under such a programme (Scott, 1999). The low cost (only one or two dollars per bag) was felt to be an insufficient incentive for higher-income residents, suggesting the need for efforts to determine appropriate fees. Recycling-related fees were found to be a highly contentious issue for London residents as well, with the majority (and low-income respondents in particular) reporting that such fees would be unacceptable and unfair (Warmer Bulletin, Jan 2002). In the Franklin District in New Zealand, a significant proportion of the community opposed a new sticker system for rubbish bag collection, with a number of residents expressing outrage when they were charged for unused stickers (see Conner, 1998 for review).

Monetary incentive policies, while potentially useful, may be of only limited effectiveness over the long term (DeYoung, 2000). Individuals tend to engage in the recommended behaviour only as long as the incentives are in place, so policies must

remain in effect permanently. Moreover, their effectiveness will depend on a number of other social context factors such as ease in acquiring the necessary materials (e.g. garbage bags), public awareness of the programme, and the authority's ability to enforce the policy. Psychological factors that can undermine the effectiveness of monetary incentives include habituation, as individuals adapt to the increased cost and its incentive value diminishes; and psychological reactance, in which individuals react defiantly and behave in ways that are opposite to what is recommended (DeYoung, 2000).

Another problem with monetary incentives is that they are less effective for residents with higher incomes. Consequently, the burden of monetary costs falls on residents with low income levels thereby creating problems in equity, with poor households paying a disproportionate amount and facing greater risk of hardship.

Monetary incentive policies are likely to be most effective when they are combined with complementary services that provide assistance. For example, the North Shore City Council combines a 'user-pays' recycling programme (involving the purchase of rubbish bags or coupons) with a kerbside recycling programme; the combination of these interventions led to a 40% reduction in domestic waste deposited into landfill during the first year (North Shore City Council, 1997).

Appeals to adopt ecocentric values, worldviews, and lifestyles. In the past decade, an increasing number of social scientists and environmental activists have argued for the utility of promoting ecocentric values and worldviews and, more specifically, how such values can be put into action by adopting a lifestyle based on principles of 'voluntary simplicity' (Elgin, 1993). Voluntary simplicity is presented as an orientation to reduce consumption and promote conservation as a way of enhancing general quality of life (through reducing activities and material goods), increasing leisure time (by reducing work time as costs of living decrease), and improving the home and community environment. Rather than focusing on specific behaviours such as recycling or composting, these efforts advocate for a general shift in lifestyle orientation. A best-selling book, *Your Money or Your Life* by Dominguez and Robin (1996) exemplifies this approach of advocating a simplified lifestyle.

Social science evidence indicates that the effectiveness of these appeals could be enhanced through the use of some key strategies. First, these programmes will be more influential if they appeal to established individual motives. Such appeals should focus on the intrinsic satisfaction afforded by these lifestyle choices through achieving harmony with nature, maintaining frugal and thoughtful consumption patterns, contributing to the community, and enhancing a sense of competence in living a meaningful and value-consistent lifestyle (DeYoung, 2000). These messages appeal to one's self-interest, highlighting the personal benefits of this lifestyle rather than discussing the 'sacrifices' required by these lifestyle changes. Messages can focus on how a simplified lifestyle enables one to enjoy more of society's luxuries through increasing availability of resources by: (1) reducing waste of resources, and (2) increasing use of activities that require low levels of scarce resources, such as participation in artistic and cultural activities, education, and many forms of travel.

Another suggestion is to reduce tendencies to view simplified living as a dichotomous, 'all or none' decision and instead to present it as a continuum along which one can progress. For example, a 'scale' ranging from beginning to advanced levels of simplified living could be developed, and the individual could be encouraged to begin with the simple steps and continue with plans to move toward more significant changes over an extended period of time. This approach can make the lifestyle adoption seem less daunting and thus increase initial efforts.

Informational appeals to change specific attitudes and behaviours. The vast amount of research on persuasion and communication provides a number of insights on developing effective information appeals. Nevertheless, developing education

materials and mass media appeals that effectively alter attitudes and behaviour remains a significant challenge. Information appeals face the challenge of attracting the actor's attention while making limited cognitive demands (Stern, 2000). In effect, they must persuade individuals to significantly alter their attitudes and behaviour while requiring as little effort in deliberation or problem-solving as possible.

Yet messages must stimulate a certain level of deliberation, as significant attitude and behaviour change will result only if the appeal stimulates thoughtful elaboration of the issue (Petty and Caccioppo, 1981). The more discrepant the proposed behaviour is with the individual's initial attitudes, the more consideration and elaboration will be required to persuade the individual to adopt the behaviour: The stages of attitude change are:

Attention → Comprehension → Elaboration (deliberation) → Integration into memory → Enduring attitude change

For a communication to instil attitude change in this manner, the communication process must achieve each of 12 steps. Specifically, the individual must:

- Be exposed to the communication
- Pay attention to the communication
- Like the communication
- Understand the communication
- Learn the communication's contents
- Agree with the contents
- Store the information in memory
- Be able to retrieve the information from memory
- Make decisions based on the information
- Act on the decisions
- Get reinforced for such actions
- Take on supporting activities (e.g. convince others to take the proposed action or re-define one's identity to incorporate the behaviour) that strengthen the attitude and behavioural motivation

An informational campaign must ensure that success is achieved at each of these 12 steps in order to change behaviour. Programme developers can use this set of steps as a checklist when designing a communication campaign, and they can also use it to delineate assessment factors in evaluations of the campaign. Carefully identifying at which steps the communication failed will help in improving the communication.

Additional guidelines for creating effective information appeals (as suggested by Bator and Cialdini, 2000) include:

- Campaigns need to identify the current attitudes and behaviours (via focus groups and surveys) in order to determine how to make messages fit the audience. Moreover, specific sectors need to be identified and assessed so that tailored messages can be developed for the various sectors. One message is unlikely to 'fit' or work for all subgroups in a population.
- To enhance attention and memory, use a highly credible source (i.e., a spokesperson) with a single, well-placed and very positive message about the behaviour's benefits. Viewers give more consideration to messages containing positive evaluations of a target behaviour than to messages containing negative or neutral information about the behaviour (Pratkanis and Greenwald, 1993)
- Source credibility must be carefully considered, as the person advocating the behaviour must be perceived as highly knowledgeable about that particular behaviour. For example, a spokesperson for recycling behaviour or composting should be perceived as an 'expert' in home activities. A television celebrity may

not be perceived as an authority on such activities, whereas a home resident may be perceived as more credible expert.

- Carefully consider what types of social norms are conveyed by the message. Social norms can be influential motivators of behaviour, but it is important to consider the types of norms that are communicated. Effective communications must avoid cues of a descriptive norm that is counter to the recommended behaviour. For example, statistics indicating that few people recycle or images depicting vast amounts of waste accumulated over time will convey the social norm that most people do not recycle or engage in other waste minimisation efforts. Messages need to communicate pro-behaviour descriptive norms (i.e., that 'everyone is recycling and reducing waste') and injunctive norms that one should engage in the behaviour (e.g. 'responsible community members recycle and reduce their waste').
- Imbedding into the communication a symbol that will be encountered in the environment can enhance retrieval of information from memory. For example, an advertisement advocating green purchasing can depict a 'green label' that will be encountered on or nearby the product on the store shelf. The symbol serves as a memory cue that establishes a connection between the message and the targeted behaviour or product. When individuals encounter the symbol in the natural environment, they recall the message and are prompted to take the recommended action. For example, an intervention involving use of a shelf prompt with a 'green' symbol increased purchases of green products by 27%, as assessed via electronic inventory systems in the stores (Herrick, 1995).
- The key message should be vividly presented, but extraneous parts of announcements should not be vivid in order to avoid distracting attention away from the message. Although campaign designers may be tempted to include flashy graphics, vivid background visuals, or popular music, they need to be careful that such attention-grabbing devices do not interfere with attention to the primary issue.
- Public campaigns can be devised so that they elicit commitment from residents to engage in the targeted behaviour. Individuals are strongly compelled to act consistently and in accordance with their prior statements of intentions and beliefs, due to an intrinsic desire to be consistent and 'true to one's word'. Obtaining a written commitment to engage in a target behaviour significantly increases the likelihood of performing the behaviour (Gollwitzer, 1999). Pallak, Cook, and Sullivan (1980) found that informing residents that their names would be included in a list of conservers published in the newspaper served to significantly increase their conservation relative to residents who were not informed that their names would be published. This effect occurred even though the names were never published in the newspaper.
- Campaigns can provide residents who commit to a target behaviour with 'social identity tags' that is, public cues or indicators that one engages in the behaviour. The act of publicly committing oneself to a recommended action tends to foster a self-identity that is consistent with that behaviour, which further instils the maintenance of the attitudes and behaviour. In effect, commitment to recycling, green purchasing, reuse, and composting promotes a social identity as an environmentally responsible person. As an example of this strategy, an intervention reported by McKenzie-Mohr (2000) involved providing resident composters with a composting sticker and asking them to attach it to their wheelie bins as an indicator of their commitment to composting. It was reasoned that the sticker would serve to sustain and enhance composting among the composters, and that it would also provide normative information about composting to others in the neighbourhood. Over 56% of the residents were composters, and so the sticker indicated a descriptive norm that community residents typically composted

(residents tended to be unaware of the prevalence of composting due to the low-visibility nature of this activity). Over 80% of residents who composted agreed to display the sticker. Although this form of participation in community promotion of composting proved to be acceptable by residents, the majority of these residents refused the additional request that they speak to their neighbours about the benefits of composting. This latter activity apparently required more social initiative and commitment than was acceptable to the residents.

- As mentioned previously, the framing of the messages in terms of the depiction of monetary costs and benefits of target behaviours can significantly influence their effectiveness. Messages that focus on the cost savings afforded by recommended behaviours often have less impact (see McKenzie-Mohr, 2000 for review). In contrast, messages that focus on the amount of money lost by not taking the recommended action are more effective in motivating behaviour change (Rothman, Martino, Bedell, Detweiler, and Salovey, 1999).

In summary, there are numerous techniques and tactics for creating persuasive appeals for changing waste attitudes and behaviours. Such efforts will be most successful if they are part of a multi-factorial programme (that is, one that integrates efforts to promote ecocentric values and worldview, provide the necessary skills, etc).

Skills training and development of action plans. In most cases, waste minimisation programmes will require specific information on how to engage in the recommended behaviour. As noted previously, the formulation of a specific plan with clear goals and perceived competence (ability to carry it out) are critical factors determining whether positive attitudes lead to action. For example, interventions that promote composting must convey information on how to acquire the composting materials, what types of waste are compostable, how to begin and maintain the compost pile, and how to use the compost. Social modelling, in which an individual possessing similar characteristics as those of the target audience demonstrates the recommended behaviours, can be a particularly effective method for skills training. In addition, social modelling can help to foster social norms for engaging in the behaviour (Bandura, 1997).

Individuals not only require practical information, they also need a schedule for when to take the necessary steps. One strategy for making such information accessible is to imbue the information into an object or medium that will receive repeated attention from the individual. In one intervention, for example, information on the reasons for recycling and steps of action were integrated into a 'waste management calendar' distributed to residents; subsequent evaluations revealed that many community residents cited the calendar as the reason for starting to recycle (Scott, 1999).

Considerations should be given to whether it is more cost-effective to provide necessary materials to residents than to attempt to instil plans for obtaining the materials themselves. A campaign to promote composting in Scotland found that doorstep give-aways of free bins (with free delivery) effectively increased composting rates from 30% to 55% (Warmer Bulletin, Jan 2002).

Gaps in the empirical research on green purchasing and re-use point to the need for empirical investigations on methods for providing skills-training and action plans for these behaviours. Evidence indicates that the use of 'green' emblems on products and shelf markers increase purchases of green products (Herrick, 1995), but clearly more research is needed to identify even more effective strategies. Similarly, little is known about how to provide skills training for increasing re-use of goods.

Finally, it should be noted that skills-training techniques are of critical importance for more complex initiatives promoting simplified living and eco-friendly lifestyles. Dominguez and Robin's (1995) nine-step process for reducing consumption provides realistic and specific suggestions for moving toward a simplified lifestyle. Further

research is needed to evaluate the effectiveness of their approach and the extent to which individuals who receive the information reduce their waste.

Monitoring and feedback programmes. As discussed earlier, behavioural feedback is critical for promoting sustained behaviour change. Individuals want to know how well they are doing in performing the recommended behaviour and what the potential outcomes (environmental benefits) are. Programmes can instigate simple strategies for enabling individuals to gauge their performance and the community outcomes, at least at the beginning of programmes. Such assessments can be self-administered if evaluations by programme providers are not feasible. Simple diary techniques and feedback on improvement rates can be reinforcing and effective in helping one to identify areas in need of improvement. It is important to note that feedback strategies are most effective if clear goals are established and the feedback is framed in terms of progress toward meeting those goals.

Other assessment strategies, such as 'ecological rucksack' assessments, can provide more general evaluations of resource use. The ecological rucksack is used to assess the environmental impact of a product or service (Von Weizsacker, Lovins and Lovins, 1997). It is based on a measure of materials efficiency called the materials intensity per service (MIPS). The MIPS identifies the units of service (materials, energy, and services) that are required to produce a product and deliver its service to the customer. The 'rucksack' incorporates this information along with the number of times the product is used; increasing the number of times a product is used decreases the MIPS for the product.

The development of these assessment techniques is highly promising, but research is needed to assess the effects of the assessment process on subsequent behaviours, and to determine whether repeated assessments motivate and sustain waste minimisation and other environmentally responsible behaviours.

Negotiation initiatives. Community programmes typically require involved parties to negotiate an agreement to support and participate in the proposed programme. Proposals often meet with suspicion or resistance from some of the stakeholders. Preliminary differences of opinion can quickly escalate into major disputes and, ultimately, failure to achieve agreement and buy-in. As noted by Opatow and Weiss (2000), symptoms and signs of environmental conflicts that are at risk of failure in achieving resolution are:

- Parties denying the severity or importance of the risks that are of concern to the other party (e.g. environmental risks claimed by the pro-environmental groups and the economic risk claimed by the opposing group)
- Parties denying the moral integrity of the other party (e.g. denigrating, discrediting, and trivialising the attributes of the other party members, condescension and derogation of the other party, perceiving that alliances with the other party would pose a threat to one's position or integrity)
- Parties denying personal responsibility for harmful outcomes (e.g. displacing blame for bad outcomes onto the other party, casting one's party as innocent or right and other parties as responsible and reprehensible).

It is very difficult to resolve environmental disputes once they have escalated to intense levels. A more effective approach is to utilise methods for the constructive management of environmental negotiations. Ozawa and Susskind (1995) suggest that negotiation processes can be facilitated through comprehensive sharing of information at the onset, cooperation in joint fact-finding efforts as needs for additional information are identified, and collaborative project design among all stakeholders. Other tools identified by Opatow and Weiss (2000) include:

- **Transparent processes:** Ensuring that procedures are open for inspection and discussion by all stakeholders
- **Interdependencies:** Fostering collaboration and cooperation on tasks
- **Inclusion and access:** Ensuring that all stakeholders' concerns and perspectives are given consideration
- **Looking ahead:** Ensuring that future issues are considered and plans for addressing them are identified

One technique for avoiding disputes is participatory problem solving. With this approach, a party avoids telling another party what to do; instead, it explains the issue to the other party and invites the party to explore possible solutions (Kaplan, 2000). Generally, groups prefer to work in collaboration with experts rather than on their own, so that they feel assured that decisions are made on the basis of credible information. Such groups therefore work best when environmental experts collaborate with stakeholders in developing programmes. An example of this participatory problem-solving approach is the Dutch Green Plan in the Netherlands. This initiative aims to achieve sustainability within a single generation, and it involves the government identifying specific environmental problems and then arranging for target groups consisting of members from industry, consumer groups, and other stakeholders to be responsible for developing measures for resolving the problems (AtKisson, 1995; Kaplan, 2000). Other examples of successful programmes that developed from participatory problem solving can be found in an extensive database of 'success stories' maintained by Renew The Earth (2002).

2.5 Summary

- A number of persuasion tactics have been discussed in this section as well as in earlier portions of this report. A summary list of tactics (in alphabetical order) is provided here for quick reference. The Fostering Sustainable Behaviour website developed and maintained by Doug McKenzie-Mohr (2002) includes many of these tactics on a summary list, and each term is linked to pages describing case studies of programmes using that tool.
- Action plans
- Commitment
- Competence-building
- Fear appeals
- Feedback
- Framing Messages to appeal to inherent motives
- Goal setting
- Incentives
- Norms
- Modelling
- Participatory problem-solving
- Personal contact
- Prompts
- Social diffusion
- Vivid Information

One of the primary research needs in this field is that of more systematic and comprehensive evaluations of each of the interventions discussed. Few (if any) of these interventions have been adequately evaluated in terms the impact on each stage of the environment behaviour process presented in Figure 1, and the impact on short-term and long-term reduction of waste. It is likely that recent developments in community-based social marketing, in combination with the growing international

awareness of the need for waste minimisation, will spur more and better intervention evaluations. Given that waste reduction behaviours are significantly determined by contextual factors, it will be necessary for New Zealand communities to develop and evaluate interventions that are tailored to their particular contexts.

3 Programme evaluation

3.1 Common Methods of Programme Evaluation

Programme evaluations are conducted to determine the efficacy and effectiveness of an intervention or programme in achieving predefined outcomes. Efficacy refers to the benefits of a programme under optimal conditions (e.g. when all participants receive all components of the programme, the programme is delivered without fault, etc.). Effectiveness refers to the benefits of the programme in practice (e.g. under realistic conditions that some of the target audience do not receive any or all components of the programme due to drop-out, failure to reach them, errors in programme implementation, etc.). Evaluation involves more than a simple audit of the changes that occur (e.g. behaviour uptake rates, the amount of waste diverted from landfill); in addition, it involves identifying the factors that are responsible for those changes (Bowling, 1997).

A complete programme evaluation would include the following sequence of five evaluations (see Bowling, 1997; Hawe, Degeling, Hall and Brierly, 1990): Structural evaluations, process or “formative” evaluations, evaluability evaluations, impact evaluations, and outcome evaluations.

Structural evaluations: These evaluations assess the organisational framework and components of the programme. Structural components could include the number of staff, staff characteristics (e.g. levels of training, skills, distribution of staff across sites), sites (e.g. size, distribution across the region, etc.), equipment (quantity and quality), types of services, capital and financial resources, etc. Of key interest is the quality of the structural framework and resources in terms of their whether they are sufficient for meeting the defined goals.

Process evaluations (or ‘formative evaluations’): These evaluations assess the programme activities, quality, and use (i.e., who is served by the programme). As noted by Hawe et al. (1990), the main questions of process evaluations include:

- Are all parts of the programme being implemented as intended?
- Are all parts of the programme reaching the target group?
- To what extent are participants satisfied with the programme and its components?

Process evaluation procedures serve as quality control mechanisms in that they provide quality assurance: that is, information that the programme activities are being carried out appropriately. It is common for staff to alter a programme over the course of its implementation by varying the contents of materials, the timing of the delivery of programme contents, or the strategy for reaching participants. Not only is it important to document these changes, it is critical to identify changes in participant satisfaction and programme efficacy in response to these alterations in order to determine whether the variations should be continued. Structural and process evaluations are particularly important when outcomes are difficult to assess or when they will only be observed after a lengthy period of time.

Evaluability Assessments: This form of evaluation provides the necessary information for conducting impact evaluations and outcome evaluations. It is a systematic process for ensuring that a programme has met the conditions required to conduct impact and outcome evaluations (Hawe et al., 1990). These conditions are:

- A logical fit between defined programme activities and goals

- Proper implementation of the programme (as determined by process evaluation)
- Agreement on what evaluation questions should be addressed
- Agreement on the measures and procedure for the evaluation

Hawe et al. (1990) provide seven steps to conducting an evaluability assessment:

1. Identify the primary users of the evaluation information and find out what they need to know. For example, primary users might be asked about the programme effects that would need to be demonstrated in order to continue funding it.
2. Define the programme. This step involves delineating the programme's boundaries and a standardized protocol that all staff agree represents the programme. This step ensures that the programme can be described appropriately in evaluation reports and implemented reliably by other groups in the future.
3. Specify the goals and expected effects. Goals and effects must be specific in terms of time, person, place, and amount (e.g. 'To increase the number of households in Hamilton that maintain a compost pile to 80% by the end of 2004').
4. Ensure that causal assumptions in the programme are plausible. This step underscores the importance of developing programmes on sound theoretical models of environmental behaviour. The causal assumptions are critical for identifying the relevant variables for the impact and outcome evaluations. For example, if the programme is expected to alter behaviour by enhancing social norms, then social norms must be assessed in the evaluation.
5. Identify the measurable and testable programme activities and goals. This stage involves identifying feasible assessment tools (e.g. self-report measures, behavioural measures, and waste outcome measures)
6. Decide on what assessments (e.g. number of different measures, number of assessment times) would provide a sufficient amount of information to determine the effectiveness of the programme
7. Ensure that the programme is being implemented as intended prior to beginning the impact and outcome evaluation. This step involves process evaluation reassessment in order to ensure that the programme is running according to standards at the onset of the impact or outcome evaluation period. These data are used to describe the programme characteristics as they stand at the onset of the impact or outcome evaluation.

Impact evaluations: These evaluations assess intervention programmes during the initial and ongoing stages in order to provide information about the immediate effects of the programme. Impact evaluations usually focus on the programmes' objectives, such as increased awareness, commitment to action, behaviour change, etc.

Outcome evaluations. These evaluations assess interventions after they have run a specified amount of time or after they have ended to determine whether they achieved the desired goals. For waste minimisation programmes, ultimately the most critical outcome of interest is the reduction of solid wastes. In many cases, however, it will not be a feasible outcome measure. For example, reduction in waste to landfills is not a reasonable outcome measure for a primary school education programme. Data from outcome evaluations are typically used to determine whether a programme should be continued or repeated elsewhere.

The distinction between impact and outcome evaluation varies according to the types of objectives and goals set by the intervention team. A waste minimisation education

programme may have attitude change as its objective and behaviour change as its goal; in contrast, a kerbside recycling intervention may have behaviour change (recycling) as its objective and reduction of recyclable waste in landfills as the goal. The exercise of determining objectives and goals often provides valuable insights into the general aims and design of the intervention, as well as the nature of the impact and outcome evaluations.

Outcome evaluations can assess whether a programme achieves the desired behaviour and environmental goals and the durability of these outcomes that is, how long-lasting the effects are. In addition, outcome evaluations can assess the limiting conditions of the programme effects what types of participants are responsive to the programme, contextual factors influencing responses to the programme, etc. (DeYoung, 2000). These limiting conditions are regarded as moderating factors variables that significantly influence the effects of an intervention.

These evaluations can involve qualitative methods or quantitative methods. Qualitative methods are valuable for providing in-depth information about staff and participant beliefs regarding the programme's effects and why they occurred. The data are highly subjective and only a few individuals can be included due to the labour-intensive nature of data analyses, and so the data are of limited reliability and validity. Consequently, the findings are limited in the extent to which they are likely to generalise to the general population of interest. Nevertheless, they can provide important insights into what parts of the programme were felt to be critical for success, why a programme may have failed, and so on (see Stone, 2002 for an example). Qualitative methods are also necessary when the number of potential respondents is so low that quantitative methods are inappropriate. Quantitative methods provide systematic evidence of the extent and magnitude of the effects. These methods are considered to be critical for a comprehensive evaluation of the extent of the behaviour change, statistical evidence of effects, and group differences. Qualitative methods can be integrated in with quantitative evaluation designs as a way of providing complementary evidence about the programme (Morgan, 1998).

A comprehensive evaluation of a waste minimisation intervention would assess changes at each step of the behaviour change process and the critical influencing factors, as delineated by motivation and behaviour theories discussed in Section I of this report. The following list includes potential factors that could be included in impact and outcome evaluations of waste minimisation programmes. Note that factors 1-12 are listed in reverse order according to the behavioural model proposed by Stern (2000; see Figure 1 in Section 1 of this report). Some of these factors will be relevant for certain intervention evaluations and not for others. The selection and total number of factors assessed will depend on the nature of the intervention and the constraints of the evaluation process.

1. Waste minimisation outcomes
2. Behaviour change (both targeted behaviour and related behaviours to assess the flow-on effects)
3. Change in intentions and commitments
4. Change in action plans
5. Change in perceived barriers
6. Change in social norms
7. Change in competence
8. Change in perceptions of behavioural consequences

9. Change in knowledge about targeted waste minimisation behaviour
10. Change in worldviews (sense of stewardship, responsibility for waste)
11. Change in social values
12. Change in endorsement for institutional/structural changes (e.g. willingness to support legislation for waste minimisation policies and programmes)
13. Community cohesion (which may be an important social benefit of community waste minimisation programmes)
14. Cost-effectiveness analysis (programme costs, savings, creation of jobs, etc.)

A comprehensive evaluation that includes many of these factors will yield important information about the programme. The evaluation will address the question of whether the targeted behaviour change was achieved, and it will provide extensive information about the programme's effects on the critical stages of the behavioural process. Specifically, it will address the following issues:

- If the targeted behaviour change is achieved, did it result in significant changes in waste levels?
- If significant behaviour change was not achieved, then where in the behaviour change process did the programme fail: changing attitudes, increasing competence, changing perceived norms, providing the critical knowledge, or removing barriers?
- Is the intervention fostering more waste-responsible worldviews, social values, and policy support?
- Is the intervention having additional effects on other waste minimisation behaviours?
- Is the intervention having other benefits, such as enhancing a sense of community cohesion?
- What are the financial implications of the intervention to both the individual and the community?

3.2 Evaluation Designs

A variety of evaluation designs are used to assess interventions (see Hawe et al., 1990). Designs that are most appropriate for community-based waste minimisation interventions include:

Non-equivalent control group, with pre-test and post-test. This design includes a group that receives the intervention and a comparable group (e.g. a similar set of neighbourhoods or communities) that does not receive the intervention, with all evaluation measures administered to both groups prior to the intervention's onset and at designated follow-up time points. The control group provides a comparison condition indicating what changes over time might be expected in the absence of the intervention. This design is limited by the prospect that the two groups aren't equivalent on all characteristics and so any group differences in changes over time may be due to the groups' inherent differences.

Single group, time series. This design includes only participants who receive the intervention, and the evaluation measures are administered at many time points both

before and after the introduction of the programme. This design provides a detailed picture of the changes over the time period as a function of the intervention. The limitation of this design is the possibility that some extraneous event occurred near the same time as the intervention started, and so it is not possible to tell whether observed changes were caused by the event or the intervention (or alternatively, whether the absence of the intervention's apparent effects were due to the event significantly reducing the targeted changes and the intervention's effects increasing the effects to baseline levels).

Non-equivalent control groups, time series. This design includes both a group factor (intervention and non-equivalent control) and a large number of assessments (time series). This design enables evaluators to determine whether changes occurred in the intervention group but not in the control group following the intervention's introduction (thus indicating that the changes were due to the intervention and not to an external event). In addition, it provides detailed information about the pattern of change over time.

Randomised controlled trial. This design is generally considered to be the 'gold standard' in intervention evaluations. It involves randomly assigning participants to intervention and control groups and then comparing the groups (usually via pre-test and post-test assessments) on differences in the evaluation measures. This design can be useful for pilot-testing some waste minimisation interventions (e.g. education programmes or interventions providing training and materials for composting), but they generally are not feasible for community interventions.

In general, the greatest strengths of an effective intervention design are:

- Use of a comparison group
- Pre-test and post-test assessments

3.3 Commonly Used Indicators in Evaluations of Community-Based Waste Minimisation Programmes

The previous subsection reviewed a number of evaluation factors that would provide information both on the outcomes of the study and related factors in the process of behaviour changes. This subsection focuses more specifically on indicators of the costs and benefits of the programme. As Stone (2002) notes, evaluations of waste minimisation programmes need to include social, economic, and environmental indicators in order to provide a complete assessment of the programme's costs and benefits. To date, few waste minimisation programmes have adequately incorporated social indicators such as community cohesion, community empowerment or adoption of a stewardship perspective of the environment. Instead, evaluations have tended to focus on environmental indicators (often defined as behaviour and waste quantities) and economic indicators (e.g. costs analyses and creation of jobs). Economic indicators for waste minimisation interventions are considered elsewhere (Dahm, 2002; Gee, Harrison, Henson, Keller, and Speidel, 1998). Here I will focus on environmental indicators of behaviour and waste quantities.

Behaviour

Behaviour is most frequently assessed using self-report measures via survey methods. As noted earlier, self-report measures are problematic in that they often overestimate actual behaviour. Nevertheless, such self-report biases may be of less importance when the focus is on identifying significant changes over time as these biases can be expected to remain relatively constant. Although absolute levels may be inflated, change rates may provide reasonable indicators of behaviour change.

Observational measures of behaviour provide more objective indicators of behaviour, although they may still be subject to observer biases and error and they are more difficult (and sometimes impossible) to carry out. Examples of common behavioural indicators are:

- Percent of people participating in programme/activity
 - Percent of people who participate at all (e.g. percent of people who buy green products over a 3 month period)
 - Percent of people who participate at a certain level of frequency (e.g. percent of people who buy green products each week)
- Percent of households participating in programme/activity
 - Percent of households who participate at all (e.g. percent of households with a recycling bin set out at least once over a 3 month period)
 - Percent of households who participate at a certain frequency (e.g. percent of households with recycling bins set out each week)
- Rate of behaviour (by individual or household)
 - Behaviour frequencies (e.g. number of times recycling bin is set out over a given time period)
- Amount of desired material produced by target behaviour (by individual or household):
 - Amount (e.g. volume or weight) of recyclables in bins
 - Amount (e.g. number) of green products purchased
 - Amount of items re-used
 - Amount of material composted
- Amount of non-desired waste or products in relation to target behaviour
 - Amount of recyclables in rubbish bin
 - Amount of non-green products purchased for which there are green alternatives
 - Amount of compostable materials in rubbish bin
 - Amount of re-usable materials in rubbish bin
 - Total amount of waste in rubbish bin
- Proportion of waste recycled or re-used by individual or household
 - Proportion of total recyclables that are recycled by individual or household
 - Proportion of total re-usables that are re-used by individual or household
 - Proportion of total compostable material that is composted by individual or household
 - Proportion of total purchases that are green products by individual or household

Quantities of Waste

Environmental indicators typically focus on the amount of waste that is recycled, re-used, and put into landfills.

There are two critical aspects of landfill waste that must be considered in evaluating the impact of an intervention programme on reducing waste:

- The actual quantities of waste going into landfills: Are absolute levels going down in response to the intervention?

- The reduction in the proportion of waste going into landfills rather than being recycled or re-used

Focusing on the actual quantities of waste going into landfills is critically important, but it may not give an accurate portrayal of the level of recycling and re-use induced by the interventions. Overall waste levels may increase over time, for example, so that actual quantities of waste going into landfills may remain constant or even increase even though the proportion of waste going into landfills is significantly reduced (see Stone, 2002). It is therefore critical to evaluate both aspects: The reduction in the proportion of waste provides important evidence of intervention effectiveness, whereas the absolute waste levels provide information regarding whether the existing interventions are sufficient.

Indicators of the quantity of waste going into landfills include assessments of the volume (e.g. number of truckloads) and/or weight of waste (which can be estimated using nationally recognized conversion rates of volume to weight).

Indicators of the reduction in the proportion of waste going into landfills typically focus on the type of waste targeted by the intervention. Examples of these indicators include:

- Amount of recyclables processed by a recycling centre
- Proportion of the target material (e.g. recyclable materials, green waste) in the waste going into a landfill
- Weight of re-usables diverted from landfill (via drop-off at a 'resource depot')
- Amount of green waste processed by a green waste business
- Number of units processed by a recycling/re-use programme (e.g. the number of old computers taken in and converted into computers for use in schools or for re-sale)

It is important to note that these waste indicators are crucial for monitoring a community's success in achieving waste targets. If there are several interventions launched in the community, however, it will be impossible to discern the relative impact of each intervention on waste levels. Moreover, these indicators fail to provide information about the number of households or community members who are participating in the programme and the extent to which they are engaging in the target behaviour. Both behaviour and waste indicators are needed in order to get a complete set of information about waste reduction, recycling, and re-use.

3.4 Conclusion

This three-part review of the social science literature on waste minimisation behaviour suggests that waste reduction initiatives will require careful thought and planning in order to be successful. Human behaviour is complex: It is driven by a host of basic motivations, guided by fundamental values and beliefs, influenced by a variety of social and contextual factors, and dependent upon key mechanisms such as prompts, feedback, and other self-regulation factors in order to be sustained over time. Social science has developed various models that assist in organising these factors and determining how different patterns of these factors affect behaviours. The model proposed by Stern and colleagues is recognised as a particularly useful framework in this respect, and it appears to be well suited for planning waste reduction interventions. Extensive research on behaviour change through the use of diffusion of innovations, persuasion tactics, and social marketing techniques has led to the identification of an assortment of tools for developing intervention materials and procedures.

Research on rates, predictors, and barriers of waste reduction behaviours remains sketchy. Recycling has received the most attention in the empirical literature, but more attention is still needed particularly in terms of the specific patterns of predictors and barriers for specific social groups such as older rural residents, young Maori residents, parents of young children, and other factions of society. In addition, the development of new types of recycling initiatives (e.g. for diapers and tires) points to social science areas requiring exploration. Composting appears to pose particular challenges for a number of community groups, and it is likely that interventions for increasing composting will require substantial creativity and tailoring to key groups in the community.

There is a particular need for research on rates, predictors, and barriers of re-use and green purchasing. To date, there are indications that individuals are much less aware of the importance of these waste reduction behaviours and have less understanding of how to fully engage in such actions. This information will be crucial to developing effective interventions for increasing these behaviours.

The history of social science provides many examples of well-intentioned interventions that failed to achieve their goals. With the development of systematic methods for designing and comprehensively evaluating interventions, there is an unprecedented opportunity to develop interventions efficiently, cost-effectively, and with high potential for success. These processes require considerable planning, piloting-testing, and research resources, particularly in the early phases of programme development. Although it is often tempting to skip them, the long-term consequences of doing so can be great.

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