

Social learning within 'Achieving Sustainable Catchment Management: Developing Integrated Approaches and Tools to Inform Future Policies' Scoping Study

Introduction:

Our project was set up to explore, among other things, the experience of interdisciplinary working and social learning. We wanted to determine if the process had occurred and if so, how.

Data were collected using pre and post project questionnaires. The questionnaires were designed to capture individual perceptions of what was learnt and how social learning occurred during the life of the project. They were distributed at the first and last workshop, with reminders going out by email. We received 16 'start up' questionnaires and 15 'ending' questionnaires (note that one member started a new job and was unable to complete before leaving) giving response rates of 70% and 68% respectively (as of 30.6.05). This provides 14 pairs of surveys whereby we can track changes through the life of the project.

There is a limitation regarding relying on the survey data alone, as it records individual learning rather than changes in collective dynamics and behaviour. Equally, two researchers asked for a definition of social learning for the final questionnaire, illustrating that the definitions explained early in the project had not sunk in!

Sample:

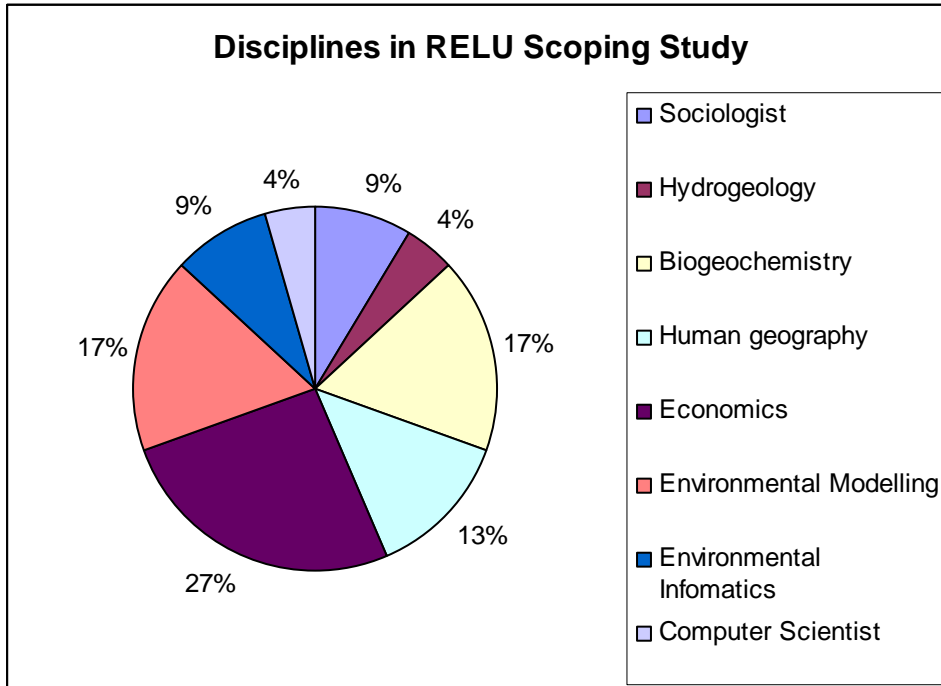
The project involved a total of 23 active researchers (attending one or more workshops and contributing to outputs) from seven organisations (Macaulay, CEH, IGER, Leeds, UCL, BGS and University of Sussex). The gender ratio was seven women to 16 men and nine were at a junior research grade and/or under 35.

Almost all of the researchers who returned the starting questionnaire (n = 15) had worked with at least one other researcher on previous projects. Controlling for relationships between researchers who work in the same organisation, 62% (n = 10) of researchers had worked with others in the consortium before.

Of those returning 'ending' questionnaires, ten of the 15 researchers plan to work on the full RELU proposal if funded, and another four had ideas for other projects despite not being part of the RELU bid. Only one was not contemplating working with the project team at this stage, partly due to their time constraints and partly due to unmet expectations regarding collective working during the scoping study. It would be interesting to monitor to what extent the scoping study does result in ongoing collaboration, particularly with regard to new relationships.

Our disciplinary backgrounds are shown below in figure one. Two individuals were the only representatives of their disciplines (hydrogeology and computing science) and the most represented discipline was economics (albeit individuals had a wide variety of sub-discipline specialities, as did environmental modellers).

The majority (N = 11) of these researchers described their research as interdisciplinary. However, the definition of interdisciplinarity varied, with some saying their subject was in itself interdisciplinary as it combined more than one single science discipline, whilst others only felt their work was interdisciplinary when they crossed domains from natural to social sciences or vice versa. Certainly, our workshop discussions on interdisciplinarity indicated that the degree of social learning required through new terminology, ways of making meaning and interpreting evidence, is increased as the difference between disciplines widens.



Personal objectives

Where researchers returned a pair of surveys, it was possible to assess if they had achieved their personal top three objectives for the project. In four cases, the objective, of winning further funding, could not be judged at the time of the ending survey. Three individuals' objectives (to have fun and to apply MCA) were not commented on in May 2005 questionnaires, either implying that they were not achieved or that the researchers no longer felt them to be relevant. One participant felt unable to comment in the final questionnaire as they had not participated as fully as they had intended.

All researchers changed one or more of their objectives to some extent during the project, with only 17 matched objectives achieved (from a possible 29 objectives¹). These met objectives centred on learning and collaboration with others from different disciplines and from different organisations. Typical examples are: '*Learning about new methodologies*' or '*collaboration with new colleagues in a variety of fields*'. This suggests that facilitating communication, one of the main purposes of the scoping study, was achieved. In a further two cases, researchers changed the emphasis of their objectives slightly, which might indicate that they had learnt to think in new ways. For example, one researcher shifted the objective from 'to foster integration' to 'understanding what integration means'.

In ten cases, completely different objectives were set by researchers at the start and end of the project. Whilst in two cases, objectives went from experiential (have fun, make new friends) to outcome focussed (learn about models, win funding), in most cases, the researchers moved from instrumental focus on outcomes (e.g. deliver project, incorporate science into ICM) to more reflexive and social learning orientated objectives. For example, interdisciplinary team working became a new, achieved objective for three researchers, and understanding the challenges of interdisciplinary ICM became a new, achieved objective for another three researchers; the remaining two researchers' new objectives focussed on learning from others (about social and bio-physical sciences respectively).

Catchment Priorities

¹ Not all researchers provided three objectives in July 04 or May 05

One of the aims of the project was to establish, in the words of one researcher, '*differences in pre-analytic visions and their implications for methods and analysis*' within catchment management. So we asked our team to identify their personal priorities for catchment science at the start and end of the project as shown in table one and two below:

Table 1: Researchers' catchment priorities grouped into themes: July 2004

<i>Catchment priorities</i>	<i>Number of mentions</i>	<i>Disciplinary Backgrounds</i>
Assessing available catchment management options	6	Economists(3), Environmental modellers (2) environmental informatics
Enhanced understanding of human behaviour underpinning land use	5	Economists (2); Human Geographers (2); sociologist
Communicating and understanding within catchments (between policymakers, scientists, stakeholders and citizens)	5	Economists(2); Environmental modellers (3);
Enhanced understanding of natural system functions	5	Environmental modellers (2); Economists (2); human geography
Integrated approaches and thinking	4	Environmental modellers (2); Economist; Human Geographer
Assessing and understanding external drivers on the system	4	Environmental modellers (2); Economists (2)
Assessing and understanding pollution pressures	3	Environmental modellers (3)
Understanding scale	3	Environmental modeller; Human Geographer; environmental informatics
Thinking long term (future generations)	3	Human geography; Environmental modeller; sociologist
Research into multiple (sometimes conflicting) institutional interaction	3	Economists (2); environmental informatics
Considering equity in management decisions	1	Sociologist

* findings from the 15 paired questionnaires

There are very few examples of disciplinary 'bias' towards specific catchment priorities at the start of the project: only the environmental modellers identified pollution pressures specifically; only 'social' scientists explicitly identified the issue of human behaviour within land use decisions, and only the sociologist identified the issue of equity. However, even at the start of the project, bio-physical scientists showed an awareness of the need to improve communication and understand the socio-economic context in which they worked; and social scientists were interested in learning more about scale and natural system functioning.

These findings suggest that whilst methodological approaches and ways of understanding issues vary widely, there are shared themes or issues around which interdisciplinary teams wished to work. The fact that many of the researchers had worked, and wanted to work, on interdisciplinary projects also explains the diversity of priorities identified and the lack of polarisation by discipline.

There may be a relationship between 'missed' personal objectives and the catchment priorities identified – certainly the objectives on 'assessing available catchment management options' and 'assessing and understanding pollution pressures' lay outside the parameters of the scoping study (although they are central to the proposal submitted from the scoping study). Others, such as integration and scale, are central to the scoping study's remit.

Table 2: Researchers' catchment priorities grouped into themes: May 2005

<i>Catchment priorities</i>	<i>Number of mentions</i>	<i>Disciplinary Backgrounds</i>
Communicating and understanding within catchments (between policymakers, scientists, stakeholders and citizens)	9	Economists (4); Environmental modellers (3); Environmental informatics; Human Geographer
Integrated approaches and thinking	8	Environmental modellers (2); Economists (3); Human Geographer; Environmental informatics; sociologist
Assessing available catchment management options	7	Environmental modellers (2) economists (4), sociologist
Understanding scale	6	Economists (2); Human Geographer; environmental informatics (2); Sociologist
Enhanced understanding of natural system functions	4	Environmental modellers (3); human geography
Research into multiple (sometimes conflicting) institutional interaction	3	Economists (2); environmental informatics
Thinking long term (future generations)	2	Human geography; environmental modeller
Enhanced understanding of human behaviour underpinning land use	1	Human Geographer
Considering equity in management decisions	1	Environmental modeller
Data resolution and access issues	1	Environmental informatics
Assessing and understanding pollution pressures	0	
Assessing and understanding external drivers on the system	0	

* findings from the 15 paired questionnaires

By the end of the project, there had been a shift in the individuals' priorities for catchment science. Improving communicating and understanding within catchments (between policymakers, scientists, stakeholders and citizens) – e.g. '*What do the stakeholders want from the catchment*' had become the most common priority, referred to by 60% of researchers. Integrated thinking and science was highlighted by eight researchers (an increase of five). These findings perhaps illustrate an increased appreciation of the role of communication, learning, stakeholder and public participation and social learning. Equally, another focus of our scoping study, scale, was highlighted by six researchers as a key priority for further research. Understanding drivers and pollution pressures were not mentioned in the final survey, although these issues may be implicit in other priorities identified.

There continued to be a mixture of disciplines identifying different priorities, with no obvious bias for social sciences to select anthropogenic topics and natural sciences to be focused on bio-physical processes. For example, the only person mentioning equity at the end of the project was a hydro-chemist! The only counter examples are the identification of data issues by someone working in environmental informatics (although it was only their third priority) or the focus on human behaviour by a human geographer.

As with the personal objectives for the project, many researchers shifted from a focus on discrete, science driven priorities for catchments identified in July 2004 to more diffuse and interdisciplinary priorities in May 2005. For example, three of those identifying the assessment of management options at the start of the project changed these priorities to understanding spatial and temporal scale issues, with a particular concern for the long term and future generations, during the project. Another three,

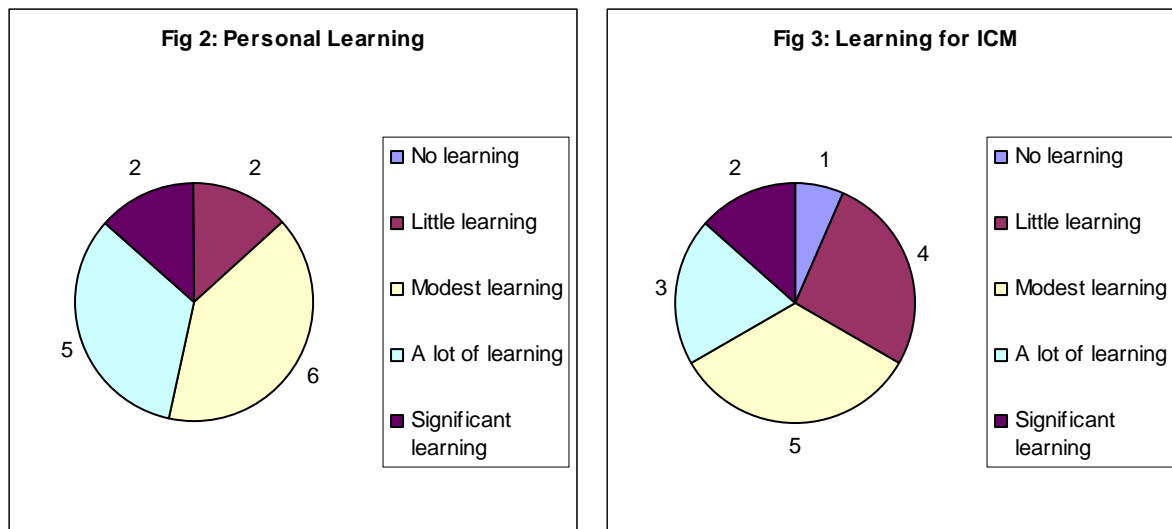
Kirsty Blackstock, Judy Clark and Vicki White

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who identified analysis of pollution pressures in July 2004, shifted their priorities to stakeholder engagement, institutional challenges and how to set appropriate management targets, respectively.

Learning outcomes

In the final questionnaire, participants were asked ‘to what extent did you personally learn from being involved in the project?’ and the results are shown in the figures below (n = 15).

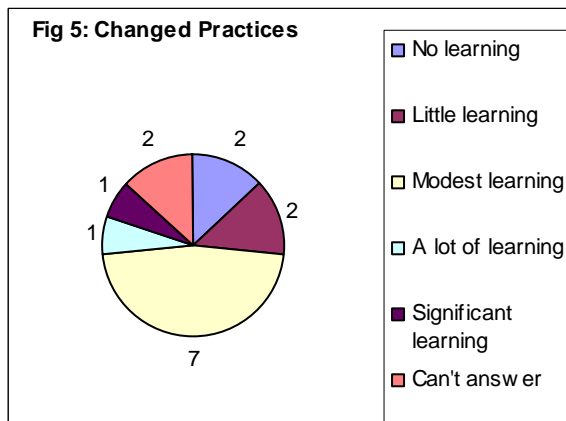
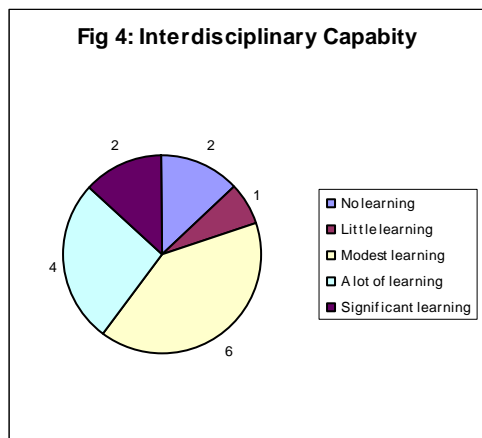


Most researchers felt they learnt something, with seven achieving a lot or significant learning. For example, an environmental modeller got an ‘*introduction to the world of qualitative analysis including use of narratives, multi-criteria and scenarios analysis and development of decision support tools*’ and an economist learned ‘*how to organize interdisciplinary learning*’. Some, particularly those who felt it was only little or modest learning, explained the constraints on their learning. Their comments seemed to identify the nature of the scoping study, particularly limited time to consolidate learning from face to face interactions and the lack of one common focus (methodologies rather than a common problem).

However, when asked ‘to what extent has your involvement in the project changed the way you think about Catchment management?’ one felt they learnt nothing, four researchers feel they did not learn very much and only five achieved a lot or significant learning. Those who did learn at least a modest amount attributed this to: (a) learning to take a more holistic view of catchment management (n = 4, all natural scientists) e.g. ‘*I came with the view that there was a correct answer to a management problem which could be analysed and solved by science. I now realise that there are many other perspectives on catchment management which need to be engaged.*’; (b) learning about new techniques and perspectives (n = 4, mixed disciplines) e.g. ‘*understand more the complexities of institutional structure*’ and (c) confirming their original interest in catchments (n = 2, social scientists) e.g. ‘*I have moved further towards the position that hierarchical integration (top down planning/control) is not the way forward for meaningful integration.*’ Those who did not learn much about ICM felt that the topics were already familiar or that they were focussed on learning about other topics (e.g. methods) rather than catchment issues.

The comparison between figs 2 and 3 helps highlight that much of the learning was procedural knowledge about interdisciplinary research practice rather than learning formal science or methods. Researchers were also asked ‘to what extent has your involvement in the project improved your ability to take part in other interdisciplinary projects?’ as shown in fig 4. The three who felt they learnt nothing or little noted that they had worked on interdisciplinary projects for many years – ‘*Already work on interdisciplinary projects, but it has introduced me to a new group*’, whilst the two who had

significant learning felt relatively new to interdisciplinary working and were keen to experience more. Those who experienced modest or a lot of learning tended to weigh the positive aspects of discovering new perspectives with the challenges and limitations experienced in the process: *'Has broadened my exposure to researchers, agencies & issues. Now have much more practical knowledge of difficulties of interdisciplinary projects'* (see also the discussion on interdisciplinarity below).



Many researchers felt that whilst they had learnt during the project, they had not had much opportunity to change their practices as a researcher. Two could not answer for this reason, and others indicated low or no learning for this reason *'Although I feel I have a greater understanding and appreciation of the need for integrated approaches to catchment management I have not been in a position where this can be incorporated practically into my research'*. The main themes emerging from the comments are (a) learning to work with multiple research agendas (b) needing to apply the learning on a full, rather than scoping, study and (c) feeling that they already worked as interdisciplinary researchers. Since evaluation studies highlight that there is often a lag between learning and changed practices, it would be useful to review to what extent researchers are able to use their interdisciplinary process knowledge in future projects.

Interdisciplinarity

Researchers were asked to consider the strengths and challenges of interdisciplinary research at the start and end of the project. Results are presented from all those responding in July 2004 and May 2005 respectively, with a discussion of the shifts noted within the 12 paired questionnaires discussed afterwards.

Table 3: Researchers attitudes to Interdisciplinarity – July 2004

<i>Strengths</i>	<i>N</i>	<i>Challenges</i>	<i>N</i>
Holistic understanding of the issue	7	Different language impedes communication	10
Robust understandings & solutions	5	Conceptual & technical difficulties with integration of different methods	8
Learning from other disciplines	5	Intellectually demanding	6
Narrow focus create problems	4	Time consuming	4
Allows a systems approach	2	Choosing what scale to work at	2
Allows achievement of sustainability	1	Lack of incentives in HE system	3
Appropriate in some circumstances	1	How to involve stakeholders	1
		Need for a common focus	1

* from 16 researchers who named more than one strength or challenge

The themes are closely linked – arguably the comments on systems understanding as a strength could sit within the theme on holistic understandings and the critique of narrow solutions is the converse of those, arguing that interdisciplinary research should lead to more robust understandings and therefore management solutions. Researchers commenting on learning as a strength stressed the potential for ‘*cross fertilisation*’, which in turn echoes the focus on holistic understanding. Equally, the challenges regarding time and intellectual demands might be connected to the issues around communication and integration. However, there were some disagreements: some felt that interdisciplinarity was mandatory to tackle environmental problems – ‘*Absolutely necessary to frame the right responses to environmental problems*’ whereas one researcher stated that it was only ‘*appropriate for certain issues*’. Some felt that the challenges were about how to frame the research issue (e.g. ‘*understand the links between land and water uses on the ecosystem*’) whereas others focused on the process issues (e.g. ‘*difficulties associated with different vocabularies and approaches*’).

By the end of the project (see Table 4 - note the sample varies between the two tables), the two most mentioned strengths remained the same but only two other, *new* strengths were mentioned. One was regarding process outcomes (trust and improved understanding) and the other was more instrumental regarding the output possibilities from interdisciplinary projects. This is interesting to compare to the fact four researchers mentioned the problem with maintaining motivation in interdisciplinary projects as the HE system is set up to reward disciplinary research. The most frequently identified challenges – communication and integration – remain. The time required to deliver interdisciplinary projects and the issue of scale are also mentioned. One new topic was the challenge of using differences in perspective constructively, which links to the strengths regarding learning, holistic approaches and creating more robust understanding.

Table 4: Researchers attitudes to Interdisciplinarity – May 2005

<i>Strengths</i>	<i>N</i>	<i>Challenges</i>	<i>N</i>
Holistic understanding of the issue	10	Conceptual & technical difficulties with integration of different methods	8
Robust understandings & solutions	7	Different language impedes communication	6
Improves trust and respect between scientists and stakeholders	1	Maintaining motivation when not rewarded	5
Adds value by allowing different outputs to single discipline research projects	1	Learning to deal with differences constructively	3
Opens up single disciplines	1	Time consuming	3
Helps identify and prepare for unexpected consequences	1	Choosing what scale to work at	1
		Loss of focus and precision	1

* from 15 researchers who named more than one strength or challenge

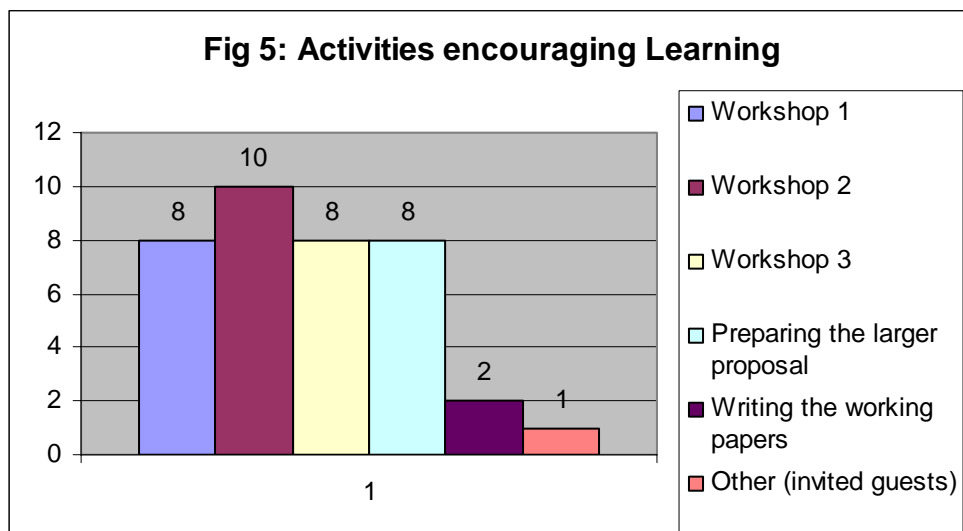
The accounts of the main strengths of interdisciplinarity are remarkably consistent over time. There are only a few changes: for example, the researcher who stated that interdisciplinary was only ‘*appropriate for certain issues*’ later felt that ‘*multiple perspectives*’ were the main strength of the approaches, possibly indicating a changed view. Another two changed their strengths from managed focussed outcomes to a greater respect for diverse perspectives. Likewise, the challenges remained remarkably consistent over time. One researcher elaborated on their earlier comment about ‘*difficulties*’ by referring to both communication and motivation/incentive issues. Another four researchers stressed the challenges arising from ‘*doing*’ integration more strongly in their second survey. A further researcher was concerned that interdisciplinarity, particularly the use of simplified approaches to facilitate linkages, might result in a loss of precision.

Recommendations for future interdisciplinary projects:

The final questionnaire indicated that most learning was facilitated by face to face discussion. This comment is typical of why these worked: *'the workshops were interactive and designed to talk across disciplines. There were different small working groups'* - which ensured that everyone talked to everyone else. Whilst the results are partly due to the sample² it is clear that the second workshop – the one with a clear focus on scale supported by interactive group work that made researchers learn – was the most constructive. This was also the only workshop that had an academic visiting researcher giving a 'key note' address.

Communication at a distance required the motivation of winning further funding. This proved useful in focusing our attention – *'preparation of the larger proposal required thought to be given to what we had learned from the scoping study'*. However, only two researchers finding the process of developing of working papers useful for collective learning. This may be because that most of the writing teams came from similar disciplinary backgrounds and the planned sharing and co-writing of drafts was constrained by most researchers' lack of time – in the words of one researcher *'the writing of working papers was within a group of researcher from whom I had already learnt a lot before this project and due to time constraints (and no money for teaching buyouts etc.) it remained a rather isolated activity'*. However, this overlooks the fact that many researchers have read the draft papers, reading about subjects that they would not come across in their usual disciplinary and professional practice and therefore possibly supporting the face-to-face learning that took place in the workshops.

There was less than anticipated learning recorded from mixing with invited guests. This may be because it was not given as an option in the survey. It may also be because it proved difficult to get end users and stakeholders to engage in the abstract nature of the project and the interaction was limited to the end of the project. Whilst not recorded in the survey, many researchers referred to learning from the invited guest at the second workshop during the final workshop and in email correspondence.



The following recommendations to maximise social learning in projects like our scoping study were made by the researchers responding to the final questionnaire:

² Not all filling in the final questionnaire attended the first workshop

- The need for committed researchers who have time to devote to the project, particularly the learning required for interdisciplinary work (n = 6)
 - Although comments regarding difficulty with incentives mean this recommendation could be difficult to fulfil.
- The need for informal and interactive workshops that facilitate exchange of ideas and lively debate through practical exercises, e.g. literature reviews (n = 6)
- The need for time for learning to evolve (n = 3)
- The need for more money (n = 2)
 - The money was related to 'buying out' time and also links back to ensuring commitment and delivery of outputs.
- The need to use a tangible example (it can be hypothetical or real catchment) to focus attention (n = 2)
- The need to have some outputs (publications or knowledge transfer activities) that reward researchers for the demands of social learning (n = 3); and to ensure that researchers deliver their agreed inputs (n = 2)
 - Discussions within the workshop and at the RELU networking activities highlight that it is often difficult to translate these studies into high impact publications. Furthermore, the academic authorship conventions make publishing from workshop discussions more difficult.
- The need for ongoing communication with practitioners, stakeholders and end users throughout the project (n = 3)
 - Although the difficulty in getting input during our scoping study means this recommendation could be difficult to fulfil.
- The need for mutual trust and respect for different perspectives (n = 1)

NB: researchers made more than one recommendation.

Summary

We believe these results provide a flavour of the social learning experienced within the project. All researchers had to focus on active listening, often regarding views and methods that were alien to our day to day professional practices, and to be open to these alternative views. The workshops in particular, whilst many found it difficult to find time to attend, provided useful spaces for reflection, sharing and thinking in otherwise overcommitted schedules. Of course, those who were actively involved in all the activities learned most with those less active collaborators tending to stay within their own disciplinary 'comfort zones' when contributing to the papers or within the workshop(s).

Researchers had to learn to state our ignorance about some of the issues under discussion (despite all being supposedly 'expert' in the field of ICM). During the second workshop, we were challenged by Giampietro to indicate how the '*researcher is in the frame*' and to explicitly recognise and verbalise the values, attitudes and norms that shape our disciplinary and methodological approaches. There was a tendency for the natural scientists to assume that they found this learning more difficult than social scientists, given that reflexivity, attention to multiple voices and plural forms of evidence are common in qualitative social sciences. However, all researchers strove to adopt an active learning approach and there was a great deal of learning by the social scientists from other colleagues, particularly with regard to alternative methods and bio-physical processes within catchment science.

Whilst the project did foster some social learning, this was partial and limited for the reasons highlighted above. It would be misleading to suggest that all researchers involved have been somehow transformed into interdisciplinary catchment scientists. In the words of one researcher: '*the main challenge is in the practical application of this approach. The different disciplines can be poles apart in terms of understanding*'. However, the expressed desire by 14 researchers to continue to collaborate will provide an opportunity for this learning to be further developed in future projects.