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Community and Environmental OR: Towards a New Agenda

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INTRODUCTION

In 1999, the UK-based Operational Research Society granted charitable funding to a systemic intervention project, based in the Centre for Systems Studies at the University of Hull, designed to create an agenda for the future role of operational research (OR) in environmental planning and management. Our final report on the project was published in 2001. This chapter summarises our findings, then focuses in detail on one aspect of these: the outputs from a mini-conference held with OR practitioners who participated in developing the agenda.

Of course, the primary focus of these practitioners was how to develop OR to make it more relevant to environmental planning and management. However, it was strikingly obvious to us that their prescriptions for change would, if implemented, make OR for environmental management (henceforth called 'Environmental OR' for short) a very similar practice to Community OR. Arguably, this should not come as much of a surprise: issues of complexity, stakeholder involvement and the political effects of change are relevant to both Community and Environmental OR. Indeed, writers on systems thinking have been arguing for some time that many environmental issues interact with social ones, and these interactions need to be taken into account if we are not to experience major, unanticipated side-effects of intervention (e.g., Midgley, 1992).

Following our presentation of the new agenda for Environmental OR developed by the participants in our project, we argue that there is a real need for an alliance between practitioners of Environmental and Community OR to support implementation of the agenda. There are three reasons for pursuing this alliance. First, to forge a critical mass of activists who can build a stronger movement for sustainable community development. Second, to give due recognition to the importance of environmental issues for local communities, and ultimately the whole human species. Third, to enable Environmental OR practitioners to learn more about methodologies and methods for participative community development (the province of Community OR). We suggest that an alliance could considerably strengthen both communities of practice.

THE CONTEXT OF OUR PROJECT

Although OR techniques have been widely used in environmental planning and management, the label 'OR' appears to have a low profile in the discourse about appropriate methodologies and methods (Bloemhof-Ruwaard *et al*, 1995; Daniel *et al*, 1997). Our own literature search reveals that, for every paper on environmental planning and management that is explicit about using OR methods, there are at

least five making claims to methodological innovation that are using the same or similar methods without any reference to OR at all (Midgley and Reynolds, 2001a). Nevertheless, in our view, the methodological focus of OR is of great value, primarily because it is so broad: it embraces a technical focus (e.g., on the assimilation and control of relevant information); it provides ideas about participation and communication between stakeholders; *and* it can invite reflection on values. Therefore, it is our belief that OR can help make environmental management a broad-based, dynamic, applied practice of central relevance to government, industry and the voluntary sector. This is why we decided to initiate the research reported here, and it is also why the Operational Research Society provided financial support for it. Essentially, a need was identified for an agenda for the use of OR in environmental planning and management that makes the actual and potential contribution of OR more visible, and which sets out the developments needed in OR if its potential is to be realised.

THE PURPOSES OF THE PROJECT

In October 1999, work started on a one-year systemic intervention project to support OR practitioners in creating just such an agenda. The project had three primary objectives:

- To make existing good OR practice in environmental planning and management more visible;
- To explore the further potential of using OR techniques for environmental planning; and
- To ask how OR would have to be further developed if it is to make an increased and sustained contribution to environmental management.

Points two and three represent an agenda for development and change. Two action-orientated, subsidiary aims also informed the study:

- To engender commitment from OR practitioners to the agenda through a process by which they could participate in its generation; and
- To produce a development plan for improving the institutional infrastructure to enhance the ability of interested OR practitioners to undertake the work set out in the agenda.

METHODOLOGY

Critical Systems Thinking (CST), as represented in the work of Midgley (1996, 2000), provided the guiding methodological framework for our systemic intervention. Midgley lists the key CST principles as:

1. *Improvement*—defined temporarily and locally, but in a widely informed manner, taking issues of power (which may affect the definition) into account;
2. *Boundary critique*—regularly questioning and exploring value and boundary judgements, both with respect to the methodological approach adopted and the substantive subject matter being investigated; and
3. *Methodological pluralism*—learning from other methodologies and drawing in methods from those methodologies.

Participants in this study did not only define improvement in terms of environmental protection, but also the more proactive improvement of approaches to environmental and associated social development. Boundary critique proved crucial, as what counts as an environmental issue was a thorny and recurring question addressed in locally meaningful ways throughout the project. Also, participants generated many insights into the ways in which OR methods can either marginalise or empower stakeholders in environmental management projects. Finally, the practice of methodological pluralism enabled us to ensure that our methods remained flexible and responsive to the great variety of situations we faced. The methods we used were drawn from Qualitative Applied Social Science (e.g., Silverman, 2000), Interactive Planning (Ackoff, 1974, 1981), Soft Systems Methodology (Checkland, 1981; Checkland and Scholes, 1990) and Critical Systems Heuristics (Ulrich, 1983).

We have chosen not to provide any further details of the enactment of the CST principles in this chapter, as the primary focus is on the outcomes of the project. For more information about CST, see Flood and Romm (1996), Jackson (2000) and Midgley (2000).

RESEARCH PROCESS

Our project ran through four phases, as follows:

Phase 1: Groundwork and stakeholder analysis

A multi-agency steering group was established, and a review of the literature on OR and environmental planning was undertaken. A stakeholder analysis was then initiated, drawing upon both the literature and the views of our steering group. Four stakeholder groups were identified: *professional experts* (operational researchers) associated with environmental planning; and users of professional expertise including agencies of *government*, *business*, and the *voluntary sector* (each operating at local, national, and international levels of planning).

Phase 2: Interviews

Two cycles of semi-structured interviews were undertaken: one with stakeholders identified in phase 1, and a second with significant others suggested by those interviewed in the first cycle. 50 respondents agreed to be interviewed in 46 interview sessions. A sectoral breakdown of agencies reveals 11 government, 13 business, 13 voluntary sector, and 11 academic. Phase 2 culminated in the production of an interim report offering feedback to respondents and providing a stimulus to launch phase 3.

Phase 3: Workshops and mini-conference

Two one-day workshops (in London and Sheffield) took place. Interested parties were invited to explore how better OR support could be provided, based on the outputs of Phase 2. The workshops were designed to establish ideal 'mission statements' associated with possible future agendas, and to explore the parameters in which such statements might be realised. We used a synergy of Idealised Design (from Ackoff's, 1981, methodology of Interactive Planning) and Critical Systems Heuristics (Ulrich, 1983) to structure the two regional workshops (see Midgley and Reynolds, 2001a, for full details). These provided source material for a two-day mini-conference in Hull (employing adaptations of some of Checkland's, 1981, methods from Soft Systems Methodology) at which OR practitioners and academics developed a fuller agenda for future collaboration.

Phase 4: Reporting

Three working documents were produced during the course of the study: an interim report, a workshops report and a mini-conference report. These were designed to elicit feedback from interviewees and other participants to support the learning process. Presentations (eliciting feedback) were also made to the Manchester Chamber of Commerce and Industry Environmental Committee; a meeting of the Operational Research Society Environmental Study Group; OR42 (the Operational Research Society Annual Conference); and the Industrial Ecology Conference in Berkeley, USA. The main written output is our final report (Midgley and Reynolds, 2001a), and a series of articles for both practitioner and academic audiences are also being produced (so far, Midgley and Reynolds, 2001b, 2003; Reynolds and Midgley, 2002; and this chapter).

FINDINGS FROM PHASE TWO

Our literature review revealed that the traditions of OR and environmental planning share some common concerns. First, both have wide boundaries in terms of clientele, the range of methodological approaches used, and attention to multiple (and often conflicting) values. Second, both traditions have an interest in fostering purposeful interdisciplinarity. Third, both OR and environmental planning are concerned with the *implementation*, as well as the *design*, of planning strategies.

Three generic issues were found to recur in both the environmental management literature and the interview data generated in our study:

1. *Complexity and uncertainty* (regarding the unpredictability of natural and social phenomena);
2. *Multiple and often conflicting values* (of those involved in environmental planning); and
3. *Political effects* (on those not involved in planning processes, including non-human nature).

An examination of how these generic issues are perceived in the public, business and voluntary sectors revealed clear patterns, summarised in the following four points:

First, the three issue categories (complexity and uncertainty; multiple, conflicting values; and political effects) are all of concern in all three sectors.

Second, for each sector there is considerable conflict between interpretations of how each issue category should be addressed. For example, in dealing with issues of complexity and uncertainty, some businesses are seeking to adopt and promote a 'learning culture', taking heed of wider economic, social

and environmental affairs in long-term planning. However, others still reduce the idea of 'sustainability' to short-term economic prosperity.

Third, issues of complexity and uncertainty dominate the public sector, with attention primarily focused on developing appropriate 'indicators'. Competing values are the main concern of business organisations, with attention being paid to minimising risks by improving stakeholder interaction. Political issues dominate the voluntary sector, with concerns about representing marginalised interests and widening the net of meaningful participation in planning processes. These might be termed the *primary* issue categories associated with each sector.

Fourth, for each sector the two *secondary* issue categories tend to cluster around the primary issue category. For example, in the public sector, conflicting values and issues of social exclusion tend to be dealt with *in relation* to the formation of indicators to deal with complex and uncertain realities.

The issues discussed above are generic and therefore arguably quite abstract. Substantive issues like transport, green belt policy, pollution, energy, waste, genetically modified organisms—and even wider concerns relating to sustainable development, global warming, world trade, population growth, the elimination of poverty, etc.—can be more specifically examined using the same parameters. That is, any environmental issue being addressed could potentially involve each of the three user groups (from the public, business and voluntary sectors), as well as some form of 'expert' function (whether operational research or another form of expertise). Likewise, any substantive problematic situation might be analysed in terms of all three generic issue types: complexity and uncertainty; competing values; and political effects.

In our interim report, produced after the interviews with stakeholders but before the workshops with practitioners (designed to develop the new agenda for Environmental OR), we reached the following conclusion. In the increasingly complex, interdisciplinary and politicised world of environmental planning, if we want to enhance expert support using OR, it will be vital to do more than just deal with the technical difficulties associated with modelling the natural world. This is not to say that the technical issues are trivial or unimportant (far from it), but it will also be necessary to address the more messy social worlds of values and ethics in which both OR support and environmental issues are embedded. We also identified a major challenge for OR practitioners: to develop methodologies and methods that are capable of dealing with *all three* of the generic themes identified in our research—complexity and uncertainty, multiple values and political effects.

DEVELOPING THE AGENDA FOR OPERATIONAL RESEARCH

Through the workshops and mini-conference, three distinct (though strongly interrelated) agendas took shape:

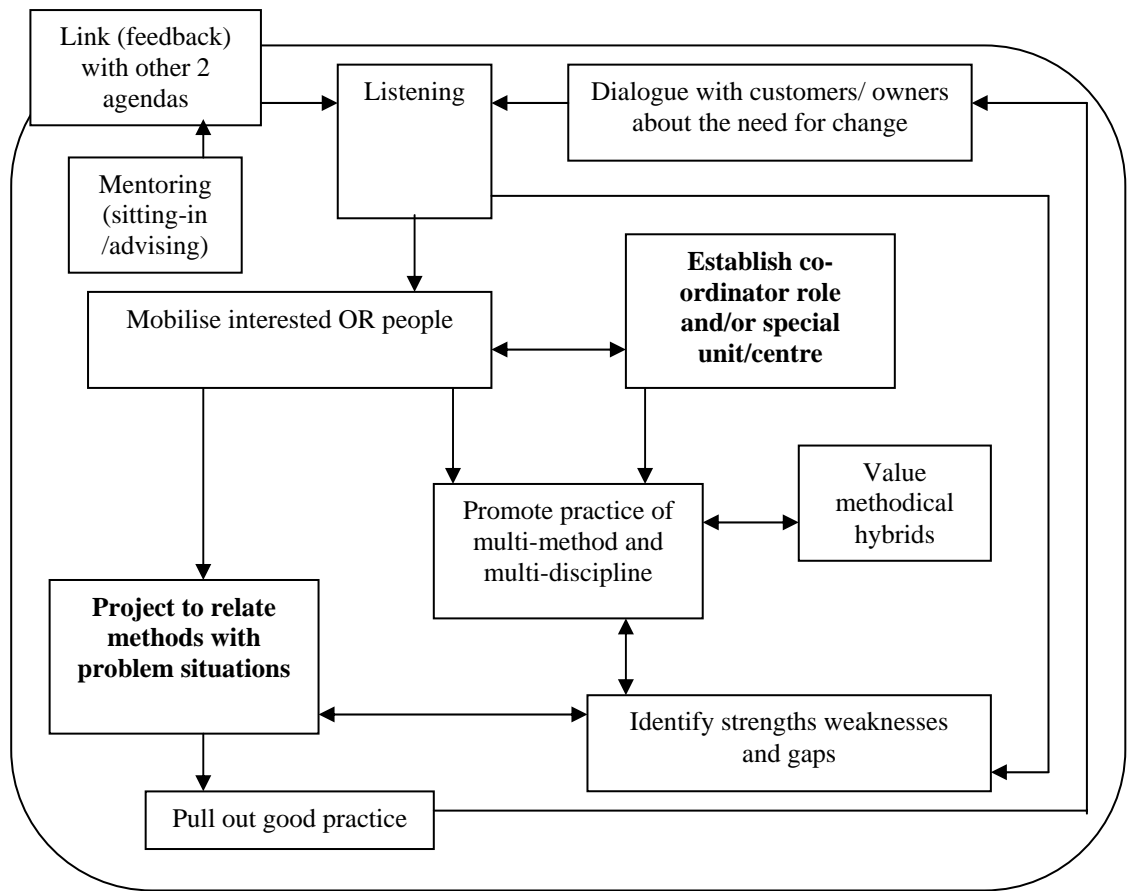
1. *Develop OR* (with a focus on methodological issues);
2. *Promote Interaction* (with a focus on issues of interdisciplinarity, intersectoral co-operation, etc.); and
3. *Promote Public Participation* (with a focus on issues of accountability and social inclusion).

Each agenda was subject to a process of analysis and 'conceptual modelling' (Checkland, 1981; Checkland and Scholes, 1990) at the mini-conference. Participants asked themselves, what is the transformation being sought? Who are the intended beneficiaries? Who or what might be made a victim (and should something be done about this)? Who should act to implement the agenda? What worldview underlies the agenda? Who should those implementing the agenda be accountable to? And what environmental constraints will have to be taken as given? The answers to these questions led the group to define key activities needed to realise the stated purposes of the agendas, and necessary links between these activities (expressed in the 'conceptual models' to be reproduced over the coming pages).

Agenda 1: Develop OR

For agenda 1 (*Develop OR*), the activities centred on establishing an on-going research project to relate methods with problem situations relevant to environmental management. The need for extensive testing of OR methods in case studies was stressed, as was the need to communicate the results of these tests to enhance the OR knowledge base for environmental management. Importantly, however, the idea of relating methods to problem contexts was not conceived as the production of a mechanical rule book for OR practice. Rather, it was seen as involving the reconceptualisation of OR as a *reflective practice*. Amongst other things, this will involve questioning purposes (rather than taking them as given); focusing on the big picture; multi-sectoral thinking; including multiple agents in defining problems; drawing upon and mixing multiple methods; and embracing environmental issues alongside social ones (rather than taking either environmental or social issues as prime). All the key activities identified as necessary to develop OR are represented diagrammatically in Figure 1.

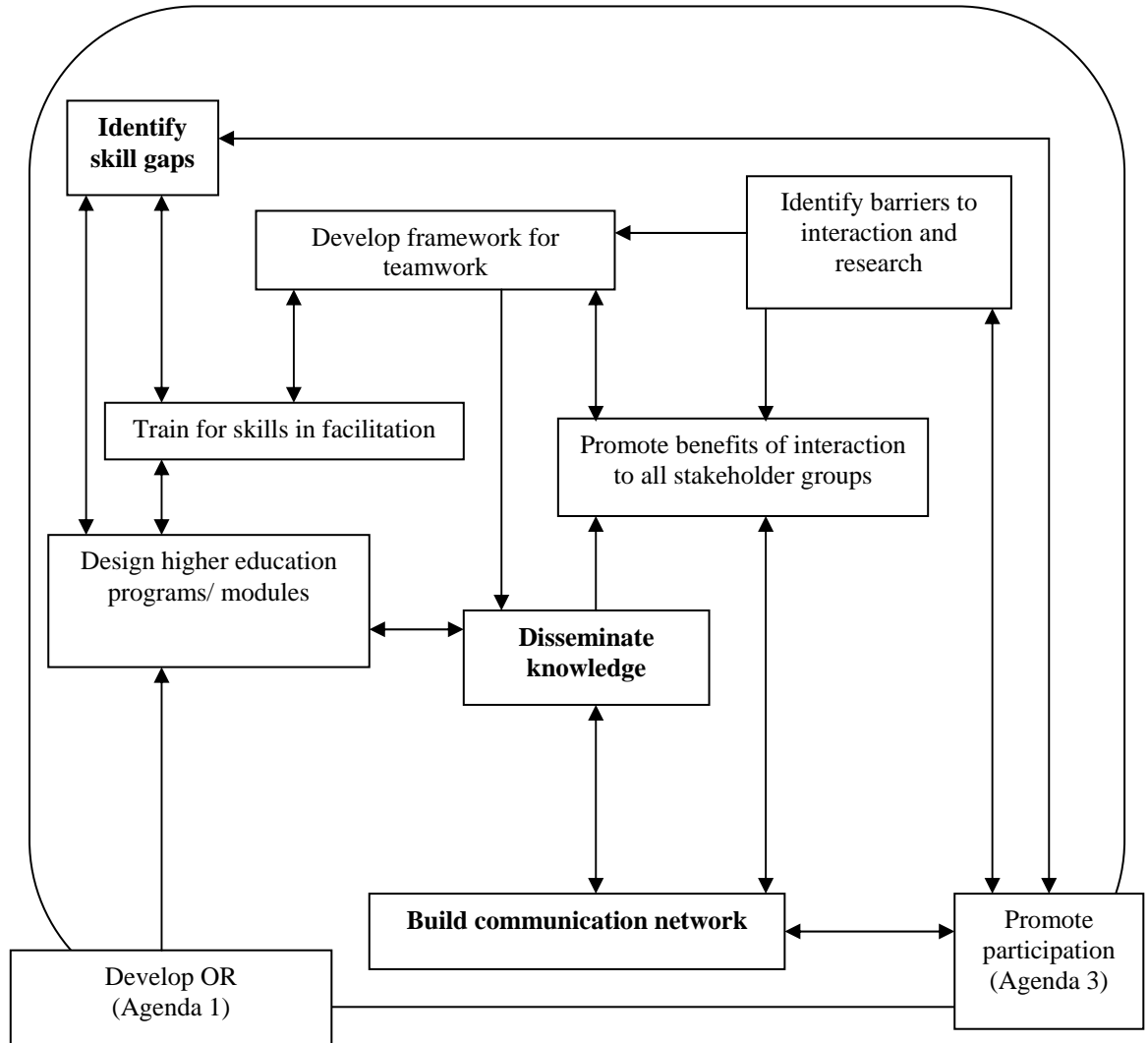
Figure 1 Conceptual Model of ‘Develop OR’



Agenda 2: Promote Interaction

In agenda 2 (*Promote Interaction*), the activities centred on developing ‘skills’, ‘knowledge’ and ‘communication channels’. Whilst interaction was mainly focused on important issues of interdisciplinarity, the agenda was also concerned with promoting relationships between public, private and voluntary sector organisations. People said that OR needed to move from being a primarily ‘backroom’, problem-solving form of expertise to being a more pro-active discipline where *raising awareness* of issues amongst stakeholders and problem structuring are key activities. Also, it will require OR practitioners to be more outward looking and facilitative than is currently the norm. See Figure 2 for a diagrammatic representation of these activities and their necessary interactions.

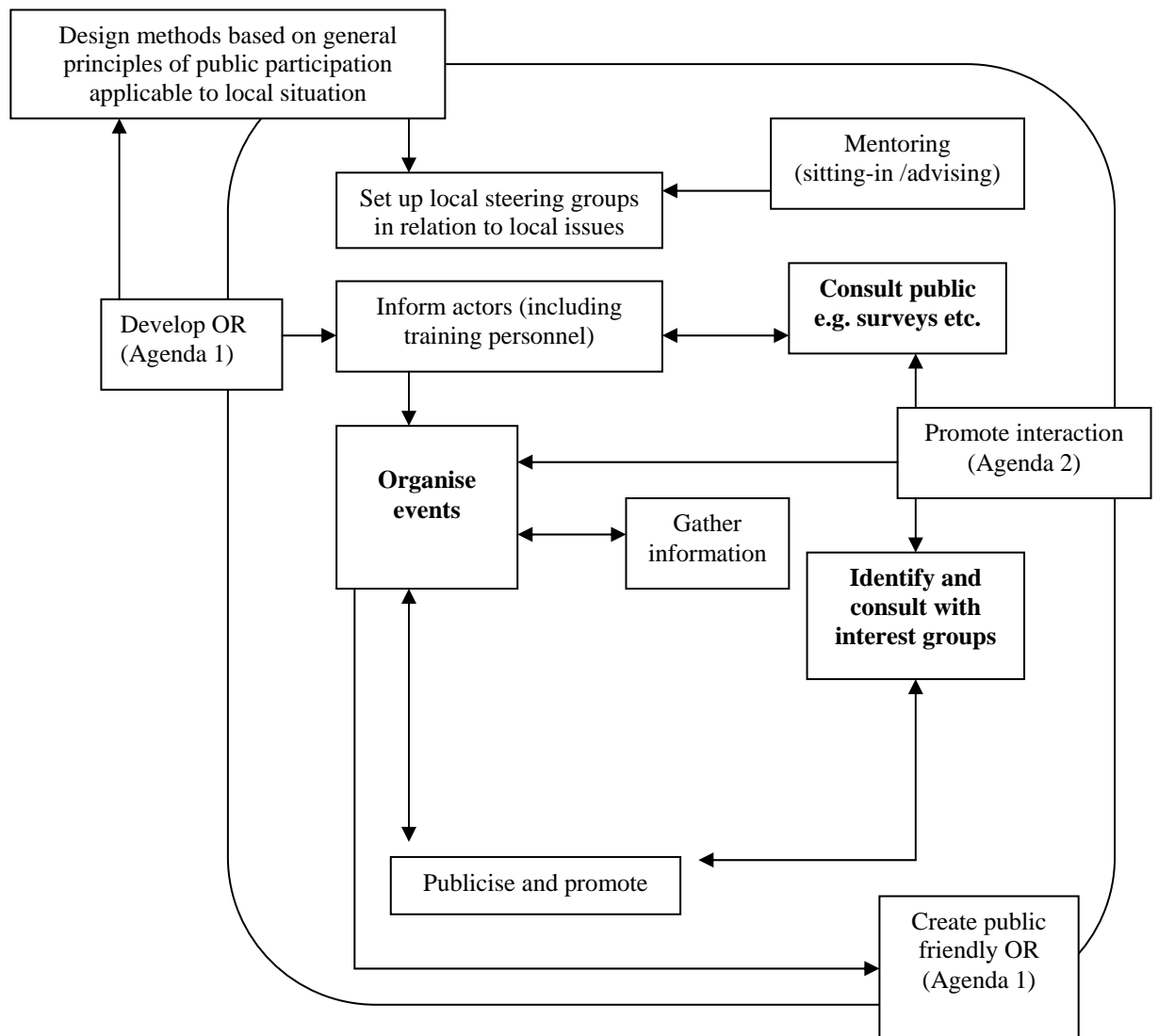
Figure 2: Conceptual Model of ‘Promote Interaction’



Agenda 3: Promote Public Participation

Agenda 3 (*Promote Public Participation*) recognised the difficulties of having a catch-all public participation remit: it is not realistic to try to engage ‘the public’ in improving OR in general. Rather, the emphasis needs to be on local participation in projects, taking care to differentiate between general public expressions of concern and special interest group involvements. The key activities that will need to be undertaken to promote public participation can be seen in Figure 3.

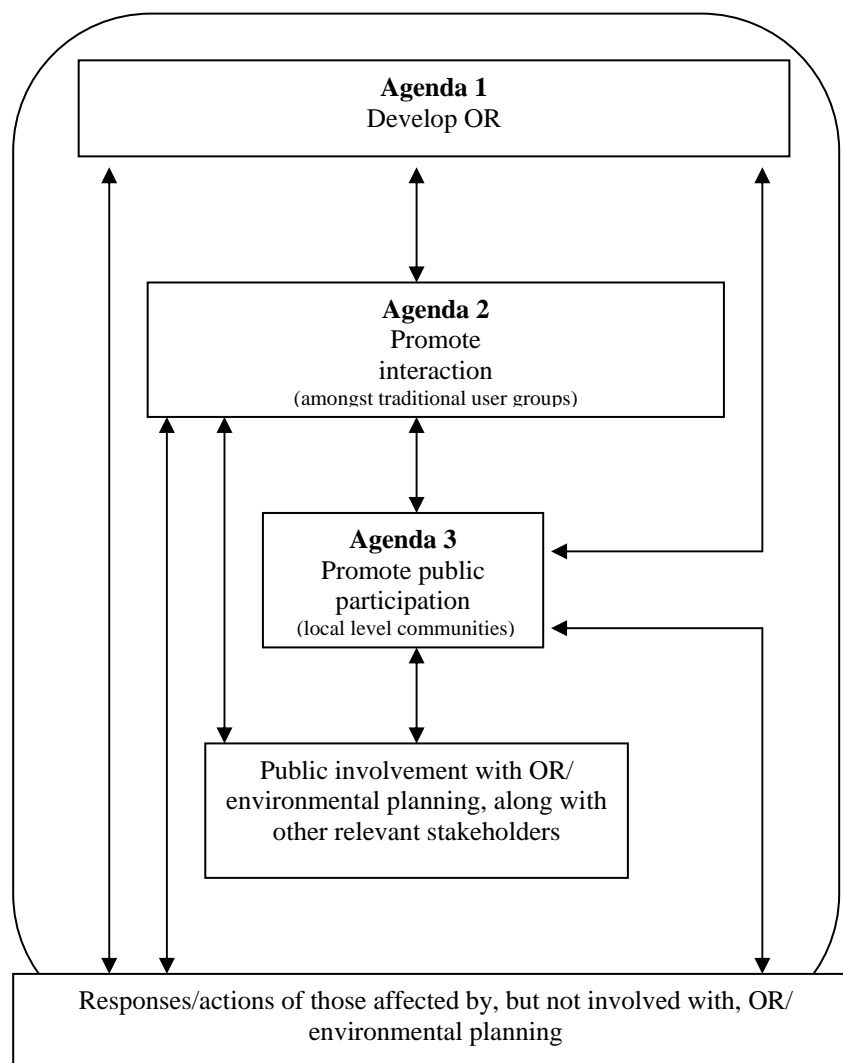
Figure 3: Conceptual Model of ‘Promote Public Participation’



Mapping the 'Whole System'

The three agendas can usefully be regarded as nested human activity systems: agenda 3 nesting in agenda 2, which in turn nests in agenda 1. Therefore, ensuring local public participation in projects is one aspect of keeping OR interactive and outward looking, and should have an impact on how interdisciplinary and intersectoral communications are conducted. Similarly, both of these agendas have important implications for developing the methodology of OR. The key interactions between the three agendas are mapped in Figure 4. While the participants in the mini-conference developed Figures 1-3, we produced Figure 4 ourselves immediately following the event (we did, however, mail it to the participants for feedback and secured unanimous agreement on it).

Figure 4: Whole Systems Model



RECOMMENDATIONS

The agendas are arguably the primary outputs of this research, together with the bond that formed amongst the participating OR practitioners. However, the group was intent on keeping its feet on the ground, and realised that enthusiasm in a mini-conference will not automatically translate into actual change unless some preparatory actions are taken. These were identified as necessary primarily because the group realised that there is currently an insufficient critical mass of activists in the UK operational research community with an interest in environmental management to make all the plans a reality. However, concrete steps for changing this situation, with (in our view) a high probability of success, were identified.

These steps were translated in our final report into a series of recommendations to both the Operational Research Society and OR practitioners more generally (see Midgley and Reynolds, 2001a, for full details). Here, however, we will only concentrate on one recommendation: that a critical mass of activists to implement the agenda for change should be built up through an alliance between different groups of OR practitioners with common interests—e.g., those working in environmental management, agriculture, international development and Community OR (amongst others).

REASONS FOR AN ALLIANCE

Essentially, there are three grounds for an alliance: the need for a critical mass of activists; the importance of bringing environmental issues into Community OR; and the need for Environmental OR practitioners to learn more about the structured facilitation of community development (the province of Community OR). Each of these is discussed in more detail below.

A Critical Mass of Activists

Bringing together a critical mass of activists is a particular issue for the UK operational research community because of its size (and we suspect it will be an issue in many other countries too). The OR Society is the main professional body for operational researchers in the UK, and it has a total of around 3,000 members, including some living overseas. The majority of these people have, at best, only a passing interest in Community and/or Environmental OR: most have solely business or academic interests. While the OR Society runs a number of study groups (specialising in development, health, agriculture, complex systems, community, environment, etc.), each of these has a relatively small number of activists. It has been a perennial complaint that none of these study groups are really thriving, despite the fact that each one has a reasonably substantial mailing list. Most members of the study groups seem content to be passive members. The participants in our mini-conference identified the lack of a critical mass of activists in any one specialism as a major contributing factor to the under-achievement of the study groups. At one point in our project, the idea was floated of amalgamating several study groups to overcome this problem. However, we explored this possibility with various study group representatives and encountered enthusiasm amongst some, and resistance amongst others. There was a fear that more popular concerns would dominate any amalgamated group, and minority interests (which are nevertheless vitally important) could get lost. In particular, there was a worry that environmental issues could be subsumed within a social agenda. For this reason, it makes sense to talk of *alliances* between groups with parallel interests rather than their amalgamation.

Of course, alliances need not be restricted to members of the OR Society (or similar societies in other countries). Since finishing our project, we have been involved in several activities designed to build capacity in 'systems thinking for social and environmental responsibility' (note that the 'OR' label has not been used in this phrase). Working with two colleagues (Wendy Gregory from the University of Hull, and Ian Roderick from the New Academy of Business), we have run three conference streams, edited a special issue of a journal, and have participated in the development of an interactive web site. Each of these initiatives has had roots in the OR community, with a significant number of Community OR practitioners participating, but has extended outwards into the systems and other research communities. The point is that, if we are serious about pursuing an ambitious agenda for developing OR, both Environmental and Community OR practitioners need to look beyond the boundaries of their own relatively small research communities and work with others in pursuit of their substantial common interests. Even when their interests diverge, this need not pose a threat: divergence can be a valuable source of learning when groups are willing to respect each other's autonomy.

The Importance of Environmental Issues

The second reason for building an alliance between Community and Environmental OR practitioners is the increasing importance of environmental issues at local, regional, national and international levels. It is possible to regard this as a purely strategic issue, by pointing out that significant sums of money are available to undertake projects promoting 'Agenda 21' (one of the principle outputs from the 1992 Rio Earth Summit). Agenda 21 consists of a large set of declarations including, for example:

- Adoption of the 'precautionary principle' (the principle that technological innovations should not be introduced unless or until there is evidence of their safety);
- A commitment to the eradication of poverty and reduction of disparities in living standards;
- A commitment to reducing and eliminating unsustainable patterns of production and consumption; and
- A statement supporting citizen participation in environmental management.

The implementation of these and the other Agenda 21 policies is being funded in the UK by the European Union, national government and local authorities (Department of the Environment, Regions and Transport, 1999)—and resources are also being made available for this in other parts of the world. Arguably, for Community OR practitioners, one of the key principles that makes their skills relevant to Agenda 21 is that citizen participation should be part of environmental management. There is now wide spread recognition that environmental protection policies require commitment from local communities if they are to be implemented effectively, and the best way to gain that commitment is through direct participation. Also, when addressing environmental issues at the local and regional levels, the unique features of particular ecosystems have to be accounted for, and it is usually local communities who know most about these.

However, phrasing this as a purely strategic issue—getting access to resources by taking on the environmental agenda—really misses the point. In the vast majority of cases, people get involved in Community OR because they want their practice to be of non-trivial benefit to local people—or even the whole of humanity. Their underlying motivations may be political, religious or humanitarian (Wong and Mingers, 1994; Midgley and Ochoa-Arias, 1999), but in a general sense they all have the desire to do something socially meaningful. There is now a wide spread consensus that the global economy is on an unsustainable trajectory. Many people claim that the ever-increasing consumption of non-renewable energy, and the production of environmental side effects of economic development, will eventually push against the ecological limits of the Earth (e.g., Meadows *et al.*, 1972, 1992). Humanity therefore faces a choice: do more of the same with the global economy, and experience the limits to growth as a crisis or even an environmental and economic catastrophe, or work for greater sustainability ahead of time, thereby averting the problem (Meadows *et al.*, 1992). Notwithstanding some dissent concerning the idea that there are immutable 'limits to growth' (e.g., Dryzek, 1997), it is still widely accepted that sustainability is a major political issue. In addition, ecological problems are made all the more difficult to address by the fact that the global financial institutions appear to be resisting all but minor, market-driven changes to their ways of working (for an interesting explanation of why capitalist institutions are so resistant, see Luhmann, 1986). Indeed, an argument is beginning to emerge that some major international bodies set up to enforce environmental protection measures are actually acting as protectors of free market forces, regardless of the ecological consequences (Young, 2002). The primary motivation for Community OR practitioners to build an alliance with the Environmental OR community is therefore that environmental issues *matter*. They are complex and multi-dimensional, with political ramifications, and they impact both local communities (hence the imperative for local participation in policy development) and potentially the whole human species.

It is very interesting to note that one of the original motivations for Jonathan Rosenhead coining the term 'Community OR', and setting out to build a Community OR movement, was to make OR relevant to his own Marxist politics (partially expressed in Rosenhead, 1986). The idea was that Community OR would contribute to building a working class consciousness in local communities, and might ultimately help empower people to move for radical, bottom-up change. However, most of those who joined the Community OR movement in the late 1980s and early 1990s either disagreed with Rosenhead's political agenda, or were largely unconcerned about it. Community OR very quickly became a broad church where many different motivations for working for socially meaningful change, interpreted in an equally broad number of ways, were accepted. Potentially, the environmental agenda offers another 'grand' political project for people to work on, particularly as envisioned by Meadows *et al.* (1992). This is not to say that all Community OR practitioners should be committed to this, or even all those interested in the interface between community and environmental issues, but we argue that it will be a significant motivator for some people to build an alliance between Community and Environmental OR. For others, environmental issues may have local relevance disconnected from any 'grand' political narrative, but the alliance will still be useful. Our own position (following Midgley and Ochoa-Arias, 1999) is that all Community OR practitioners should be clear that their projects *do* have political

implications, whether they want them to or not. There is therefore an onus on them to reflect on and justify their political assumptions (particularly the vision of community they are promoting) as part of their practice. We are happy to see a diversity of political visions, but not the abdication of responsibility for these. Community and Environmental OR can both be enriched by a debate that makes explicit the implications of various political positions for OR practice.

The Need for Community OR in Environmental Management

The third reason why Community and Environmental OR practitioners should, in our view, build an alliance is the wide spread recognition (mentioned earlier) that citizen participation should be integral to environmental management (this has been codified into policy in the form of Agenda 21). We have seen that dealing with environmental issues makes sense for Community OR practitioners who are concerned with facilitating meaningful community development. However, it is also the case that Environmental OR needs what Community OR practitioners can bring to the alliance in the form of methodologies and methods for facilitating debate.

It is still the case that a clear majority of Environmental OR projects focus on the use of quantitative methods. An example is cost-benefit analysis, incorporating costs to the 'external' environment (e.g., Rycroft *et al*, 1988; Pearce *et al*, 1990; Butler and Nelson, 1994; Lindsey *et al*, 1995; Mirasgedis and Diakoulaki, 1997; Parkinson, 2000). Another is the production of sustainability indicators for performance measurement (e.g., Qingzhen *et al*, 1991; Zhao *et al*, 1991; Ellis *et al*, 1996; Spengler *et al*, 1997). These methods *can* be implemented in a participative manner, for instance by involving stakeholders in the definition of indicators, but there is not necessarily any methodological onus on the practitioner to do so—and this practice also begs the question of what should happen when stakeholders hold conflicting values. We are not arguing *against* the employment of quantitative methods: on the contrary, they can be very useful—especially when there is wide spread agreement on the need for intervention, but the intervention is difficult to pursue in the face of great complexity (Midgley and Reynolds, 2001a). However, several decades of research on environmental management have demonstrated very clearly that defining ecological problems in purely scientific terms, and providing technical solutions to them while ignoring management and local community values, can lead to major problems with implementation (e.g., Bosch *et al*, 2003). In other words, purely technical solutions are only credible to all stakeholders when these stakeholders are in agreement that the issues have been defined correctly. Securing such agreements is often problematic—and indeed, sometimes people have such divergent values that they don't even agree on what the most important issue is, let alone whether it has been defined correctly. Therefore, the experience that Community OR practitioners can offer of facilitating dialogue on complex social issues, primarily using problem structuring methods (Jackson, 1988), should be invaluable for Environmental OR. Some examples of this kind of dialogue do already exist in the Environmental OR literature (e.g., Njiforti *et al*, 1991; Fischer, 1995; Brown and Jacobs, 1996; Sudhir *et al*, 1996; Frederickson and Frederickson, 1997; McClintock *et al*, 1997). However, in our view, community facilitation is not yet a sufficiently wide spread practice, and there are many useful Community OR methods yet to be tried on environmental issues. Given this scenario, an alliance between Environmental and Community OR practitioners could be very fruitful indeed.

CONCLUSION

In this paper, we have described a project in which practitioners developed an agenda for enhancing the role of OR in environmental planning and management. There were three parts to the agenda: developing OR (with a focus on methodological issues); promoting interaction (with a focus on issues of interdisciplinarity, intersectoral co-operation, etc.); and promoting public participation (with a focus on issues of accountability and social inclusion).

One of the recommendations coming out of this project was that Environmental and Community OR practitioners (amongst others) could usefully form an alliance to implement the agenda. We surfaced three reasons why this alliance would be beneficial: the need for a critical mass of activists; the importance of bringing environmental issues into Community OR; and the need for Environmental OR practitioners to learn more about the structured facilitation of community development.

We hope that this chapter will spark some debate about political and practical priorities in both Community and Environmental OR, and eventually give rise to co-operation across the boundaries of these hitherto mostly separate enterprises.

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