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Article

A typology of coastal researchers' modes of interactions with stakeholders

Jessica Milligan, Jeremy Hills, Tim Smith, Martin Le Tissier

A feature of the management of natural resources in the coastal zone is that it involves multiple stakeholders. It has been suggested that the effectiveness of coastal management relies on the cooperation of this multitude of stakeholders in decision-making. This study reports on the findings of an investigation into the modes of interaction used by coastal researchers to communicate with stakeholders. A qualitative research methodology was used through both telephone and in-depth face-to-face interviews to elucidate the mechanisms of interaction and, in turn, produce a typology of interaction modes. It was found that there were five main modes of interaction: Limited; Mediator Achieved; Key Stakeholder; Full Interaction and Mixed and that the discipline area in which the researcher worked did not dictate their preferred mode of interaction. It was concluded that although there are a number of limitations to effective participation, these interactions have significant implications for meaningful participation in the management of coastal resources.

Keywords: natural resources, sustainable management, stakeholder participation

Introduction

Integrated Coastal Management (ICM), the practice by which a holistic approach to the sustainable management of coastal areas is taken, attempts to inculcate an inclusive mechanism and process for stakeholder's interaction,[1] as it is claimed that the effectiveness of coastal management efforts relies on the cooperation of the multitude of stakeholders who reside in the area.[2] This is done by the utilization of social science to combine adaptive management and political change into "social learning".[3] In fact, Chapter 17 of Agenda 21, from the 1992 Earth Summit states that the management of the oceans and coasts should be "integrated in content and anticipatory in ambit".[4] It is also asserted, within Agenda 21, that, "one of the fundamental prerequisites for the achievement of sustainable development is broad public participation in decision-making".[5] However, it is recognised that while full participation is seen as a major component for the success of ICM programmes it is rarely fully realised.[6] This would suggest that in practice stakeholder involvement is somewhat limited and this, in turn, has implications for the realisation of sustainable development.

Concern over the relationship between science, citizens and technology seems to be a characteristic of contemporary society.[7] There is also the issue of trust[8] between stakeholders and scientists and it is recognised that if trust is in place it can lead to partnerships between scientists and end users to target science and make it more relevant to the everyday lives of the stakeholders, while community education can drive sensible legislation and policy and empower local communities.[9] It is not only a case of "informing the public" but the opportunity for a reciprocal process whereby researchers can gain from the contextual knowledge of the local people while providing information in a way that makes sense.

There are a multitude of potential benefits to be gained by involving the community in decision-making and the policy process.[10] These include to:

- allow debate about social values;
- formulate policy or policy principles;

- draw on particular expertise;
- implement policy;
- better deliver government policy program funds;
- engage in management or on-ground works;
- ensure transparency and accountability;
- monitor environmental or social trends and conditions; and monitor and evaluate policy and management.

The relevance for this study, therefore, lies in exploring the communication and dialogue between the scientific community and the stakeholders whose lives are affected by activities in the coastal area of Australia. This paper examines the interaction modes and their associated characteristics and implications in order to assess the nature and role of these interactions with respect to "meaningful" stakeholder participation in coastal management and environmental decision-making.

Methodology

The Cooperative Research Centre for Coastal Zone, Estuary and Waterway Management (the Coastal CRC) was used as a case study. It is the major coastal research group in Australia and is comprised of 13 core participating organisations, ranging from Universities to Government Agencies that are distributed throughout Australia. It was established with the aim to work with industry to focus and promote excellence in research and development.[11] One of the main goals of the Coastal CRC is:

> To bridge the gaps between science and the community; and between science and decision-making, policy and planning.

The Coastal CRC sees co-operation as the key to successful management of natural resources and aims to integrate science across the various research themes of Assessment and Monitoring; Ecosystem Processes; Planning and Management; Citizen Science and Education; and Decision Frameworks.[12]

This study used a qualitative, multi-method approach with the use of constructivist methodology[13] to look for commonalities in the interaction types identified as described by the Coastal CRC researchers interviewed by telephone and in person, and also used a phenomenographic stance to identify where the differences were with respect to the mixed of responses given regarding the types of interaction modes utilised. The research is a "snap shot" of the Coastal CRC at a particular time in its history; at the end of a three and a half year cycle, and when it was about to begin a new round of funded projects.

Materials and Methods

Sampling Design

The study took place in two phases. For each phase a pilot study was carried out to ensure the interview strategies were achieving their aims of collecting useful qualitative data to inform the typology. The first phase comprised of 20 phone interviews, using researchers from each of the five research themes of the Coastal CRC. For each theme, four Coastal CRC researchers were selected randomly from the pool of researchers assigned to that theme from Coastal CRC documentation. From the variety of responses of these phone interviews, a diversity of interaction types was identified which was provisionally divided into five categories which had identifiable characteristics. This categorisation was carried out through a qualitative review of the interview notes and through discussion with Coastal CRC members. This categorisation was considered provisional at this stage and was subject to confirmation following the second phase of the survey.

The second stage of the study involved a total of seven in-depth face-to-face interviews with individuals who could be identified from the telephone responses as "belonging" to each of the provisionally identified interaction types, i.e. the individual had displayed attitudes or evidence of operational activities which clearly aligned them to one of the provisional categories of interaction. For

each of the identified interaction types, one individual from the first-phase telephone survey was randomly selected and a second stage interview was carried out. If the randomly selected individual was not available to be interviewed in the timeframe of the project, then another individual from that particular interaction type was randomly selected. As the five interviewees, one from each interaction group, did not span the five research themes of the Coastal CRC, a further two individuals were randomly selected from the remaining research themes which had no representative in the phase 2 survey. Thus, a total of seven individuals drawn from all five of the research themes, which were attributable to an interaction category were interviewed during phase two. As interviewees had already been interviewed during the first phase, this method allowed for triangulation of results.[14]

Data Collection and Analysis

The first phase interviews were conducted by telephone using teleconferencing equipment and were recorded with a dictaphone. Interviews lasted approximately 5-10 minutes each. In each interview five questions were asked to ascertain the interviewees' views of the definitions of the terms "stakeholder" and "interaction" and also to elicit how they interact, how they approach stakeholders (or vice versa) and why they interact in the way they do.

The second phase interviews were conducted face-to-face and usually took place in the interviewees' place of work. In total, seven interviews were conducted and lasted approximately 30-45 minutes each. Interviewing was semi-structured and used a prompt sheet to let interviewees talk about what they felt was important with regard to interactions with stakeholders. The data was recorded onto audio-cassette and, analyzed using the computer software package NVivo. This allowed for qualitative analysis and coding of the data to find patterns in the interactions and explore the characteristics of the interaction modes discovered. NVivo is a fine-detailed analysing tool and was used to combine subtle coding of themes with qualitative linking by creating "nodes" to store coded information. It allowed a way of filtering through the interview transcripts to find the most prevalent themes and issues. Tools in the software program, such as the search function and the modelling tool, helped to assess the data in-depth and functioned as a visual identification of areas of overlap.

Results

Definitions and Interaction Characteristics

During the phone interviews the 20 interviewees were asked to give their definitions of the words, "Stakeholder" and "Interaction". This was deemed necessary to gain an insight into how varied the perceptions of the terms would be and hence how this would affect the interpretations of the interaction modes. The responses given for the definition of Stakeholder can be divided into the following categories:

- Interest in either input or outcome of research (direct & indirect);
- Affected/influenced by research;
- Financial input given;
- Use for data/information.

The majority of the responses fell into the first two categories with 85% of the researchers indicating that their view of a stakeholder was someone with an interest in either the input or the outcome of research or is affected by it. In fact, one researcher put it eloquently as, "any person, group or organisation who is affected by or who affects decision-making, in terms of natural resource management". This is in line with the Department for Funding of International Development (DFID) definition of stakeholder given as, "a stakeholder is any individual, community, group or organisation with an interest in the outcome of a programme, either as a result of being affected by it positively or negatively, or by being able to influence the activity in a positive or negative way".[15] However, one researcher brought up the point that the term can be very ambiguous and that, "there are some very different interpretations of who the 'so-

called' stakeholders are". This issue has been addressed by both Fischer and Fletcher[16] who discussed the issue of representativeness and highlighted that often only those stakeholders with a vested interest or who are particularly vocal are involved in discussions regarding how natural resources should be managed. This has implications for the involvement of the wider public in decision-making, since as one researcher claimed, "not all people recognise themselves as a stakeholder".

The definition of Interaction was less easy to differentiate into discrete categories but several of the researchers talked about the people that they would be interacting with having a "vested interest" and also interaction being of a diverse nature, ranging from simple conversations by phone or email to collaborative work with other researchers and stakeholders. However, one researcher described the interactions as falling into two categories; formal and informal, and claimed that:

> "Formal interactions are currently through our stakeholder meetings, formal communications such as, you know, the Flotsam and Jetsam (the Coastal CRC monthly e-newsletter). Any sort of documentation that we would send out, both in a written form or in electronic form. And informal is the interactions or the discussions that take place outside of those formal environments and I guess that's more, harder to narrow down is what is an informal interaction. And I think often we don't put enough consideration into what that is. To me, it's actually perhaps, getting advice, providing feedback on a one-to-one basis as opposed to in a more group format".

A more all-encompassing definition was provided by another researcher who said, "An interaction is any communication or dialogue that results in an exchange of information or facilitates a process of change". Other interpretations of what constituted an interaction were that the aim should be "trying to achieve a common goal", with the stakeholder and "to determine the answers to questions that they are interested in as well", while also trying to achieve research that has both relevance and context for the stakeholders involved, and at the same time being transparent.

Typology of Interactions

There have been a number of attempts to produce typologies to classify forms of public participation, most of which have been based on Arnstein's "Ladder of Participation",[17] which gives a continuum of approaches ranging from those which are based on government driven ("top-down") control of decision-making to those in which the power is more evenly distributed between both the government and the public in a more collaborative arrangement.[18] However, no such typology exists for the interaction modes that occur between researchers and stakeholders.

The following typology (Table I), by using the Coastal CRC as a case study, classifies the main modes of interaction which are apparent from how researchers communicate with stakeholders. It offers a description which simplifies the interactions used by the researchers and is by no means a concrete and full portrayal of how the interactions work. However, it does provide a useful way to see how the interactions may occur on a continuum of involvement and provides some insight into the types of projects in which particular interactions tend to function; gives characteristics of the potential interaction modes and provides advice on what implications each interaction mode has for decision-making.

Table I. Typology of coastal researchers' modes of interactions with stakeholders

Mode	Characteristics	Examples	Implications
Limited Interaction	• Non-direct • Produces information • 1 way flow • Informing • Tend to be more technical projects	1. Water Quality (website) 2. Fisheries (Report Writing)	Promotes tokenistic involvement, will not result in development of long-term partnerships but useful in delivering research outcomes to a wider audience

Mediator Achieved	• Chain of people involved • Networks • Interpersonal skills • Don't necessarily know end-users	Often used in conjunction with other interaction modes to increase knowledge	Can negatively influence the extent to which people feel "involved" in the process but may lead to extended networking
Key Stake-holders	• Focussed on certain groups or individuals • Representatives (especially when great stakeholder diversity) • Allows decrease in complexity • Targeted	Stakeholder workshops (large numbers of participants e.g. 100)	Need to ensure that there is full "representativeness" and not just "so-called" stakeholders involved
Full Interaction (Face-to-Face)	• Feedback • Most interactions face-to-face • 2 way • Smaller groups involved • Fewer mechanisms used • Direct, not just representatives	1. Meetings with councils 2. Field days with farmers	Need for trust to be built up but potentially allows more scope for "openness", especially in face-to-face interactions
Mixed	• "Horses for courses" • Complexity • Stakeholder specific (each has their own preferred means of interaction)	Projects where the attitudes of all stakeholders involved is sought	Dependent on individual researchers skills as a communicator, understanding stakeholder diversity, and their motivation

Limited Interaction

This interaction category typifies the minimum level of contact that is required to actually have any sort of interaction. Hence, it tends to be sporadic and uses mechanisms such as report writing, emails and the production of websites to convey information to the stakeholder. It is a primarily non-direct way of interacting with little scope for personal contact, and is really a one-way flow of information. In a way it is similar to the "Informing" stage in Arnstein's participation ladder with its tokenism type of involvement. However, it does provide a useful function of information transfer and will always be part of some projects, particularly those of a more technical nature. The most important issue is to realise that this mode cannot be used in isolation but must be backed up with other modes at different points in a project cycle. For example, more direct methods of engaging the stakeholder such as face-to-face meetings to gain feedback on project outcomes and such.

Mediator Achieved

Often a researcher will use either existing networks of contacts or will aim to create a network of individuals from whom they can gain knowledge. A chain of individuals may be involved in the interaction with some individuals having contact with other stakeholders by means of indirect communication through other people. However, individuals using this mode will still need to possess good communication skills in order to elicit cooperation from other individuals who will achieve the direct interaction for them. Researchers can use this mode in conjunction with other modes as it lends itself to engaging a multitude of stakeholders at any one time since it makes use of networks of contacts to achieve the interaction and exchange of information. This mode does have a potential disadvantage in that some stakeholders may feel disengaged and at a distance from the actual research.

Key Stakeholders

In this interaction mode the interactions are targeted towards specific individuals or groups of individuals and function to gain an overall understanding of the stakeholder views. Hence, "spokespeople" are selected to be the recipients of attention since in some projects there would be too many people to feasibly interact with individually. These selected individuals tend to be chosen as representatives of a particular interest group and can potentially allow the voices of many people to be heard. This is similar to the mediator achieved interaction except that with this mode the individuals are chosen for their knowledge, expertise and experience in the particular issue that is being discussed, whereas in the mediator mode the mediator need not be as well versed in the issue - they just act as a go-between for information exchange. This mode does have the potential problem of being accused of not being representative enough and neglecting certain individuals, especially those that do not even realise that they are stakeholders (those that are indirectly affected by a programme or project). Yet, it does offer the advantage of allowing for a decrease in the complexity of people involved and permits a targeting of research.

Full Interaction

This mode focuses on personal contact and fully engaging the stakeholder, most often by using face-to-face mechanisms such as meetings and interviews to build up a good relationship with the stakeholder and gain their trust. This in turn may lead stakeholders to be more open and vocal in their assessment of projects and their own agendas and objectives. Feedback is often given in this situation and similarly to the key stakeholder mode, the information exchange is more of a two way process, as opposed to the first two modes, which are primarily one-way flows of information. It involves smaller groups than the previously described key stakeholder interaction. This means that the research may not be so researcher driven. The openness of this mode makes it more likely that stakeholders will approach researchers because a level of trust can be built up as a result of face-to-face interaction, with the stakeholders not only knowing who the researchers are personally but the stakeholders also feeling more comfortable in initiating an approach to discuss issues that they feel are relevant. In fact, face-to-face interactions were described as being particularly successful for a number of reasons, such as: being more open; allowing stakeholders to speak their mind more freely; and avoiding misinterpretation due to questions being answered directly and in person.

Mixed

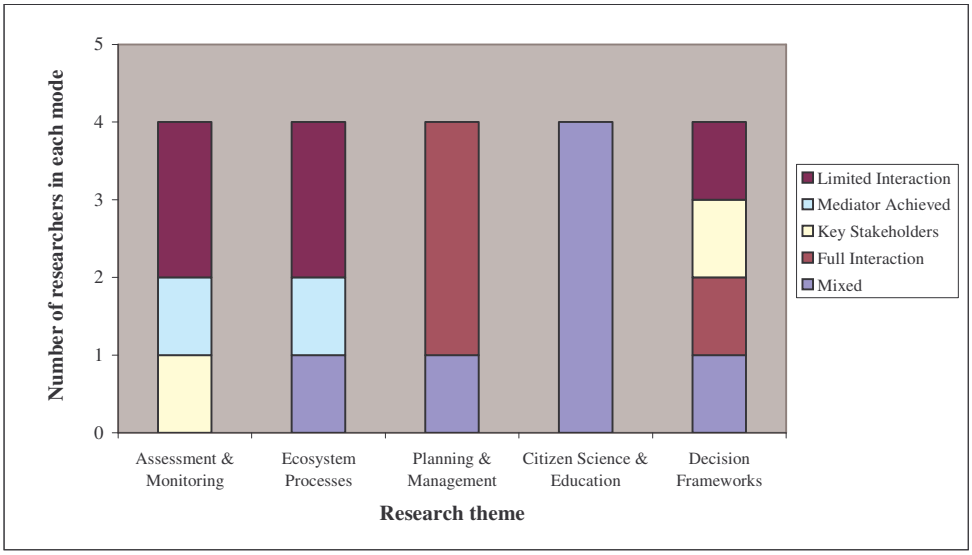
This mode is the most flexible and in-depth of the interaction modes in the typology. It take a "horses for courses" approach, using a variety of interaction mechanisms, ranging from surveys to face-to-face interviews and attempts to match the interaction used with the preferred mode that the stakeholder wants. It recognises the complexity of understanding stakeholder needs and tailors the interaction to each individual (or group) in order to gain the most from the situation and also to get feedback and support for the project. However, the effectiveness of this interaction type is very dependent on the motivation and communication skills of the researcher. Every type of stakeholder can be addressed and with the social research focus that this mode has it is on the other end of the interaction spectrum from the technical-focussed limited interaction mode.

Influences on Interactions

Research Theme

There was a general consensus among the researchers that interactions tend to be either researcher driven or initiated equally by both researcher and stakeholders. One researcher provided an insight into a possible reason why this might be the case, "Basically, I think, because people can't find who to talk to, or they are interested enough to listen to you if you talk but not interested enough to find out where you are off their own bat". However, the use of a particular interaction mode is not necessarily dictated by the researchers theme within the CRC (Figure 1), especially with the attempts at cross-theme integration. Despite, a great diversity in predominant interaction mode across the five research themes one theme

does stand out. Citizen Science and Education has all four of the researchers interviewed from that theme falling into the "Mixed" mode category, while the other themes have a greater variety of modes evident.



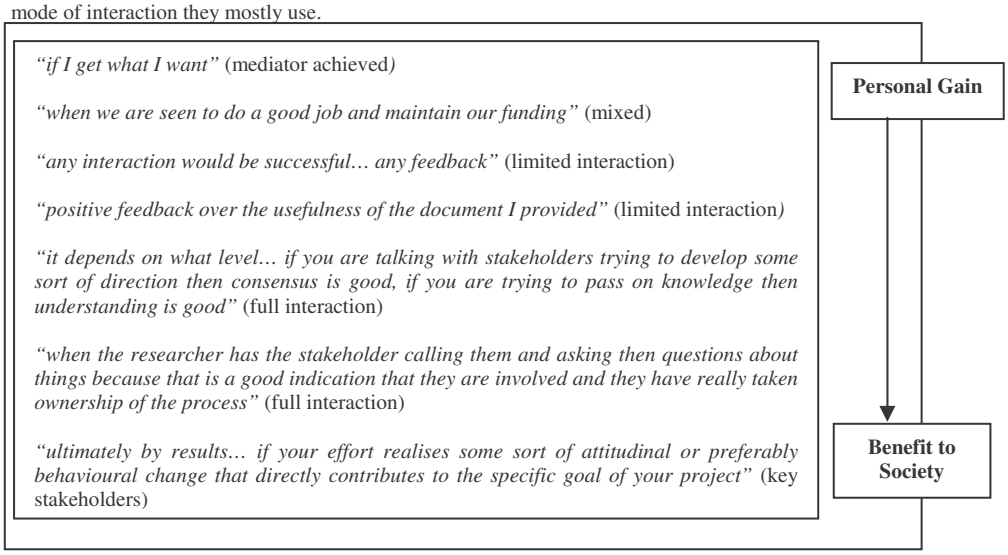
The level of stakeholder interaction and the mode of interaction used by the CRC researchers is also dependant on the project aims and purpose. For example, those involved in the analysis of stakeholder values and attitudes will no doubt fall within the Mixed/Full end of the interaction typology due to the need to use a variety of mechanisms/methods and to actually talk directly with the stakeholders involved, while researchers who are producing more technical data research, just as a physical model of coastal dynamics, may find that they have less scope for direct communication and so are relying more on limited interaction methods such as report writing and have less opportunity to disseminate their findings to a wider audience.

Finally, the individual researchers' motivation to build up trust and good relationships with the stakeholders directly and their personal skills as a communicator are important as a driving force influencing the modes of interaction. In fact, one researcher commented that "not everyone can be a communicator, because you get mixed messages, particularly in very large groups and it is important to have consistency and people hitting the mark because they know the community well". Hence, this response would suggest that sometimes the mediator mode would be most useful in a large project situation.

Effective Interactions

The researchers' surveyed exhibited variation in their response to how they would classify an effective or successful interaction (Box 1). Similar to the typology of interaction modes, the responses can be placed on a continuum, ranging from those which have a narrow, individual focus on what the interaction means for them as a researcher, to the more socially aware, beneficial to society viewpoint of what is a successful interaction. There did not appear to be any relationship between the classification of an effective interaction (with emphasis on either personal or societal gain) and the mode of interaction that the researcher used. This suggests that there must be other individual differences influencing how the researcher views a successful interaction. These may include personal motivation for carrying out research and possibly the worldview of the researcher.

Box I. Responses to how researchers' would classify an effective or successful interaction and which mode of interaction they mostly use.



Limitations to Interactions

A number of potential limitations to achieving successful interactions (or indeed any interaction at all) were uncovered in the process of this study. These include:

- Individuals being too busy to interact;
- Lack of understanding of the functioning of other institutional cultures (e.g. academia and industry);
- Time constraints (deadlines);
- Budget limitations (e.g. funds not available for travel expenses to conferences).

The issues of understanding other institutions and the way they operate were particularly highlighted by one researcher in terms of the client-consultant relationship they had when producing results for a specific organisation. They stated that, "We would like to know a little bit more about what these groups do in terms of their normal business activities so that we can in a sense provide a service to them". This concept of providing a "service" and producing a product for a client was a recurring theme within the study and exemplifies the situation where researchers are hired to fulfil the role of a consultant and provide a certain data set or report or such by a predetermined deadline. However, one issue that arose from this was the complexity of some bio-physical data and how inflexible some of the contracts seem with rigid deadlines and predetermined outcomes

Discussion & Conclusions

The aim of the Coastal CRC is to make science both relevant and accessible to stakeholders and to engage the stakeholders in the research process. It is important that awareness of interactions and their implications is evident in research projects and that individual researchers build on their own personal strengths and weaknesses to ensure that attempts to "bridge the gaps" are successful and that there is a sense of ownership for the stakeholders in the research that is being conducted, while making the research relevant and accessible. The stakeholders must be able to help set the agenda[19] rather than merely being given the information and told the best way to manage their natural resources.

Key issues raised by this study include those of translation and transparency of research data. For example, some stakeholders may not want to read a 200 page report, they would rather have face-to-face communication so that they can ask questions and get answers in a way that is meaningful for them and their lives. It may also be easier for individuals to open up and ask questions more directly. There is a need to tailor the interaction mode to the stakeholder (either as individuals or as a group) and find the preferred mode of interaction and hence target both the information and the format that it is communicated by.

It is crucial to realise that the typology presented (Table I) is not rigid but instead is a dynamic way to represent the spectrum of interaction modes used by the researchers. There is movement between the modes and this is dependent on the situation (i.e. the project specifics and objectives), the personal preferences of the researcher in terms of interaction modes they feel most comfortable with, the motivation of the stakeholder (i.e. are they driving the interaction by approaching the researcher) and the political circumstances. In fact, the individual personal characteristics of the researcher rather than the research theme that they work within may be a more influential force in determining how they interact. However, as reported, one research theme, Citizen Science and Education does stand out, with all the interviewees using the "Mixed" mode of interaction. This is hardly surprising given that the ultimate aim of this research theme is to, "encourage active citizen participation in public interest research". Since this theme is mostly concerned with the social aspects of the research then it can be expected to be a more "inclusive" area of research, striving to gain an insight into the various viewpoints of the multiple stakeholders involved in coastal management. As Lockie[20] states, "Essentially, the challenge of bringing management and science closer together is to achieve better synthesis of goals and bodies of knowledge. Achieving better information management and effective co-learning requires 'direct involvement of all stakeholders' in a complex problem-solving process".

The following recommendations could help to ensure that "meaningful" participation is achieved and that the CRC aim to "bridge gaps" between the various stakeholder groups, be they other researchers, government agencies, industries, politicians or community members is also achieved:

a) An investigation into the stakeholders' modes of interaction with researchers as a way of better understanding the two-way communication process. Do stakeholders see the interactions in the same way as the researchers do and if not what are the implications for research and policy making in coastal management?
b) Researchers should share their experiences in terms of the interactions they use with different types of stakeholders or different situations to build up a better picture of what works best and when. For example, by extending the participation toolbox from the "Citizen Science and Education" theme. In fact, advice on when/how to engage stakeholders, in the form of a list of guiding principles of citizen science is on the toolbox website. There is also now a 'chooser' function on the toolbox website to help people choose the most appropriate tool.

It is proposed that typology can be used to support bridging the gap between science and stakeholder groups. The typology could be used as a conceptual model in a workshop type environment, with stakeholders, scientists, or both. However, it is also proposed that such a typology could be used in the planning and review stages of projects. For example, in the project planning stage during the construction of a Logistical Framework, the Activities identified by the project can be mapped onto the characteristics of the interaction types to identify the proposed main interaction typology. Clearly, Logistical Framework Activities can be modified to modify the interaction typology of the proposed project. The typology could also be used as part of the review process for projects in which stakeholder engagement is an identified output and assigned to relevant categories of interaction.

This paper has focussed on interactions between researchers and stakeholders, and the production of a typology of these interactions has far-reaching implications, especially when as Dovers[21] states, "Connecting communities, science and policy in a constructive and mutually rewarding relationship will require much more attention to the human processes of communication, as well as the structures through which the communication can occur". It is necessary for natural resource managers to "help communities understand the interlinked nature of many apparent resource issues and help them to apply technical information in a larger context of shared understanding".[22]

In his vision of the future of science Constanza[23] maintains that, "Science research and education will balance analysis and synthesis to produce not just data, but knowledge and even wisdom. This will enable vastly improved links with social decision-making". Although somewhat idealistic in its portrayal as science being able to produce the ultimate "knowledge" this outlook does address the issue of combining the best available science with contextual knowledge and feed both of these in to policy strategies in order to better implement relevant and targeted decision-making.

One of the researchers eloquently summed up the necessary approach for ensuring successful and meaningful participation when they stated that, "I think that it is important to strike a balance between the naïve participatory paradigm where we want to get everybody involved in everything and good old, traditional social science research, where we have a whole load of techniques for synthesising things and using sampling".

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Authors

Jessica Milligan, Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia, NR4 7TJ.
Jeremy Hills, Envision Partners LLP, Ridley Building, University of Newcastle upon Tyne, Newcastle upon Tyne, NE1 7RU.
Tim Smith, CSIRO Sustainable Ecosystems, Brisbane, Australia.
Martin Le Tissier, Envision Partners LLP, Ridley Building, University of Newcastle upon Tyne, Newcastle upon Tyne, NE1 7RU. m.le-tissier@envision.uk.com