Improving Conservation Community Group Effectiveness Using Mind Mapping and Action Research

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Abstract
This paper examines a case study where mind mapping is used within an action research project to foster improved community group effectiveness and decision-making. The case study focusses on the social dynamics experienced during the formative stage of a community action group in Byron Bay, New South Wales; one of a network of such groups, formed to ensure that sustainable environmental management practices are followed in proposed coal-seam gas developments. In the context of examining systemic social interactions within such a group, the study recognises both the importance of communication and the susceptibility of individuals to certain behavioural patterns. Negative emergent norms led to excessive behaviours that threatened to hinder effective communication and group behaviour. Use of mind mapping countered this negative tendency, focussing the inherent positive qualities of the group, and thus enabling more efficient decision-making. Shown to be an effective tool for overcoming communication barriers and increasing cohesion; its power lies in maintaining process transparency, removing power-structures and ego-centric personal barriers, hence facilitating effective communal knowledge sharing, clarification, idea crystallisation, and planning.

Keywords: non-linear communication tools, mind mapping, coal-seam gas, social change, community action, group dynamics, action research

INTRODUCTION
This paper demonstrates the use of mind mapping in order to improve decision-making and group effectiveness. The case study focusses on a community action group formed as a result of a land-use debate regarding coal-seam gas developments. Such natural resource management issues are becoming increasingly contentious as decision-makers struggle to balance demands for economic development with associated environmental risks (Suzuki and Dressel 2003; Reid et al. 2010), creating challenges for sustainability. Civil society and citizen participation in decision-making has been recognised as key to sustainable development (Bäckstrand 2003; Lafferty 2004). Urgent calls are being made for the development of mechanisms that allow science and society to better address decision making and citizen needs at global, regional, national, and local scales (Reid et al. 2010), including improved communication between groups of different cultures, languages, and nationalities (Kumasi et al. 2010). Environmental managers and policy-makers need tools to assist in weighing community input alongside expert advice in assessing implications of policies and management plans (Fraser et al. 2006). Participation in community groups facilitates community cohesion, forming a nucleus for clarifying community values and needs, and potentially encouraging social action (Bhatt and Tandon 2001). However, despite good intentions, the development of well-functioning community groups can be difficult, and may need outside support. This paper describes one approach to assisting such
development, using the example of a community group addressing the natural resource management issue of gas industry drilling, describing the use of mind mapping within an action research context to help the group define its purpose, structures, and aims.

The research focuses on interactions occurring within the case study of a community action group formed in Byron Bay, Northern New South Wales, Australia, under the banner of a growing social movement concerned with the impacts of coal-seam gas exploration and production on natural water systems (Lloyd et al. 2013). The unifying issue of water within this particular social movement is drawing together people from diverse sectors of society. Groups that form under such circumstances are a rallying point for a variety of personalities from differing backgrounds, offering a range of skills and experience in support of their unifying cause. However, in order to be effective in their aims, these individuals are required to form harmonious and effective community groups and networks, and achieving this may be difficult. Barriers to communication, such as hyper-narcissistic behaviour, unresolved conflict, and unclear focus, can leave individuals feeling disillusioned and alienated by the group processes (Keen 2003). Here we demonstrate one way to overcome this concern, and thus enhance the effectiveness of a community engagement with natural resource management through involvement in a community action group.

Evidence from the cognitive sciences (Vekiri 2002) shows that visual displays contribute to the enhancement of learning and provide support for the use of mind mapping in enhancing, retaining, and improving knowledge. Used as a communication tool, mind mapping can contribute to the empowerment and social learning that can take place for individuals and groups (Lloyd et al. 2010). This paper, therefore, explores the use of mind mapping as a non-linear tool for improving community group effectiveness and engagement in a natural resource management issue, hence helping to set the community on a pathway towards effective social change, providing a valuable case study for the application of such a tool in this context.

The background to this study lies in the importance of growing and widespread acceptance of the concept of community consultation throughout national and international development sectors since the 1970s. Community participation has been defined as the collective efforts at increasing and exercising control over resources and institutions by groups previously excluded from control (Kumasi et al. 2010). For this to be successful, community groups need to be operationally successful, especially where there is a danger that a top-down approach towards change and development can fail to incorporate factors of local significance; alienating local communities from the decision-making process (Suzuki and Dressel 2003; Clapper and Wolfram 2007; Pickering and Jewell 2008; Brown 2011). Inadequate community engagement is a primary governance problem contributing to social conflict around land and resource management issues (Hindmarsh 2010), and even where the consultation process successfully gathers data from stakeholders and the community, it is rarely involved in initial planning or in deciding upon future research activities (King 2000).

As a result of these concerns, there is a shift internationally towards more participatory or bottom-up approaches being integrated within the consultation process to give greater credibility to sustainable environmental management practices (Fraser et al. 2006). Relevant stakeholders need to be systematically represented, and better tools and frameworks developed for this purpose (De Weaver and Lloyd 2005; Lloyd 2005); Reed (2008), for example, argues that stakeholder participation needs to be underpinned by a philosophy that enables empowerment, equity, trust, and social learning to take place. Effective community engagement helps to improve the quality, legitimacy and accountability of decisions, and also can lead to social learning (Huitema, Cornelisse et al. 2010). The social learning that can take place during community group processes can positively influence both stability and change in a societies’ ecology. Community groups can provide an important space for information sharing, raising of concerns and synthesis of ideas (Lebel et al. 2010), while it is known that the best type of learning occurs over time in real life contexts, thus emphasising the development of capacity for effective action in the setting that matters to the learner (Senge et al. 2000). There are, however, a limited number of mechanisms or frameworks available for public services to involve the public (Hagglith and Vanclay 2003; McIntyre-Mills 2010).

The neuroscientist Greenfield (2000) stresses the need for awareness of the different metaphors for knowing. The more connections that we are able to make within the brain and across different areas of knowledge and different paradigms (social, economic, and environmental), the more conscious people can become. This has implications for approaches to science, the way people live and run governments, and for ethics (McIntyre-Mills 2010). To empower individuals and groups in the community and make informed choices to steer governmental decision-making processes, the general community and scientific communities need to align more closely; to foster social learning on the scale needed to bring about true sustainability for our society, whilst the idea of science as purely rigorous, quantitative, statistically based and objective, needs to shift towards a more integrated approach (Greenwood and Levin 1998; Reed 2008).

Action research takes the view of scientific enquiry as a form of human action that involves creativity, innovation, ambiguity, complexity, group dynamics, and many pragmatic concessions to the limitations imposed by the resources and time available. Used in this way, the processes of action research and action learning can be used effectively to change individuals, groups and organisations (Swepson et al. 2003).

Action learning (or action research) is typically characterised by the mutuality in which knowledge springs from action. Dick (2000) regards action research as a family of processes which allow for a combined pursuit of research, action, change, reflection, and planning. He emphasises the importance of alternating action and critical reflection within a spiral process.
resembling that of Kolb’s (1984) experiential learning cycle. The key aim of action research is to establish a learning community within which the involved participants are able to control their own destinies more effectively, and can keep improving their capacity to do so whilst remaining conscious of the learning process (Martin 2001). Action research acknowledges that the world is more complex than our apprehension of it can be, and thus we will always be approaching this complexity through a series of imperfect compromises (Greenwood and Levin 1998).

The positivist, reductionist approach to scientific research breaks a system down into its various components in order to identify cause and effect relationships between simple units of study. However, applied in a social context, this can lead to the separation of individuals or groups from the seemingly chaotic patterns and rhythms of life (Flood 2010). System dynamics or systemic thinking underpins action research with the idea that the whole is greater than the sum of its parts. Before describing the application of this action research approach, it is important to consider the role of social activist groups and, especially, the dynamics within such groups.

**The role and dynamics of social activist groups**

Social action is one segment of a wider, complex set of relationships between people and institutions, and has been argued to be a symptom of resistance to the social domination of capitalism (Guptara 2010). Social movements are socially-collective actions in which the general population is alerted, educated, and mobilised to challenge power-holders; and address and attempt to redress social issues (Moyer 2001). Such a definition places engaged citizens at the core of the democratic process within what is essentially a struggle for power, raising the expectation that people can, and should, be included in decision-making processes in all aspects of public life (McIntyre-Mills 2010). This provides a role for all those who wish to participate in the process of turning festering social and environmental issues into a citizen demand for change, whilst developing creative solutions that are more appropriate for society as a whole (Moyer 2001). Castells (1983) brings the focus of social movements straight back to community, noting that where people feel unable to control the world, they tend to shrink the world to the size of their community.

Aggregating people can pool knowledge and ideas on a common purpose, share the workload and allow for the specialisation of tasks, supporting each other, and maintaining momentum on a task where one person may not. A community group may be a homogenous collection of members with clear boundaries, or have much wider ranging personalities and blurred boundaries; social movements far more typically consist of groups of the latter description (Shields 2000). Opposition to social movements may come from many directions, including the industry being challenged. However, one of the greatest challenges comes from the social dynamics of the movement itself, which is the focus of this research.

A useful way to consider group formation is to view groups through Tuckman and Jensen’s (1977) model of four-stage development, often referred to as forming, storming, norming, and performing (Tuckman and Jensen 1977). The storming stage is characterised with the potential for conflict to occur as conformity decreases and clarification of values and goals is sought. In the final stage, the group becomes a high performing team that is able to work out collective goals, issues, and difficulties with increased loyalty, support, cohesion, synergy, and high team morale. Group members share roles and information freely and high levels of communication link increased productivity with individual satisfaction. Moreland and Levine (1982) elaborate on the stages of group formation as collective norms develop. From entry to group socialisation, individuals are shaped by the group and the group is in turn shaped by individuals.

Decision-making can take longer in teams, and egocentric behaviour, such as power plays where people seek to devalue others’ point of view or manipulate a situation, can seriously hinder team success. Groups can lose focus and be criticised for coming up with wild, impractical proposals and waste time discussing the viability of such options (Hensey 2001; Keen 2003). In fragmented and/or politicised circumstances, a group situation can become particularly volatile, where a butterfly effect of sorts can occur as unintended consequences of individual actions can build up and manifest in unexpected ways (Flood 2010).

Effective teamwork is able to improve information flow and increase member learning and skills, which lead to decision-making based on a broader framework of knowledge, ideas, and perspectives. Many key factors can contribute to an effective team (Gladstein 1984; Brannick et al. 1997; Hensey 2001; Moyer 2001; Keen 2003; Baninajarian 2009); those most commonly stressed in the literature are the alignment of goals and objectives, structure, leadership, and communication. Deliberate efforts to develop teamwork can directly improve effectiveness, especially those groups which consist of powerful and impatient personalities (Buchholz and Roth 1987; Hensey 2001). Buchholz and Roth (1987) state that the key to producing a synergistic group relationship is achieving the full commitment of individuals through collaborative decision making, meaning that they are all focussed on working towards one agreed direction or purpose (Weissglass 1990; Senge et al. 2000; Stankey and Allan 2009).

**Harnessing and maintaining productivity using non-linear communication tools**

Communicating new and varied concepts between and within different community groups requires recognition of a variety of learning styles and tools to aid communication for actively engaging individuals. When dealing with the complex interactions of dynamic social systems, visual or non-linear communication tools are often able to more adequately express information and allow social learning to take place (Lloyd et al. 2010). There are several related non-linear communication tools...
tools, with the common feature being the use of diagrammatic relationships of various kinds. Pictures and structured diagrams are thought to be a more clear and comprehensible way to display complex topics. Group model building, concept mapping, mind mapping, and argument mapping are variants of these tools (Dwyer and Stave 2008; Davies 2010), although some are used interchangeably.

Mind mapping has been described as visual, non-linear representations of ideas and their relationships (Biktimirov and Nilson 2006). The idea is to write in a visual language that follows the brain’s thought processes, and is therefore easily understood and processed by the brain (Akinoglu and Yasar 2007). Goodman (1986) stresses the importance of designing work settings that are brain compatible, not brain antagonistic (Jensen 2007). Hart (1975) regards the brain as a special environment where information is organised into patterns. In order to break away from the conceptual constraints of old ideas, there is a need to take a wide view of an issue or problem. This can then be creatively defined by using objective judgement to select priorities and form a plan of action. Buchholz (1987) describes creativity as the breaking of established cognitive connections whilst making novel connections, which is exactly what the skilled use of a mind map can achieve.

A typical mind map starts with a central theme from which information branches out into nodes that use key words, colours, and graphical representation (Buzan and Buzan 1996). A hierarchy of associations can then be built as those nodes branch out into a secondary order, and from this further links can be made. Mind mapping is regarded as a form of structured brainstorming that shows the way ideas relate to each other and is a useful tool for expressing and interpreting complex environmental and geographical concepts and systems (Åhlberg and Ahoranta 2002; Lloyd et al. 2010).

Mind mapping is useful for promoting collaborative and active learning processes for people with a variety of learning styles, and as a tool for analysis and note taking (Lloyd et al. 2010; Jones et al. 2012). In the context of problem-solving, decision-making processes and also in education, mind maps are used to form, visualise, conceive, classify, and structure thoughts for improved performance (Farrand and Hussain 2002). The mind mapping tool is able to direct people towards convergent and divergent thinking, helping to build ideas or clarify a problem by visualising general frameworks and/or details of chosen topics (Akinoglu and Yasar 2007). Being able to view all the components of a mind map simultaneously aids people to make important connections between existing conceptual understandings and new knowledge (Buzan 2002; Fender 2003; Akinoglu and Yasar 2007; Lloyd et al. 2010).

In order to achieve solid strategies and action plans, it is important to facilitate dialogue between group members, which can bring to the surface relevant ideas and concerns from as deep a level as possible. A clear set of group values and priorities can then be compiled to align a group on a path of action where shared resources can be managed more sustainably (Flood 2010). Two contrasting activities play a vital role in generating creative power: the divergent process is a brainstorming scenario for generating as many options as possible whilst developing and linking ideas. The convergent phase of creativity can bring ideas together to further develop a practical solution. A thinking process such as this is useful for defining both problem and solution, since once a problem has been clearly defined it is much easier to generate relevant solutions whilst not limiting conversation to one topic when considering alternatives (Goodman 1986; Buchholz and Roth 1987).

When people interact with each other, there can be a very specific set of information that is shared with others (Luft 1969). When individuals gather together, the information that is or is not disclosed by individuals can have a significant impact on trust and has the potential for creating disharmony or conflict. A dark side of human nature can manifest in a variety of ways such as hidden agendas, victimisation, self-interest, and corruption. Meanings behind such a dark side can be largely unconscious, with motives such as uncertainty and anxiety caused by a whole range of reasons from fears of rejection, lack of skills and knowledge, and/or the need for recognition. Our existential sense of insecurity can drive us to anxiety amongst the purposeful activities associated with work and life (Hase et al. 1999). If opportunity is provided for group members to rapidly and transparently communicate who they are; who they represent and their goals and motivations, then there is much better chance of group cohesion.

Haggith and Vanclay (2003) used a non-linear communication tool to develop a sustainable management plan for the communal natural resources of a Zimbabwean tribe. The success of this study demonstrates that there is greater potential for social cohesiveness when group aims are aligned for the common good. Individuals are far more likely to behave in ways that benefit the group rather than themselves when they have helped to define collective aims through a transparent process (Buchholz and Roth 1987).

**METHODS**

The systemic thinking perspective of action research has been used as the epistemological basis for this study, which seeks to describe and understand social interactions occurring within the group (Flood 2010). Knowledge gained through this process is specific and local, whilst taking as holistic a view as possible (Greenwood 1999). Researchers must recognise themselves as agents of change and key instruments of the study; with their role being to design a process that can produce the relevant information that can lead to action and subsequent improvement (Martin 2001). The core of action learning (Swepson et al. 2003) is the researcher’s ability to ask fresh questions and to mentor people to find their own answers. Once the initial planning stage is over, the role of the researcher is to guard the process and critically reflect on their own strategic actions, hence continuing the action research cycle which in turn leads to the uncovering of new interpretations and perspectives (Martin 2001). Figure 1 illustrates the action learning cycles developed in this study.
Mind mapping for improving the effectiveness of a community action group

The use of a case study method was chosen due to the intention to examine interactions not easily distinguishable from their context, being an integrated approach of enquiry that uses unique examples of social situations as the basis of deep description and analysis, to gain insight into questions of how and why a social process or phenomenon works (Yin 2010). Multiple sources of data have been used to increase the richness of contextual understanding (Gladstein 1984; Reason and Bradbury 2001; Yin 2003). In this study, the specific case study is of the Byron Bay coal seam gas (CSG) community group. At the time research started, the most active social movement in Australia was forming in relation to potential impacts of CSG exploration and production on water resources. The movement began in 2010 in Tara, a small township in southeast Queensland (Australia), when several land owners carried out research following requests by a gas exploration company to carry out works on their land. From this, significant concerns arose regarding the sustainability of the mining techniques used. The Lock the Gate Alliance formed out of this initial group, attracting the support of many existing environmental groups. As awareness of the issue grew, hundreds of groups have since formed across the country. The study focusses on the intra-group dynamics of the Byron Bay community action group, Byron Saving Australia’s Natural Environment (BSANE), following an invitation from a group member playing the gatekeeper role.

Where some case studies may focus on homogenous groups who have a great deal in common in terms of age, gender, economic, socio-political, and cultural background, the BSANE group was a non-homogenous group, representing a wide cross-section of the local population. Of approximately twenty-five group members, just over half were female. The group comprised of individuals from a wide range of educational and socio-political backgrounds, with ages ranging from sixteen to near seventy. About twelve people were local land owners of land covered by Arrow Energy’s Petroleum Exploration Licence 445, four of whom were farmers. Two individuals were in the final years of high school and three attending university. Other occupations included teaching, hair-dressing, information technology, marketing, and hospitality, with several individuals having businesses of their own in catering and real estate. Although all spoke good English and most were born in Australia, including several indigenous Australians, there were also a number of Australian citizens originating from the United Kingdom, South Africa, and the United States. One group member had close family working in the Queensland CSG industry, and at the time of these meetings many in the group had direct or indirect investments in the CSG industry through their superannuation (retirement) funds (however this later changed). Meetings took place in the centre of Byron Shire, although attendees came from at least seven of the surrounding townships.

Seven BSANE meetings, two to four hours long, were observed prior to a mind mapping workshop. During this phase, a process diary and mind maps were used by the researcher as a data collection technique to answer the question, “what social dynamics are aiding or preventing success?” Gladstein’s (1984) model of task group effectiveness provided a theoretical framework for the critique of meeting processes and the identification of barriers to group effectiveness (Yin 2003), discussed in the process diary. This data was then used to develop the next phase of the project, where the use of mind mapping was tested as an intervention for improving group effectiveness. A semi-structured mind mapping interview technique was used to gauge viewpoints of group members, with a focus on key concerns and aims. This qualitative data was then combined with contributions made during group sessions in order to differentiate between individual and group thought processes in preparation for the mind mapping workshop.

To measure group effectiveness, Straus and Corbin’s (1990) grounded theory for qualitative research stresses the necessity of the development of a set of rules that the decision making process can follow for the coding of behaviour. Dickenson and McIntyre’s (1997) framework provides a clear scientific pathway by which team performance measures can be derived. The methodological process is: Identify a relevant model of team performance; use the model to identify variables to be

![Figure 1](http://www.conservationandsociety.org)

The two action research cycles of the study, showing how data gathered from the initial phase of observations and interviews was used to develop the second phase, where mind mapping was adopted to enhance group understanding, focus, and cohesion.

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measured; identify observable attributes for each variable; identify observable behaviour for each attribute; and develop decision rules and a measurement scale for the coding of each behaviour. The Gladstein model was chosen as a model of group effectiveness, as it takes into account a wide variety of task groups in different contexts (Gladstein 1984). Gladstein applies the findings of laboratory experiments and human relations training to on-going organisational work teams and groups; separating variables that contribute to task group effectiveness into inputs, processes, and outputs. Inputs at the group level include group composition and structure, such as clearly defined roles and goals. Group process includes communication, strategy development, conflict resolution, boundary management, and skills-based role allocation. Outputs are performance and satisfaction (Gladstein 1984). The area of interest for this study comprises the process variables, but also considers the impact of input variables, as in a laboratory setting these variables would be controlled. The characteristics exhibited by successful teams were categorised according to the Gladstein (1984) model. This provides a detailed framework, following the same process utilised by Dwyer and Stave (2008) to develop a matrix to be used by the researcher in the analysis of observations, and from this, the extent to which the group exhibits desired behaviours could be scaled.

RESULT

Group dynamics

The observation phase enabled the researcher to gain an understanding of group dynamics and to provide a valid critique of group process. Meetings consisted of a random association of individuals from varied cultural backgrounds, ages and professions, with the group appearing to be in the early formation stages (Hensey 2001). Lengthy discussions covered a diverse range of topics and divergent individual agendas were linked to key group aims; few individuals did most of the talking and no obvious process was followed. Benefits of this approach were that people felt comfortable discussing a wide range of topics. Listening, however, was not always of a high quality. Social norms that developed during this stage were for periods of lengthy monologues, interjections and parallel conversations (Buchholz and Roth 1987). Strong ideas regarding views of the group role were apparent, but there was no clear attempt to integrate these or move them forward. No action points were clarified, and there was no strategy to check or feedback on those points. The meeting often focussed on problems of a global scale; or on perhaps what Keen (2003) may call wild, impractical solutions.

No-one felt that it was their role to take charge initially, and one individual who tried was not accepted by the group, possibly due to an autocratic leadership style. Over several meetings, group size fluctuated from 8 to 25, and different people were writing agendas, with facilitation providing little leadership, and meeting purpose often being unclear (Gladstein 1984; Buchholz and Roth 1987). Some meetings experienced conflict, specifically between strong personalities, with one individual marching out mid-meeting. No clear structure or process was followed; very little was put to a vote, and there was no sum-up or meeting close. Instead, conversation continued for up to four hours until members were literally exhausted and would start to leave one by one (Gladstein 1984; Senge et al. 2000). Group members were clearly experiencing frustration of this high level of unstructured conversation and inability to gain traction as a group. Despite this, some roles were defined prior to the workshop, hence the Chair started to put certain processes in place including meeting agendas. Five individuals from the group were interviewed regarding key concerns, shown in the Wordle graphic in upper Figure 2. Interviewee responses regarding views of the group’s role and aims (shown in lower Figure 2) highlight strong themes relating to community and people coming together. Each time a word has been mentioned by interviewees it is amplified; hence the larger words show common themes that have arisen from the interviews.

Mind mapping for improving group effectiveness

Given this record of concerns, roles and aims, the researcher was invited to implement a mind mapping workshop, to assist in group development. This provides an opportunity to test mind mapping as an intervention for improving the effectiveness of a group such as BSANE, drawing from the information gained through previous phases of the action research process. The

![Figure 2](image.png)

**Figure 2** WordleTM word cloud plots, displaying the relative importance of ideas and concepts expressed by participants regarding the development of the BSANE group, based on analysis of interview transcripts; the clouds give greater prominence to words that appear more frequently in the source. These were later used to draw common themes with the mind-maps developed by the group. **Top**: concerns voiced by interviewees. **Bottom**: views of the group’s role and aims.
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principle aim of the workshop was to answer the question, “Can mind mapping be used to improve community group effectiveness?” Its objectives were to: clarify concerns; establish overarching goals (to create purpose); gather ideas and knowledge; form smaller task groups (Wheelan 2009); prioritise potential goals and actions; carry out a skills audit to help establish roles within the sub-groups; and to develop a specific plan of action.

Key behavioural processes used to measure group effectiveness are task behaviours, identified from the observation stage of the BSANE group. The ability of the group to focus on the task in hand, form clear aims and objectives, and to use time effectively, were the chosen units of analysis. A pre-test gauged individual perception of group effectiveness and previous experience of mind mapping, and an evaluation sheet provided a post-test for feedback following the workshop. The workshop was voice recorded, and evaluated by the researcher for a comparison to be made to group functioning in previous meetings. Group effectiveness was recorded as scaled values at each meeting, using set definitions of effective group attributes adapted from the Gladstein (1984) framework; this was a similar assessment process to that used by Dwyer and Stave (2008). The scores allocated by the researcher were explained and justified in the process diary. A top score given for effective communication, for example, indicated that group members exhibited active, effective and open communication, all individuals were practising both listening and talking in discussions that were rich in substance, and diverse views were valued and sought (cf. Dwyer and Stave 2008).

The session commenced with a brief introduction to the use of mind mapping and completion of the pre-tests. The first mind map was compiled showing diverse concerns. However, issues related to the CSG industry were agreed to be the focus of the workshop, hence a second hierarchy was developed around the word fracking, (Figure 3). The second mind map was used to brainstorm group goals. The mind maps had a skeletal structure that provided guidance, whilst allowing the group to make the majority of contributions. Clarification of the overarching objectives created a focal point, kick-starting their momentum in a single direction (Baninajarian 2009).

The final map (lower Figure 3) had a node for each of the four ‘actions’ sub-groups – fundraising, communications, research, and administration. To each of these, the whole group made contributions. A talking stick (a group management device by which an object is passed from person to person, allowing only the person holding the object to speak) was passed around the group, used to ensure that each individual made at least one contribution, although it was later discarded when found to disrupt the flow of thought. Certain social dynamics were apparent, as one member in particular kept trying to hurry up the process, then would speak at length. Such behaviours were, however, minimised, as the mind mapping process was able to gather and share the knowledge of the group in a short space of time.

The group then split into four working groups. Almost all group members appeared engaged, responding enthusiastically to the activity, as they designed their mind maps in their own individual styles (although there was one notable exception of two new arrivals who spoke loudly between themselves). In the allocated time, the working groups had now completed a skills audit, using their own mind maps, and two of the four groups had developed strategy for achieving a chosen goal, one being how to organise a fundraising event. Writing down their skills was powerful for group members. One participant commented, “It felt so empowering to write down my skills in front of the group and share what I can do”.

The group re-joined for the workshop for a summing up, and evaluation sheets were completed. The members appeared to be already working better together and building momentum; group motivation has demonstrably improved (cf. Jones et al. 2012). Three individuals confessed that they had been disillusioned with the progress of the group, but were now feeling much more positive: “This was my last meeting mate, if this carried on like the others, I was out. Now I feel like we have a direction and unity, Thank you!” Just as the meeting finished, the two newcomers who had not participated, started arguing, shouting and swearing. The group pulled together immediately to tell them that this had been their most productive and positive meeting yet, and that they were not to ruin it. They were then
encouraged to hold hands with the whole group who chanted a positive affirmation three times, followed by three oms (an incanted sound often used in meditative ceremonies to express respect for the universe; it is often adopted in communal activities in this region as a closing ritual for meetings and gatherings, bringing the meeting to a close).

**Measures of group effectiveness**

Gladstein (1984) scores provide numerical assessment of effectiveness of group meetings, before, during and after the mind mapping workshop (Figure 4). Whilst resource availability and commitment to the cause remained relatively constant throughout the process, there is a marked improvement in all other areas, including communication, conflict resolution, role allocation, project management, collaboration and decision-making processes, indicating a strong improvement in group effectiveness both during and following the workshop, when the group continued to develop process, structure, roles, and meeting protocols. The greatest improvements evident were that of project management and group structure, which were developed and maintained in meetings following the workshop.

Participant evaluation of the mind mapping activity is important, since it reflects the immediate response of participants to this stage of the action research cycle (Greenwood and Levin 1998). Pre and post-testing of the group’s perceptions of the effectiveness of mind mapping provided insights into its effectiveness. The pre-test group showed a diversity of views (Figure 5): common themes comprise concerns regarding time management, and neutrality regarding goals and objectives. It is interesting to note that a significant number of participants believed that an adequate process was being followed, in contrast to the researcher’s observation that there was little or no process in place at that time. The prevalent tendency towards neutrality changes in the post-tests, where participants unanimously agree that the mind mapping workshop had aided formation of clear goals and focus. Participant comments and the Gladstein scores support this. All respondents gave a positive response to the mind mapping workshop in the post-tests (Table 1).

**POST-STUDY REFLECTION**

Much was achieved in the hour-long workshop, despite time limitations and the unsuccessful use of a talking stick. The mind maps created were typed up by a group member, which indicates that some may favour a more linear thought process, but also shows the ease at which the non-linear diagrams can be converted to linear form (cf. Lloyd et al. 2010). The workshop was well timed to aid group formation in this case, and could be applied to many other groups during early formation stages to foster movement towards cohesion. Various issues were discussed at length prior to the workshop, which may well have been an important factor in allowing for individuals to air their diverse views, providing a fertile ground for group cohesion.

From the analysis and triangulation of the data gathered, it is evident that mind mapping has contributed to a significant improvement in a variety of indicators of group effectiveness. The group is comprised of widely differing and strong personalities. However, mind mapping gave them the opportunity to concisely voice differing perspectives, identifying motivators whilst bringing them together on common ground and consolidating collective goals. The benefits of this process cannot be underestimated, as it has facilitated momentum towards a unified purpose (Wheelan 2009). The mind mapping workshop helped BSANE to move on from the storming stage of group formation, where there was significant potential for the group to break down. Instead it moved forwards to the performing stage, more able to function effectively as a group, and from this, to develop identity and strategy (Moreland and Levine 2001). However, it is important to note that the BSANE group is in an area with a unique socio-political profile. This case study has shown, nevertheless, that despite a wide-ranging variety of participant backgrounds, the mind mapping worked well. It would, of course, be interesting, to further test this technique with groups of different demographics and socio-political views in other regions of Australia.

The meetings following the mind mapping workshop continued to be productive. Roles were formalised, processes
were agreed upon and an agenda was followed. Photographs of the mind maps were emailed out and used to create a mission statement. The group name was chosen at the following meeting, and several events and strategies have been planned and implemented. Conflict is dealt with more easily, as opposing views are rapidly negotiated and compromises found. Mind mapping has been adopted as a communication tool by the group, and has since been used for idea synthesis and strategic planning. Communication is open, a platform for creativity has been maintained and new ideas are explored and developed. Differing views are valued, whilst decisions are made collaboratively. One month following the mind mapping workshop, BSANE carried out a successful information evening with approximately 250 attendees and 6 well-known speakers, with petitions, information sheets, registration sheets and merchandise organised. Many other events were now being planned, and the group linked with other groups across the region to coordinate their efforts. In short, the group was now displaying synergy, and clear, strategically developed goals (Buchholz and Roth 1987; Baninajarian 2009).

### CONCLUSION

The observation of the BSANE group highlights many patterns of behaviour outlined in the literature, showing a fluid and changeable set of group dynamics. This study has demonstrated the importance of communication, and the susceptibility of individuals to follow certain patterns of behaviour. Importantly, negative emergent norms can quickly lead to excessive behaviours which can hinder communication and group effectiveness. Here we demonstrate the capacity of the use of mind mapping to counter egocentric behaviours that threatened to disrupt positive group behaviour. Divergent ideals were included in the transparent, larger group process of mind mapping, which enabled more efficient decision-making whilst discouraging the development of negative behavioural patterns. This case study demonstrates that when groups are effectively communicating and combining individual knowledge, experience, ideas, skills and wisdom, the synergistic potential is enormous, and that mind mapping can provide an opportunity for interactions of this quality to occur. The momentum that occurs when a group achieves synergy propels individuals and communities towards increased participation, empowerment, action, and social change. The use of mind mapping has been shown in this study to be a highly effective tool for overcoming communication barriers and increasing cohesion despite varied value systems, educational and cultural backgrounds. While it is only one of many such tools for strengthening community groups and providing cohesion, it can be easily adapted for use in a variety of contexts for improving social dynamics and collaboration in consultative practices. This is essential in particular regard to contentious resource management issues and for improving the ability of community groups to change, adapt and respond to environmental management issues. The power in the use of mind mapping is in the maintenance of transparency of process, removal of power-structures and ego-centric personal barriers for more effective communal knowledge sharing, clarification, idea crystallisation, and planning for the future.

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