Social marketing perspectives on barriers to and enablers of effective sustainability communication

Lynne Eagle - David R. Low - Lisa Vandommele

Abstract

Purpose of the paper: The purpose of this paper is to discuss the challenges facing those communicating the potential impact of sustainability on individuals and social groups, using widely accepted behaviour change theories to illustrate major factors that influence behaviour change decisions and supplement this with a review of literature that discusses other factors that should also be considered in developing communication strategies.

Methodology: This is a conceptual paper that uses social marketing principles to highlight the challenges involved in the effective communication of sustainability and related issues.

Findings: We highlight the complexity of factors impacting on individuals' attitudes, beliefs and actual behaviour adaptation and suggest that current communication strategies could be significantly improved through greater understanding of adaptation decisions and the key barriers to, and enablers, of sustained positive behaviour change. We highlight current deficiencies relating to both individual and community behaviour change and develop a research agenda that may assist in addressing current gaps in knowledge. We then discuss several major issues in relation to community-based sustainability issues. The paper concludes with recommendations for transdisciplinary research to focus on improvements to message clarity and communication as well as on an understanding of the way messages are accessed and synthesised.

Limitations: This is a conceptual paper: cross-cultural and trans-disciplinary research is needed to determine how the discussed factors vary across contexts.

Implications: An increased understanding of the factors influencing effective communication will benefit policy makers and those involved in the communication of sustainability-related issues.

Originality of the paper: The value of this paper is that it takes a trans-disciplinary approach to issues normally discussed only within individual disciplinary areas.

Key words: sustainability; behaviour adaptation; behaviour change

1. Introduction

In this article, we discuss the factors that should be taken into account in designing effective sustainability interventions. We approach this from a social marketing communications perspective, critically reviewing the literature that highlights potential gaps in current research and understanding and examining potential barriers to, and enablers of, sustained behaviour change. We identify deficiencies in extant communication models and

suggest ways in which more robust hybrid models can be developed for the communication of sustainability messages, including the need to change behaviours and specific behaviours that are desired. We move from individual factors to focus on potential barriers to, and enablers of, sustained behaviour change within community-based contexts.

2. What does social marketing offer?

We firstly define the social marketing approach, then justify why it may present a more effective approach to sustainability community than information-only approaches. Social marketing has been debated vigorously in the academic literature for over forty years although there appears to be agreement that the foundation was laid in the early 1950s when it was queried "why can't you sell brotherhood and rational thinking like you sell soap?" (Wiebe, 1951-52; p. 679). The concept of social marketing evolved from "planned social change"(Kotler and Zaltman, 1971) to the "marketing of social causes". While public health issues have received considerably more social marketing focus than environmental issues due to the recognition that the cost of preventable illnesses was approximately 20% of the UK's GDP (National Social Marketing Centre, 2006), the latter field is growing (see, for example, Peattie and Peattie, 2009; Carrigan *et al.,* 2011).

Like many other marketing-related concepts, there is no single definition of social marketing, the concept having evolved over time from narrow and somewhat simplistic foundations.

In 2013, the three social marketing associations, ISMA ESMA and AASM developed a consensus definition of social marketing:

Social Marketing seeks to develop and integrate marketing concepts with other approaches to influence behaviours that benefit individuals and communities for the greater social good. Social Marketing practice is guided by ethical principles. It seeks to integrate research, best practice, theory, audience and partnership insight, to inform the delivery of competition sensitive and segmented social change programmes that are effective, efficient, equitable and sustainable.

It emphasises incremental, practical and achievable changes to practices relevant to a specific target group (Barr *et al.,* 2011a).

There is a growing acknowledgment of adopting the principles underpinning social marketing, particularly when underpinned by theory-driven approaches, that have been found to lead to more persuasive messages across the range of socio-economic groups (Schneider, 2006). A focus on sustainability requires behaviour change from individuals and communities. Rothschild (1999) argues that governments at all levels have three mechanisms by which sustained behaviour change can be achieved: law, education and marketing-based persuasion. Education is necessary, but rarely of itself sufficient to change behaviours (Cappella, 2006; Smith, 2008). This is particularly evident in relation to assumptions that all that is required is to provide people with information in order for

behaviour change to occur, particularly given that the specific behaviours that are sought are not articulated but rather phrased in terms of general sustainability aims. Social marketing offers a framework for designing behaviour change programmes that is flexible enough to be applied to a range of behavioural change issues (Corner and Randall, 2011). However, it is not a panacea and the role of legislation and incentives in conjunction with both education and social marketing must be recognised (Rothschild, 1999; Sheavly and Register, 2007).

3. Communication of the need to adapt: the information deficit concept and the attitude-behaviour gap

Lack of knowledge (i.e. 'information deficit') is cited as causing misconceptions and apathy (Owens and Driffill, 2008) and is therefore suggested as an impediment to both attitude and meaningful behavioural change (Semenza *et al.,* 2008). The weakness of the 'information deficit' concept in failing to recognise the complex interaction of values, experience and other factors in achieving (or not achieving) successful and sustained behaviour change is acknowledged in the extant literature (Lorenzoni *et al.,* 2007). Additionally, a gap between reported attitudes towards environmental issues and actual behaviours is well documented in the literature (Ockwell *et al.,* 2009). (Moser, 2010). Attitude change towards performing specific behaviours is necessary (Moser, 2010), but also complex. Attitudes are multi-factored and interact with a number of other key factors in influencing behaviour, especially norms (Fishbein and Cappella, 2006) and self-efficacy (Fishbein, 2008).

Attitude change alone is unlikely to be effective in achieving sustained behaviour change, as a focus on individual voluntary change ignores social, environmental, structural and institutional barriers to behaviour change (Ockwell *et al.,* 2009). People are unlikely to take action unless they perceive potential positive or negative personal consequences, but are also influenced by social interactions with others in their communities (Gooch and Rigano, 2010). A further barrier to change may also be a perception that changing one's own behaviour will not make any difference in the face of the magnitude of potential climate change impacts (Semenza *et al.,* 2008).

4. Assumption of 'spillover effects'

In discussing possible behaviour change strategies, policy makers assume, without evidence, that 'spillover effects' will occur, i.e., people can be "ushered onto a virtuous escalator" (Thøgersen and Crompton, 2009; p. 143) whereby behaviours performed in one setting will automatically lead to changes in another setting (Barr *et al.,* 2011b). There is also an assumption that small behaviour changes will lead to larger changes and catalysts for other changes, but there is evidence that this does not automatically occur (Corner and Randall, 2011). Doing one pro-environmental behaviour may be seen as compensating for other environmentally detrimental behaviours,

i.e., spillover effects may be negative rather than positive (Mazar and Zhong, 2010). Thus communication that focuses on single behaviours, such as recycling, is unlikely to impact on other potentially sustainability actions.

5. Message sources

Mass media provides most of the general public's knowledge of science and risk perceptions (Foust and O'Shannon Murphy, 2009). Consumers no longer use individual media, but rather multiple media simultaneously (Ewing, 2009). Furthermore, consumers rather than behaviour change intervention developers integrate messages from numerous sources and may incorporate material such as word-of-mouth, news stories and other non-marketer originated material, as well as personal experience and situational factors (Finne and Grönroos, 2009). Intervention developers must face the implications of a communications environment in which they no longer control all communications. For example, within social networks, marketers cannot control the direction or outcome of discussions; anyone can post opinions and readers may find it difficult to assess the relative credibility or veracity of sources and claims (Campbell *et al.,* 2011).

What is clear is that any behaviour change messages will not occur in isolation, but instead be subject to a range of competing messages and social encouragement or discouragement, including peer and family influences, as well as perceived and actual behavioural norms. Competing behavioural influences are depicted in Figure 1. Further research is needed to determine the range of message sources and the relative influence of the messages obtained from them in order to counter those likely to increase behavioural barriers and to identify those most likely to encourage and enable positive behaviour change. This should be undertaken in conjunction with the application of an appropriate communications theory as discussed in the following sections.

6. Communications theory

In a review of major frameworks that have been used to explain the gap between environmental knowledge and behaviours, it is noted that although "developing a model that incorporates all the factors behind pro-environmental behaviour might neither be feasible nor useful, we do find diagrams that serve as visual aids in clarifying and categorizing such factors helpful" (Kollmuss and Agyeman, 2002: 256). Behavioural theories provide valuable insights into the potential drivers of, and barriers to behaviour change but do not aid communications strategy development:

Fig. 1: Peattie and Peattie (2003) diagram of competing influences on behaviour adoption and maintenance

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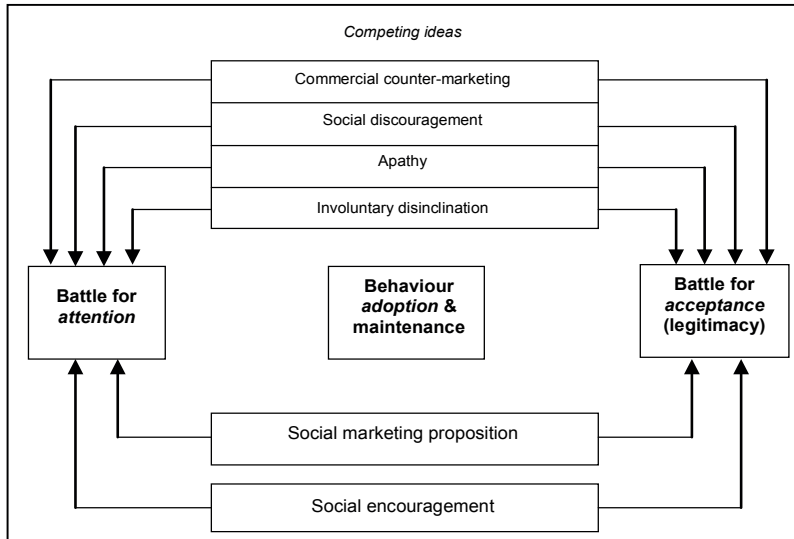

Source: Peattie and Peattie (2003)

Behavioural theories do not tell us how best to design messages so that they will be attended to, accepted, and yielded to. We would argue that this is the role of theories of communication. (Fishbein and Cappella, 2006; p. S14)

However, traditional communications theories, such as Hierarchy of Effects models no longer offer complete explanations of communication processes. For example, AIDA (Awareness, Interest, Desire, Action), which was originally developed a century ago (Figure 2), is of limited relevance to the contemporary communication context (Barry and Howard, 1990; Barry, 1987).

Fig. 2: AIDA model of impact of communication on behaviour
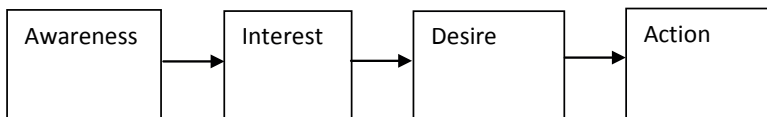
Source: Barry, 1987

Later models such as DAGMAR (Defining Advertising Goals for Measured Advertising Response) (Colley, 1962) expanded AIDA to include additional steps, i.e., Awareness, Involvement, Comprehension, Conviction and Action. These traditional models were developed within an advertising context and predicated on a marketer originated and controlled, one-way information flow. They came to prominence during an era in which mass media were dominant and the prevailing belief, particularly in the USA,

was that advertising was a strongly persuasive force and people passive recipients of communication messages. These models acquired the status of accepted wisdom, if not dominant paradigms, in spite of considerable evidence that, even before the Web 2.0 era, they were not universally applicable (Jones, 1990).

A new marketing communication research agenda is required that would investigate many aspects of media use, including the examples below:

- How do individuals and groups use traditional and new media to gather information and inform opinions that shape behaviour?
- How well do traditional communications models and theories describe, explain or enable predictions of persuasive social marketing communication processes in the 21st century, particularly for new media forms such as social networks, where content is created and managed by users?
- Can we develop an integrated model of communication effectiveness, taking both traditional and new communication contexts and new communication theories into account?
- How can interactive media and consumer generated content (e.g. blogs and forums on specific issues) influence desirable behaviours?
- How can this knowledge best be used in developing and implementing interventions aimed at achieving long term sustained behaviour change?

A research agenda such as this should include the use of research techniques beyond those used for traditional media analysis, such as those deployed in the emerging fields of 'webometrics', 'web analytics', 'infodemiology' and 'infoveillance'. These methodologies offer opportunities and means for analysing how people interact both with computer-mediated information and with other users of this information (Thelwall, 2009).

As part of this, a re-examination of the relevance of traditional communication theories for the 21st century environment should be undertaken, together with newer - but in the sustainability context largely untested - models. For example, the Technology Acceptance Model (TAM), the Innovation Diffusion Model (Premkumar and Bhattacherjee, 2008) and various hybrid models that combine the TAM with more widely known behaviour change models, such as the Theory of Planned Behaviour and the Theory of Reasoned Action (Ajzen and Fishbein, 1980; Ajzen, 1991) should be explored.

Another relatively recent approach deserving of attention is the Integrative Model of Behaviour Prediction and Change (Figure 3). This latter model shares many attributes with its predecessors such as the Theory of Planned Behaviour, explaining behaviour change as the outcome of behavioural intention, which itself is the outcome of social norms and an individual's attitude to the behaviour in question. The element of perceived behavioural control and power accounts for variance in behaviours with incomplete volitional control, i.e., where the individual lacks complete control of the behaviour and is therefore unable to change behaviour. A recent further addition has been the re-categorization of

norms into 'injunctive' and 'descriptive' components (Hennessy *et al.*, 2010). The IM model is claimed to be a "*unique behavioural theory because it provides a detailed causal specification for explaining and predicting behaviour and also includes standardized measurement protocols to operationalise the theoretical constructs. Additionally, the theoretical principles are sufficiently general to apply to a variety of behaviors*" (Bleakley and Hennessy, 2012; p. 28). The use of techniques such as structural equation modeling using these measurement protocols in the sustainability sector would enable the relative influence of behavioural precursors to be mapped in order to inform future interventions.

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The Integrative Model places more focus on the influence of background factors than its predecessors, including, importantly, the role of intervention activity and media exposure. A key contribution of research underpinning the effective use of this theory is that different population segments may be driven more strongly by attitudinal factors, normative influences or perceived self-efficacy, i.e., the ability to change behaviour and sustain that change (Fishbein, 2008). Thus very different intervention strategies may be needed for different population segments (Smith-McLallen and Fishbein, 2008). For example, a behaviour that is attitudinally driven in one population or culture may be normatively driven in another (Fishbein and Cappella, 2006).

This theory, like other theoretical frameworks, does not have sufficient power to predict all behaviour, but in the health sector has been shown to predict up to 70% of some types of behaviours (Fishbein, 2008; Fishbein and Yzer, 2003). In the sustainability context, the use of the TPB and other related theories has been descriptive rather than analytical; therefore its power as a predictive tool has yet to be tested (Kollmuss and Agyeman, 2002).

Fig. 3: Fishbein et al. Integrative model of behavioural prediction and change (IB Model)
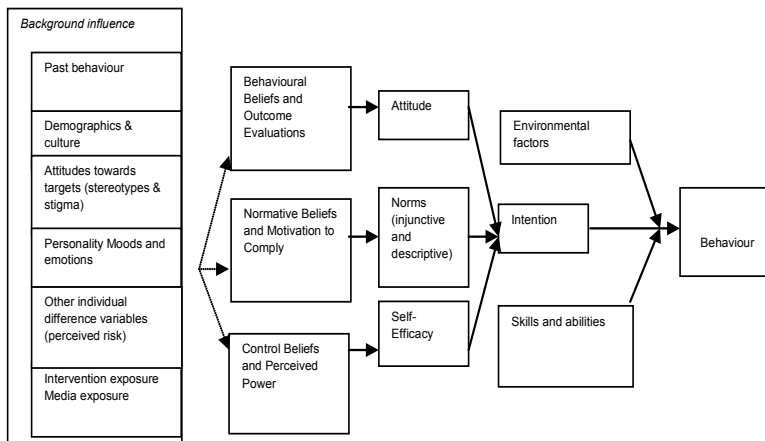
Source: Fishbein and Cappella, 2006

7. Improving communication effectiveness and message framing

The aim of intervention communications is to increase the strengths of beliefs that will increase positive behaviours and reduce the strength of beliefs that promote negative behaviours. The premise is that beliefs related to positive actions will carry more weight as determinants of attitudes, norms, self-efficacy and intentions (Fishbein and Cappella, 2006). A key factor that needs to be considered in terms of facilitating effective communications is whether messages are framed in terms of potential losses or gains to an individual; conversely, factors such as reactance, unrealistic optimism and risk denial are significant barriers to behaviour change.

No one single framing approach is applicable across all intervention types. In low-involvement conditions positive messages appear more effective, whereas the reverse is true for high-involvement conditions (Donovan and Jalleh, 1999). People are reluctant to act in response to information that contains ambiguity or uncertainty (Morton *et al.,* 2011). While positive framing fosters greater self-efficacy, in health contexts it can have a boomerang effect if the message conflicts with pre-existing knowledge, attitudes and beliefs (Wolburg, 2006). We are unable to locate any studies that have tested for these effects within sustainability contexts.

Effectiveness is also enhanced when the personal salience of messages is coupled with ways of building or reinforcing self-efficacy and presenting low cost solutions and support (Spence *et al.,* 2010). However, before this is achieved, issues relating to the capacity of individuals to understand must be addressed.

8. Capacity to understand: time dimensions and functional literacy

8.1 Cognitive limits: time dimensions

An individual's ability to visualise the future is only 15-20 years for most people (Tonn *et al.,* 2006); 50 years seems to be the longest conceptualization limit (O'Neill and Hulme, 2009), with scenarios projected beyond this being seen as largely hypothetical (Lorenzoni *et al.,* 2007). Therefore, talking about what will happen in a hundred years or by the end of the century is unlikely to be effective.

8.2 Functional literacy

The Organisation for Economic Cooperation and Development (Nutbeam, 2008) defines functional literacy as whether a person is able to understand and employ printed information in daily life, at home, at work and in the community. Varying definitions of literacy make cross-study comparisons difficult, however there appears to be agreement that some 20% of the population of most developed countries have severe literacy

problems and a further 20% have limited literacy (Adkins and Ozanne, 2005). The 2006 Australian Bureau of Statistics' Adult Literacy and Life Skills Survey gives cause for concern. The five-level assessment of literacy, for which Level 3 is regarded as the "minimum required for individuals to meet the complex demands of everyday life and work in the emerging knowledge-based economy" (Australian Bureau of Statistics, 2006) gives the following estimates (Table 1):

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Tab. 1: Summary of functional literacy levels australians aged 15 – 74 years (ABS: 2006)

Domains Measured	Domain Definition	% with scores falling in the lowest two quintile levels
Prose literacy	The ability to understand and use information from various kinds of narrative texts, including texts from newspapers, magazines and brochures.	46
Document literacy	The knowledge and skills required to locate and use information contained in various formats including job applications, payroll forms, transportation schedules, maps, tables and charts.	47
Numeracy	The knowledge and skills required to effectively manage and respond to the mathematical demands of diverse situations.	53
Problem Solving	Goal-directed thinking and action in situations for which no routine solution is available.	70

Source: Australian Bureau of Statistics, 2006

Scientific literacy is defined as having "a basic vocabulary of scientific terms and constructs and a general understanding of the nature of scientific inquiry"; on this basis only 17% of US adults were classified as being scientifically literate: (Miller, 2004: 273).

There also exists an additional group that could be classed as 'aliterate', in that they are able to read but choose not to, and rely on television rather than print media for news. More importantly, they learn through trial and error rather than by reading instructions (Wallendorf, 2001). The specific needs of these groups must be taken into account, acknowledging their difficulties but avoiding appearing condescending in the design and delivery of appropriate interventions (Bohnet, 2008). Much of the extant research centres primarily on the health sector and, clearly, more research is needed in functional literacy as it relates to sustainability issues.

9. Role of communities versus individuals

Few people now question or deny the gravity of the sustainability issues being faced both nationally and internationally. Environmental degradation, food security challenges and climate change present complex problems that have the potential to adversely impact the sustainability of individual and

community lifestyles and health issues (Peattie and Peattie, 2009; Berry *et al.,* 2011) . It is recognised that the majority of current sustainability indicators are based on national-level data that may *"miss critical sustainable development issues at the local level and may fail to measure what is important to local communities"* (Reed *et al.,* 2006; p. 406). Changing weather patterns and recent weather 'events' have increased discussions at all levels about what actions can or should be taken and whether strategies should focus on mitigation, adaptation, or both (Urwin and Jordan, 2008). Mitigation focuses on reducing the impacts of factors that impact on sustainability such as climate change while adaptation focuses on coping with its impacts: *"Put plainly, mitigation aims to avoid the unmanageable and adaptation aims to manage the unavoidable".* (Laukkonen *et al.,* 2009; p. 288). Mitigation efforts have a primarily global or national focus, but adaptation needs to be local (Vasi, 2007).

9.1 Adaptation and mitigation: achieving a balance

Adaptation has received less focus than mitigation, but there is increasing recognition for research to inform policy in areas such as to what extent various adaptation measures can help achieve sustainability goals, including the reduction of the impacts of climate change and thus what policies are need, and how they can be applied - and funded (Burton *et al.,* 2002). Further, there is also recognition that adaptation will not take place automatically and that some adaptation strategies may undermine social, economic or environmental issues (Eriksen *et al.,* 2011).

"*Mitigation without adaptation will not prepare societies for inevitable changes in the climate, and adaptation without mitigation will eventually lead to conditions to which adaptation is inconvenient, expensive or impossible*" (Picketts *et al.,* 2012). There is thus recognition that a combination of mitigation and adaptation strategies is necessary, but this is not unproblematic: "*these two strategies do not always complement each other, but can be counterproductive. A similar argument can be made for linking climate change adaptation with sustainable development. In order to avoid these conflicts, priorities need to be set*" (Laukkonen *et al.,* 2009; p. 287).

A new focus on proactively planned adaptation is evident in the academic literature, but experiential knowledge is lacking, inhibiting adaptation implementation. A barrier to the acceptance of the need for change may be the perception of risk given that first hand experiences of consequences may be lacking (Spence *et al.,* 2011). Two closely related concepts are the ability of a community (or social system) to withstand environmental changes (Taylor *et al.,* 2011) and adaptive governance, which examines formal and informal organisations and structures that manage the use of shared assets (Hatfield-Dodds *et al.,* 2007).

9.2 Community capacity and willingness to adapt

Communities themselves may vary widely in terms of their ability to adapt to change (Ivey *et al.,* 2004). It has been argued that community adaptive capacity ranges from 'powerless spectators' (who lack capacity, skills and resources) through 'coping actors' (who have the capacity to adapt but who may not be doing so effectively), to 'adaptive manager' communities (who have high levels of both adaptive and governance capacity) (Fabricius *et al.,* 2007). The most effective methods of assisting communities achieve adaptive manager status are not clear, although the capacity for social learning has received some attention (Ison *et al.,* 2007). Further, "adaptive capacity will not necessarily translate in adaptation" (Berrang-Ford *et al.,* 2011, p. 25).

The ability of communities to take control of their own change management activities is important, as many social marketing / behaviour change interventions are predicated on the assumption that communities are better able to understand their own needs and to develop, or co-create, appropriate solutions to challenges they face (McKenzie-Mohr, 2000). Co-creation has proven to foster innovation, rapid dissemination of knowledge (Kollmuss and Agyeman, 2002). This approach is not unproblematic as existing systems, structures and norms present significant barriers to sustained behaviour change (Moloney *et al.,* 2010). Additional challenges relate to competing knowledge and parochialism and the well-known "commons dilemma" whereby personal advantage overrides common interests (Aitken *et al.,* 2011).

It is important to identify used sources of information and the level of trust these sources have across different population groups. Different information sources may be used at different points during which behaviour change is considered, with social networks and trusted individuals likely to be more important than impersonal (e.g. mass media) sources if a decision is made to investigate how to make that change (Emtage and Herbohn, 2012). The sources of information used and preferred for communication will therefore be explored, in order to determine how well current information provision meets the needs of individuals and communities.

A key factor in achieving successful adaptation by individuals and communities to external influences and changes is the complex concept of social capital which is now discussed in detail.

9.3 Social capital

"Social capital is a necessary condition for sustainable community development as it enhances linking ties that increase access to resources outside the community. Social capital in and of itself however is not always sufficient to sustain and develop local community initiatives"(Dale and Newman, 2010, p. 5).

However, while social capital is recognised as a key element in community-level adaptation (Adger, 2003) its precise meaning, dimensions and mechanisms are unclear. This is due, in part, to the fact that the concept

is, in spite of a large body of literature on the subject, difficult to define due to multiple definitions stemming from disparate disciplinary approaches including economics, political science, sociology, anthropology and other social sciences. The definition used in the context of complex socio-ecological systems is "the social norms, networks of reciprocity and exchange, and relationships of trust that enable people to act collectively" (Armitage *et al.,* 2009, p. 96).

This diverse disciplinary interest has resulted in a lack of standardised measurement instruments (Van Der Gaag and Snijders, 2005) or empirical data across all aspects of society in which social capital (however defined) may have a role (Sabatini, 2009). It is now recognised that there has been an over-emphasis on easily measured utilitarian economic factors at the expense of other aspects of community sustainability, well-being and adaption to change, such as cultural and non-material impacts (Adger *et al.,* 2011) . There is also debate over the contribution social capital analysis can make, with views as divergent as it potentially providing a 'magic bullet' versus it being a misrepresentation of structural factors over which communities have little control (Onyx *et al.,* 2007).

Variations in perceptions of social capital within the public sector have thus led to large statistical inventories but a lack of direction as to "how to implement the concept in a concrete and useful manner from a public policy perspective. Specifically, it does not distinguish between what social capital is and what it does" (Franke, 2005, p. 6) , although it is suggested that social capital makes "other forms of capital more efficient" (Woodhouse, 2006, p. 83). These other forms of capital include human, natural, physical and financial ones and their interdependence is recognised although poorly understood (Myers *et al.,* 2012).

The various forms of social capital are particularly important when governmental agencies are not actively involved in planning for major adverse events or in recovery from them: "*social capital, in effect, takes over as a substitute for help from the state. The rolling back of the state in times of crisis or "adjustment" often means that this substitution of social capital is a necessity, rather than a choice*" (Adger, 2003, p. 397). Successful adaptation requires social networks, together with leadership and trust and is regarded by some authors as "the glue for adaptive capacity and collaboration" (Folke *et al.,* 2005, p. 451).

Positive impacts of social capital are evident when strong ties exist and there is a belief that working together can make a difference; general expectations that support this work will develop, evolving into descriptive norms (i.e. norms about what most other people are actually doing (Cialdini, 2007) about effective behaviours and motivating others to support the activity (Foster-Fishman *et al.,* 2009).

However, the fact that social capital may have positive or negative impacts is not widely recognised. Negative social capital may reinforce inequalities, exclude 'outsiders' or restrict freedom to act (Adhikari and Goldey, 2010). Negative social capital may generate negative outcomes for a whole group such as a reduction in norms, (in) tolerance of 'outsiders' or may produce positive outcomes for some at the expense or exclusion of others (Patulny and Svendsen, 2007). Understanding how

positive and negative impacts vary across different types of communities is important as is the development of an understanding of the factors that enhance or diminish social capital such as inequality, exploitation and power tactics (Onyx *et al.,* 2007) and the impact, positive or negative, of policy implementation (Talbot and Walker, 2007).

10. Conclusions and directions for future research

We have detailed the complexity of factors potentially impacting, both positively and negatively on communication of the need for behaviour change in order to achieve sustainability aims. We have also provided a partial research agenda focused on the interactions of individuals with marketing communication channels and highlighted a range of community-based aspects that warrant further investigation. For the latter, multiple disciplines should be involved. There are three possible approaches to the combination of expertise from multiple disciplines: multidisciplinary, interdisciplinary and transdisciplinary. Multidisciplinary approaches seek input from different disciplines but these are independent of each other and may create a mosaic of interventions. In interdisciplinary approaches, disciplines work together to provide input but individuals stay within their own disciplinary boundaries (Holmes *et al.,* 2008).

The transdisciplinary approach is synergistic in that it uses concepts, theories, research approaches, analytical methods and strategies for the interpretation of findings to develop shared conceptual frameworks that integrate and transcend individual disciplines (Mâsse *et al.,* 2008; Ramadier, 2004). Key features of this approach include recognition that no one group has a monopoly on knowledge and that collaborations must be created 'not only between different academic disciplines but between researchers and non-academic groups with a stake in the problem under investigation'(Balsiger, 2004, p. 161).

The influence of intrapersonal, interpersonal, organisational, community and societal influences on sustainability-related issues and the multi-level interventions that will be required to address them indicates that transdisciplinary approaches have much to offer in developing effective communications.

Our research agenda would encompass the use of techniques such as structural equation modeling, as noted earlier, to compare and contrast the analytical and predictive power of available theories, to operationalize theoretical concepts and to thus predict potential behavioural outcomes resulting from future interventions.

As part of this research agenda, a range of messages, incorporating both positive and negative framing, a range of temporal dimensions and individual versus collective community actions will be developed and tested across a range of population sectors, including climate change sceptics versus believers and people from a range of educational backgrounds. Comprehension and both short and long-term message impact will be measured. In conjunction with this research will be the development of a greater understanding of the communications channels used and trusted by different population segments.

Cross-cultural research is desirable but presents a number of distinct challenges, including language nuances, and, if undertaken in developing countries, potentially lower literacy levels which may impact on data collection techniques such as using cognitive interviewing techniques to overcome the problems encountered with survey-type instruments by gaining participants' understanding and interpretation of individual questions and how their answers are constructed. In addition, the theories discussed earlier and many other behavioural theories have been developed and applied within developed western contexts. As part of our contribution to expanding knowledge and expertise, the intended research will endeavour to evaluate the utility and predictive power of these theories within developing countries.

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Academic or professional position and contacts

Lynne Eagle
Professor of Marketing and Associate Dean (Research) for the College of Business, Law & Governance
James Cook University, Townsville, Queensland, Australia
e-mail: lynne.eagle@jcu.edu.auUniversity

David R. Low
Dean of the College of Business, Law & Governance
James Cook University, Townsville, Queensland, Australia
e-mail: david.low@jcu.edu.au

Lisa Vandommele
Curriculum Management Officer
James Cook University, Townsville, Queensland, Australia
e-mail: lisa.vandommele@jcu.edu.au