CREW
centre of expertise for waters

Evaluating Science: Policy: Practice Interfaces (ESPPI-CREW)

Final Report

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Cover photograph: Participants at the CREW workshop to identify capacity building projects 2012-2013

Centre of Expertise for Waters (CREW)

Crew is a hub which ensures that water research and expertise is available and accessible to the Scottish Government and its agencies. Its overall purpose is to provide clear scientific advice to inform key areas of government policy, ensuring that existing and new research expertise can feed into development of water-related policy in Scotland in a timely and effective manner.

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Associated CREW reports

- Blackstock, K., Waylen, K., Hastings, E. and Morris, S. (2011) *CREW Stakeholder Baseline Report*
- Blackstock, K., with inputs from Main Research Provider Staff (Andrew Cuthbert, Iain Brown, Emily Hastings, Sarah Dunn, Alistair McVittie, Wendy Kenyon, Lorna Dawson, Craig Simpson, Marc Stutter, Alison Hester and George Gunn); staff at SEPA and Scottish Water, coordinated by Roger Owens (CAMERAS) and Chris Spray (2011) *CREW Scoping Process – Background Paper for information*
- Blackstock, K. (2011) *Report to CREW Steering Group on Crew Scoping Workshops*
- Evely, A., Lambert, E., Reed, M. and Fazey, I. (2012) *Evaluating Knowledge Exchange: A Review*
- Morris, S., Towers, W., Hastings, E. and Banks, E. (2012) *Interviews with Principal Investigators of CREW Capacity Building Projects*
- Morris, S., Blackstock, K., Hastings, E. and Towers, W. (2011) *Review of Good Practice in KE Evaluation*

EXECUTIVE SUMMARY

Background to research

Scotland's centre of expertise connecting water research and policy (CREW) delivers objective and robust research and professional opinion to support the development and implementation of water policy in Scotland. Although the importance of demand-driven science to support policy and practice is increasingly recognised, it is not easy to ensure that information is communicated effectively, to the appropriate end-users, in a suitable format, and at the best time to impact on policy or practice. There has been little evaluation of what makes for 'good' knowledge exchange that improves interaction, and no agreed methodology for evaluating these practices.

The aims of the Evaluating Science, Policy, Practice Interfaces (ESPPI-CREW) project are to:

- Understand existing science: policy: practice interfaces;
- Measure and analyse how CREW's structure, members and activities contribute towards these interfaces; and
- Evaluate performance and suggest ways to improve links between research, policy and implementation.

Through these, ESPPI-CREW will support the following CREW aims in increasing:

- the networks between researchers, policy makers and practitioners in the field of water management (both the coverage and the quality of interactions);
- the skills and capability of researchers to share knowledge appropriately and in response to policy/practitioner demand; and
- the impact of knowledge generated by CREW activities, such that it can lead to improved environmental, social and economic outcomes for those involved in water management.

Research activities

The 6 structures of CREW have been assessed. These are:

1. Call down service;
2. Capacity building projects;
3. CREW website;
4. CREW Facilitation Team;
5. CREW Steering Group; and
6. Policy-Research Advisory Group (PRAG).

Key findings from the evaluation

Understanding KE

- Much of the evidence base focuses on the theory and processes of KE (activities and outputs); there are few examples of KE evaluation (mechanisms, outcomes and impact) in the research literature.
- Measuring impact of KE is understood to be complex, because it is extremely difficult to separate out the direct effects of a particular KE initiative from the wider social, political, economic, institutional and cultural factors also influencing outcomes in the real world.

- Current good practice recommends integrating the desired outcomes and impacts of KE into research specifications, with assessment of performance against specified aims and objectives, activities to achieve these, indicators of performance, outputs, and a clear rationale of why these specifications are believed to be able to produce the desired KE outcomes and impacts.
- Evaluation is often planned and carried out by people who are not involved in the research. Participatory approaches that include researchers and stakeholders provide opportunities for enhancing implementation and evaluation of KE interventions through their involvement in the processes of evaluation design, implementation and performance assessment.

Evaluation of performance in year 1

- Many stakeholders found the CREW structure confusing and are unsure how to start dialogue.
- CREW products need to be made visible in a crowded arena of KE programmes.
- The **call down service** has been well-used; with 18 call down enquiries handled across a wide range of topics. Feedback received has been very positive, although obtaining feedback on KE mechanisms has been patchy in CREW's first year.
- Nine **capacity building projects** were specified and implemented 2011-2012. All capacity building projects proceeded on the basis of clear aims, objectives and planned activities as identified in the action plans CREW requires for these projects. There were some difficulties in agreeing the terms of engagement with university partners; these were resolved, but resulted in delay in projects relying on university partner expertise.
- **vCREW** was operational from June 2011 and 2000 visits have been recorded. Content has been increasingly added throughout the year. The ability to register as an expert for CREW work is now possible via the website. Project details, including JHI contacts, are also publicly available.
- The **steering group** (CSG) has met as planned on three occasions, with papers and minutes prepared by the facilitation team (CFT). The facilitation team has found these meetings to be useful in planning CREW activities and in providing good direction for CREW more generally.
- The **policy-research advisory group** (PRAG) has met on two occasions as planned, but appears to be working less than optimally. Rationale for membership is not fully transparent, members do not represent the range of CREW stakeholders, and there appears to be only limited ownership of the group among current members. Major input this year was on prioritisation of capacity building projects for 2012-2013, but this was seen to be a difficult process.
- The **facilitation team** (CFT) met monthly as planned and has largely met its objectives during year 1, including managing the call down service, vCREW and the register of experts; administering and supporting capacity building projects; producing papers for meetings; producing publicity materials; and attendance at water-related events. Some fifty experts registered to work for CREW during year 1; a joint launch event with the Centre of Expertise on Climate Change (CXC) was attended by 55 SG policy staff; and the scoping workshops for capacity building projects involved 26 stakeholders.

Key conclusions

1. CREW structures have worked well in year 1 to increase networks, increase researcher skills and capacity in knowledge exchange and increase impact of CREW knowledge generation.

2. Membership has widened from the original stakeholder group to include a range of policy makers, scientists and expertise available to CREW. Closer links have been formed with CXC. CREW appears to be more focussed on the science-policy interface, having no practitioners on the Steering Group or PRAG, and with practitioners involved primarily through inclusion in some capacity building project stakeholder events. In particular, the Hydro Literacy project has engaged with educationists in year 1.
3. CREW has been characterised as a programme of individual KE projects (Evely et al. 2012) and the different structures have used a wide range of KE mechanisms in year 1. These include methods of communication and specific KE mechanisms- stakeholder workshops, questionnaire surveys, focus groups and interviews. Interviews with project principle investigators (PIs) indicated that researchers are increasing their skills and capability in KE through their work on CREW capacity building projects.
4. As indicated in the literature on evaluation of KE, assessing CREW research impact has been difficult so early in the life of the centre. Some policy impacts can be demonstrated however: in presentations of project findings at key stakeholder conferences and at Westminster; involvement of team members on expert panels; use of call down briefings and research summaries by senior policy makers; and contributions to the Hydro Nation agenda and Scotland's bid to host the 2015 World Water Forum.
5. The review of literature on evaluating knowledge exchange showed that there are very limited examples that relate directly to evaluating KE. It also found that KE is highly context specific; therefore no 'catch-all' and generic methods for evaluating KE are likely to be identified. Despite such challenges, the literature notes many advantages to evaluating KE and these are particularly linked to participatory approaches to evaluation, which provide significant opportunities for enhancing implementation and evaluation of KE interventions.
6. Participatory evaluation is particularly pertinent to KE because KE itself often aims to include some form of participation. Applying principles from participatory or empowerment evaluation can therefore assist projects to increase the effectiveness of their outcomes through more participatory mechanisms while simultaneously encouraging adaptability and flexibility as new understanding about KE emerges.

Main recommendations

1. Areas needing to be addressed in year 2 include increasing the number of experts registered to carry out CREW call down work; increasing CFT support for project PIs; reconsideration of PRAG membership; increasing the amount of information available about CREW, especially outputs available on the website; and developing a members' section of the website allowing access to the full range of CREW materials.
2. Future evaluation of KE interfaces within CREW should take a partnership approach, using self-evaluation, and involving programme and project managers from the outset to specify clear aims, objectives, activities, performance measures, and indicators of achievement for each aspect and capacity building project. The assumptions as to why they believe those interventions are likely to deliver the desired outcomes should be made explicit at the outset. A proposed model for future CREW evaluation has been developed.

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1. INTRODUCTION

Scotland's centre of expertise connecting water research and policy (CREW) delivers objective and robust research and professional opinion to support the development and implementation of water policy in Scotland.

Understanding how knowledge exchange activities can improve the impact of research evidence on policy is of increasing interest to researchers and funders of research. Scientists are being required to embrace a new relationship with society, including placing more emphasis on improving multi-way interaction between researchers, decision-makers, practitioners, and other beneficiaries of science, to identify research goals, questions and desired outcomes.

This requirement is partly because society needs more effective and rapid responses to ever-increasing environmental and social challenges. Furthering knowledge about sustainability (through scientific endeavours) is both important and useful, but unless it is coupled with meaningful engagement with the public and other decision-makers e.g. people who influence, formulate, and put policies into practice, more research alone is unlikely to bring significant change. Recognition of this has led to increasing emphasis on designing and implementing knowledge exchange processes and activities.

1.1 Research approach and Structure

The overall aims of the ESPPI-CREW project are to:

- Understand existing science: policy: practice interfaces;
- Measure and analyse how CREW's structure, members and activities contribute towards these interfaces; and
- Evaluate performance and suggest ways to improve links between research, policy and implementation.

This final report provides a summation of the activities undertaken to address these aims and project findings. Detailed information about each is given in associated ESPPI-CREW reports. See inside cover page for details.

This report is in four main sections:

1. Measuring existing science: policy: practice interfaces within CREW, which sets out the evaluation methods used;
2. Understanding existing science: policy: practice interfaces in knowledge exchange, which presents findings from a literature review on evaluating knowledge exchange;
3. Evaluating performance of CREW, which presents the results of year 1 evaluation; and
4. Conclusions and recommendations for improving CREW.

2. MEASURING EXISTING SCIENCE: POLICY: PRACTICE INTERFACES WITHIN CREW

This section describes the methods used to evaluate CREW year 1 performance.

Table 2.1 Summary of ESPPI-CREW research objectives, methods and outputs

Research Objectives	Research Methods	Research Outputs
1. Understand existing science: policy: practice interfaces within CREW	a) Preliminary review of good practice guidance for KE evaluation b) Targeted review of literature on evaluating KE	a) Summary of findings b) Report
2.Measure and analyse how CREW's structure, members and activities contribute towards these interfaces	a) Develop evaluation protocol b) Establish baselines i) CREW planned activities ii) Stakeholder knowledge, views and preferences for CREW working c) Establish database to record data on operation of each aspect of CREW, including changes to plans	a) Evaluation plan i) Baseline of aims, KE mechanisms, outputs and target audiences ii) Stakeholder baseline c) Searchable Endnote file
3. Evaluate performance during CREW year 1 Suggest ways to improve links between research, policy and implementation	a) Compare baseline data with actual activities b) Interviews with capacity building project PIs to provide insights into project performance and improving links c) Collate data from evaluation activities and analyse performance	a) Summary of performance against baseline data b) Interview report, research summary c) Tables comparing plans and performance
4. Report on year 1 performance and make recommendations for future KE	a) Present findings from ESPPI-CREW activities, and draw overall conclusions b) Develop a tool for future evaluation of CREW	a) Final report b) Model for future evaluation

2.1 Literature review

A review was undertaken to bring together literature relevant to evaluating projects and programmes which aim to enhance KE between researchers, policy makers and stakeholders. The sources include a selection of research papers (n=53) that specifically conducted or discussed evaluations of KE, and an examination of broader evaluation literature.

2.2 Protocol development

A protocol for monitoring CREW activities was developed. This protocol has been applied to the 6 CREW structures identified for year 1 evaluation (call down service; vCREW; capacity building projects; steering group; policy-research advisory group; and facilitation team). Table 2.2 summarises the protocol steps, actions taken and the rationale for each step.

Protocol Step	Action Taken	Rationale
Choose how to store and organise data.	Endnote database compiled.	Provides searchable evaluation resource.
Establish the main JHI, HEI and Policy contacts.	Main contacts and details listed.	Identifies contacts for data collection/sharing of findings.
Record the aims of each CREW activity/project.	CREW baseline developed.	Provides a benchmark for the evaluation, i.e. to judge if these goals were met.
Establish the planned activities and timelines.	Inputted into Endnote database.	Establishes what was planned and when for comparison with what happened.
Identify changes in plans.	JHI PIs interviewed.	We can learn why things changed and whether these changes affected the process and outcomes of each activity/project.
Establish what activities took place. Methods: i) quantifying activities; ii) assessing the quality of the activities; iii) using data after the event; iv) using face-to-face data collection; v) relying on written documents.	 Table of activities for each aspect of CREW produced. JHI PIs interviewed; client feedback analysed. Endnote database compiled February/March 2012. JHI PIs interviewed. Documents analysed	These are process data that record what actually happened, to allow us to compare this to baseline data. Provides simple metrics for evaluation. Provides contextual data for the metrics. Records what actually happened towards the end of CREW year 1. Provides rich material for analyses of capacity building projects. Provides information for analyses of governance and structures.
Establish who was: i) engaged in these activities; ii) consulted on outputs; iii) informed of the results	 Stakeholder baseline (questionnaire) Data from mid-year CREW reporting used and updated. Target audiences inputted into Endnote database.	 Provides a benchmark for the evaluation i.e. to judge whether KE increased, and whether mechanisms and outcomes matched those envisaged. Record who participated and to what degree they were engaged, allowing comparison with the baseline. Provides information to investigate research impact.
Collect data from those engaged, consulted and/or informed about the activities.	JHI PI interviews. Feedback from CREW clients.	Provides information to enable evaluation of participants' views of the effectiveness of CREW.
Analyse data.	Analysis of: i) baseline data; ii) stakeholder baseline data; iii) CSG, PRAG, CFT documents; iv) vCREW, call down, capacity building project data; v) literature review.	Allows drafting of final report, drawing of conclusions, and making recommendations for future evaluation of CREW KE.
Draft final report.	This document.	Allows for comment before finalising.

Table 2.2 Protocol steps, actions taken, and underlying rationale.

2.3 Baseline development

2.3.1 CREW activities

The baseline records the original aims, outputs, KE mechanisms and target audiences for each aspect of CREW. The baseline was developed from key documentation as a benchmark for evaluating processes and outcomes during year 1. The completed baseline is presented in Appendix 2. Data collected for the evaluation have been compared to the baseline, providing insight into how activities matched up to those envisaged during planning; assessing how far each facet progressed as originally conceived; and setting out reasons for successes, failures, and changes of course.

2.3.2 Stakeholder knowledge, expectations, and preferences for KE

A stakeholder baseline was prepared to record the understandings of CREW and its challenges, as understood by a cross-section of those involved with CREW, at the beginning of its activities. Data were collected using a questionnaire distributed to participants involved in year 1 projects and activities. Findings from the stakeholder baseline are presented in section 4, and in Blackstock et al., (2011).

2.4 Data collection

Data were collected from RESAS reporting; Steering Group, PRAG and CFT meeting papers; vCREW including web metrics; and the call down service. Data were also collected for capacity building projects from project documentation and in interviews with JHI PIs. PIs were interviewed in March 2012 to:

- compare project progress against the baseline objectives, planned activities and outputs;
- obtain views of project leaders on project processes and how their projects contributed to increasing KE among scientists, policy makers and practitioners.

Interviews were one-to-one, face-to-face, and based on discussion points developed from the ESPPI-CREW evaluation protocol. Discussion points and a summary of the evaluation plan were circulated in advance.

2.5 Data analysis

The principal method was documentary analysis, supplemented by feedback from CREW clients and from researchers undertaking the work. Interview data were analysed using Framework[1] and a report of findings was prepared for the evaluation. For details see *Interviews with JHI PIs*, Morris et al. (2012).

2.6 Reporting and recommendations for improving CREW

This final report was prepared by the JHI ESPPI-CREW evaluation team. This involved summarising information from the reviews of literature; baselines; interview study; feedback; and documentary analyses. Recommendations made in the review of literature on evaluating KE (Evely et al. 2012) were summarised, and recommendations for future CREW evaluation drafted by the JHI ESPPI-CREW evaluation team in light of the findings from the project.

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[1] *Framework is an analytical tool for qualitative research findings, developed by the National Centre for Social Research. See Ritchie, J. and Lewis, J. (eds) (2003).*

3. UNDERSTANDING EXISTING SCIENCE: POLICY: PRACTICE INTERFACES IN KE

3.1 Scope and methods

The review reflects on what needs to be considered in the design of evaluations, covering a wide range of fields (due to the limited research on evaluating KE purely in environmental fields). A summary of the review is given here, for more details see CREW report Evaluating Knowledge Exchange: A Review (Evely et al, 2012).

A key finding of this review is that carefully designed evaluations of KE in the literature are limited.

3.2 Defining knowledge exchange

Despite the lack of a generally agreed definition, some key characteristics of KE have been identified (Evely et al. 2012):

- KE is a process of individual or social learning, within or between individuals or groups;
- KE can be a one-way flow of information, but to be more effective, KE needs to be a process that involves the co-production of knowledge through engagement between scientists and other stakeholders;
- Knowledge is a dynamic concept, therefore viewing knowledge as a fixed or inert entity, no matter who exchanges it, how it is exchanged, or in whichever context is problematic. Such a view does not reflect relatively common and accepted understandings of knowledge and how it is constructed and shared;
- KE is influenced by a range of factors including political and social considerations, power relationships, the status of individuals, and what the research process aims to achieve;
- Outcomes of KE can be wide ranging: generation of information that can be shared; increased awareness of an issue or solution to a problem; individual learning; enhanced relationships; increased cohesion and trust within and between stakeholder communities; empowerment, participation, ownership and responsibility for decision-making; innovation, changed attitudes and influenced behaviour; and flattening of power hierarchies between individuals and groups;
- KE outcomes depend on a range of individual factors, such as how different people internalise knowledge; the skills of people facilitating KE; past experiences; current expertise and backgrounds of people involved in KE processes;
- Outcomes depend greatly on how KE is defined, how goals are identified, and the processes implemented;
- Outcomes and impact of KE can be immediate, short or longer term. It is challenging to attribute direct relationships between KE and impact.

3.3 Knowledge exchange and its evaluation

The research literature indicates that there is little evidence of what makes for good knowledge exchange that improves interaction among stakeholders, and no agreed methodology for evaluating KE practices. Nevertheless, the literature includes initiatives that have explored the theories and processes of science-policy interactions to promote good practice. These can be used to design an evaluation of KE

to measure performance against aims, objectives, and activities, and assess effectiveness of outputs. The main evidence gap is in how to measure the longer term outcomes and impacts of KE initiatives.

Literature discussing theory and practice in evaluation of KE mechanisms generally follows the principles of evaluation, with evaluation widely agreed to mean measuring the processes, outcomes and impacts of an activity against anticipated ones. Assessing impact means measuring change that can be attributed to the initiative, taking account of other factors that may have contributed to the change identified, including whether such change would have happened anyway. Assessing impact is widely agreed to be particularly sensitive to external factors, and requires consideration of the apparent paradox that even good examples of KE processes may result in no impact.

Process evaluation, which involves assessment of the implementation of KE interactions, is generally seen to be more straightforward, so long as appropriate aims, objectives and indicators of performance are identified, and the evaluation is of performance against these. The literature indicates that the key challenge for KE process evaluation is in identifying, measuring and assessing less formal stakeholder interactions.

3.4 Guidelines for conducting and designing evaluations

Key stages involved in designing and implementing evaluations are outlined here based on the European Union's external assistance projects and programmes (European Communities 2006a, b, c, d). These guidelines are particularly relevant to evaluating KE for three reasons: they provide a comprehensive overview of methods, tools and approaches for evaluation; and the guidelines cover individual projects and programmes (a collection of projects aiming to achieve a higher order goal), making them especially suited to the different levels of project implementation within CREW. Lastly, the guidelines are framed in relation to 'interventions' and how a particular project influences change, such as levels of engagement, relationships, or understanding about a specific topic or process.

The EC guidelines define evaluation as "the systematic and objective assessment of an on-going or completed project, programme or policy, its design, implementation and results" or as "judgment of interventions according to their results, impacts and needs they aim to satisfy" (European Communities 2006a). Evaluations can be conducted before implementing an intervention (ex ante evaluation), during implementation (mid-term evaluation) or after completion of the intervention (ex post evaluation). Key stages for designing and conducting an evaluation include:

1. Analysing the intervention strategy: why an intervention has been implemented and why a project was expected to deliver the desired outcomes. There are two key parts to analysing an intervention strategy: a) examining the intervention rationale; and b) analysing the intervention logic. The rationale is the justification for the intervention and why it was considered necessary. Understanding the rationale is important for evaluations because making the reasons for the intervention explicit enables the evaluation to be targeted more specifically towards the objectives of the intervention. The intervention logic is the assumptions as to why an intervention was/is believed to deliver the expected outcomes. Examining the intervention logic in evaluation provides the basis for identifying evaluation questions.

2. Identifying questions for the evaluation: a number of questions so that the data collection and in-depth analysis can be appropriately targeted. The questions need to provide useful information and be linked to specific evaluation criteria.

3. **Establishing criteria for the questions and the evaluation**: Criteria can include:

- Relevance
- Effectiveness
- Efficiency
- Sustainability
- Impact
- Coherence/Complementarity

4. **Establishing judgment criteria**: enables a judgment to be made about the success of the intervention being evaluated. This includes establishing indicators that specify which data are to be collected and identifying the target level or threshold i.e. how much of a change or result is needed for the intervention to be considered a success.

5. **Methodological design:** establishing the relationship between a question that is asked, the data used to assess merits and success (indicator) and the level or threshold that will determine whether an intervention has been successful.

6. **Data collection and Analysis:** qualitative or quantitative.

7. **Judgment:** about the merits/success of an intervention.

The stages outlined above are designed to ensure rigour and objectivity when making a judgment about the success of an intervention. To promote objectivity, each of the stages provides a robust methodology that ensures judgments are carefully made against the specified outcomes of a project or programme. Thus when designing the evaluation methodology, all steps in the process need to be considered. To develop effective evaluation methodologies, managers of projects and programmes will need to have explicit objectives of their interventions, how they will achieve them, and be able to justify why they believe that their intervention will deliver the desired outcome. Managers need to be clear about what they mean by KE and how this affects the way in which they are trying to deliver it.

3.5 Theories and concepts used to frame KE and evaluation

There are many ways that knowledge and KE are conceptualised (Bierly et al. 2000; Evely et al. 2012; Nonaka et al. 2000). This influences how KE is approached and evaluated. The review of the research papers therefore examined the theories, concepts and frameworks used to frame KE and/or its evaluation.

The review of the theories and frameworks highlighted a number of general issues. These included the need for evaluations to:

- Involve stakeholders as participants in the evaluation process;
- Be designed for the specific context in which an evaluation is to be applied. Catch-all types of evaluations are unlikely to work;
- Be included throughout the KE process rather than simply at the end;
- Use a diversity of disciplinary perspectives and methods as KE covers a wide range of topics.

3.6 Implications of the review of evaluating KE

The key findings, implications and challenges from the review are:

- Evaluation of KE is important in connecting research expertise with policy and practice;
- KE interfaces are most commonly understood to be the means or mechanisms used for science-policy-practice communications;
- KE evaluation is widely agreed in the literature to involve evaluation of outcomes, i.e. impact made by exchanging knowledge, as well as evaluation of the processes involved in implementing the KE initiative or mechanism under assessment;
- Evaluation should be of a KE initiative that is planned, and for which clear objectives have been agreed;
- Evaluators should work closely with the people planning and implementing the KE initiative to agree evaluation methods and the collection of monitoring data to underpin management of the KE process and its evaluation, appropriate to the objectives of the KE evaluation;
- Some form of impact assessment is needed if KE evaluation is undertaken. In particular, measuring change attributable to a KE interaction requires the establishment of a baseline/benchmark and a counterfactual, and identification of other factors (contextual, co-incidental) that may influence observed change;
- Value for money is of increasing importance. KE evaluation is a further cost on top of the cost of KE and the cost of the work that is being communicated. KE evaluation design should be proportionate to the KE mechanism, including its cost, both in financial terms and in the time and effort required from evaluators/evaluation informants.
- Project and programme managers need to consider the kinds of approaches to understanding and conceptualising knowledge and KE and the implications of this for implementing KE and its evaluation;
- Evaluation of knowledge exchange can be assisted by an understanding of the key frameworks and theories utilised in the literature;
- These frameworks and theories conceptualise KE evaluation as complex and highlight the need for a mixed method, multi- or inter-disciplinary and participatory approach;
- The evaluations should not be purely at the end of projects, with studies highlighting the need for viewing evaluation more as an intervention with cycles of evaluation, reflection and redesign built into the process as a way of achieving significant institutional or behavioural change;
- Indicators to assist evaluations of KE tend to be context specific but generally include some form of evaluation of changes to knowledge, behaviour and motivation and attitude as a result of KE. This means that indicators need to be identified specifically for individual projects and programmes;
- Measurement of knowledge and behaviour indicators tend to use a qualitative or mixed methods research approach, while evaluation of ecological and business-related indicators lean toward quantitative or mixed-methodology. A range of approaches to evaluation are therefore likely to be needed;
- A number of challenges and recommendations associated with KE evaluation were identified with the most frequent being a need for validation of the evaluation framework itself.

The previous sections highlight the need for clarity regarding indicators used in evaluation; the need for embedding evaluation throughout the KE process and for involving stakeholders in designing and conducting evaluations. The following sections therefore discuss addressing these issues including approaches for identifying objectives, goals and measures of success (indicators), and principles and practice of embedding participation of stakeholders into the process (participatory and empowerment evaluation).

3.7 Approaches for identifying objectives, goals and measures of success (indicators)

The key to effective evaluation is knowing the intended objectives of a project or programme. Without this, it is impossible to know what to evaluate. Given the wide diversity of possible objectives and indicators, they can only effectively be identified through close collaboration and participation of evaluators, project managers and stakeholders. This includes examination of what a project aims to achieve, how it will be achieved and the underlying assumptions as to why it is believed that certain actions will result in success (Schmidt 2009).

There are a number of approaches and frameworks that guide the process of aligning activities with goals. Such approaches assist in addressing the first four stages outlined in the EC guidelines. Two of the most commonly used approaches are developing logframes and theories of change (TOCs). While both of these approaches are planning and management tools rather than evaluation tools per se, they both aim to identify goals, assumptions and measures of success (indicators).

There are some differences between logframes and TOCs that influence the choice of the method. Logframes are designed to help deliver a research objective or a fixed outcome through some form of problem solving and/or 'building' towards an end goal, such as research to understand a complex problem. TOCs are more about creating change in complex settings, such as community development to enhance human wellbeing. Consequently, logframes generally illustrate programme components, outcomes, inputs and activities. They are particularly useful for assisting a manager to determine when outcomes are not synchronized with inputs and activities. TOCs are effective at linking outcomes and activities but also have considerable emphasis on explaining how and why the desired change is expected to come about. This is useful in projects that involve changes to/with people, where changes in behaviour of a project are complex and where there are high degrees of subjectivity with regards to the problem focus, solutions and different perspectives as to how change will be achieved. Thus while logframes are useful, in many cases TOCs are likely to be more appropriate for development of KE projects, programmes and evaluations.

Logframes and TOCs are extremely useful for identifying objectives, activities, assumptions, and indicators and relate closely to the initial steps in the evaluation design process. Thus ideally, project and programme managers and those implementing or conducting evaluations need to work together using an approach such as logframes or TOCs to: (a) enhance the likelihood of success of an intervention; (b) ensure the evaluation is relevant to the project; and (c) improve the design of the evaluation methodology.

3.8 Key conclusions

The overall aim of KE evaluation is to improve the effectiveness and efficiency of the KE process and increase research impact. ESPPI-CREW focuses on increasing understanding of how to better match research with the needs of policy and practice and providing evidence of which KE mechanisms work, in which contexts, to bring about desired and envisaged change.

Despite claims as to the value of KE, there has been little research on its evaluation, and examples of actual evaluations are limited (Fazey and et al. 2012; Phillipson et al. 2012; Plummer and Armitage 2007). Lack of evidence on KE effectiveness is partly because conducting such evaluations can be difficult, both in determining which aspects of KE should be evaluated, and in establishing linear relationships between KE activities and longer term outcomes and impact given the strong influence of political, social, and cultural contexts, and institutional factors (Phillipson et al. 2012).

Yet, despite such challenges, the literature notes many advantages to evaluating KE, for example:

- Helps to refine the practice of KE either during implementation or in the design of new projects.
- Requires evaluators, project managers and stakeholders to clarify the objectives of a KE process. This assists the evaluation and helps project or programme managers to be clearer about their objectives thereby increasing the likelihood that the goals will be met.
- Requires participants to consider their assumptions as to why they believe that a particular KE process or project will deliver the outcomes and whether alternative approaches would be more effective.
- Provides opportunities for stakeholders to work together to share perspectives, increase ownership of and responsibility for delivering KE and the intended outcomes.

Participation of stakeholders in setting up and conducting evaluations enhances their motivation and empowerment to deliver desired KE outcomes and to reflect on and share what they have learnt (Fetterman and Wandersman 2005; Zukoski and Luluquisen 2002). Such participatory evaluations are referred to as ‘empowerment evaluations’ and require close collaboration of stakeholders prior to implementation of a KE process/project (Fetterman and Wandersman 2005). Thus, if implemented appropriately, KE evaluation can enhance exchange of information, generation of knowledge, and the learning of people involved. KE evaluation can also become a crucial part of the design of the KE process itself (Armitage et al. 2011), and is therefore an important part of enhancing the effectiveness of KE projects and programmes.

4. EVALUATING PERFORMANCE OF CREW

This section aims to identify what has worked in CREW year 1, why or why not, and to use data collected from client feedback, JHI PI interviews, and documentary analysis to evaluate performance against the baselines of CREW activities and of stakeholder knowledge, expectations and preferences for knowledge exchange processes and outcomes.

4.1 Findings from the stakeholder baseline

4.1.1 Knowledge of CREW

There was a noteworthy difference in responses regarding how much respondents knew about the aims of CREW, with policy makers reporting knowing 'a little' or a 'fair amount', and the science side 'a fair amount' or 'a great deal'. Generally, those on PRAG or the Steering Group tended to be more informed than those involved in individual projects. The responses suggest more work is needed to ensure that all those involved in CREW are aware of the aims, and are given further opportunities to feed into the process and future project design. Those on PRAG and the Steering Group are often unsure who else to involve in discussions.

Many attendees to the initial PRAG meeting reported that the event had improved their understanding of CREW. This highlights the importance of meetings to discuss CREW.

4.1.2 Communication preferences

Respondents were asked for their preferences for communication (figs 4.1 & 4.2). In some cases the preferences differed between the two groups. Whilst meetings were popular, there were pleas for these to be limited, targeted to specific topics and informal, with dates planned well in advance. Similarly, email was seen as necessary, but to be used sparingly.

Figure 4.1: Science Communication Preferences

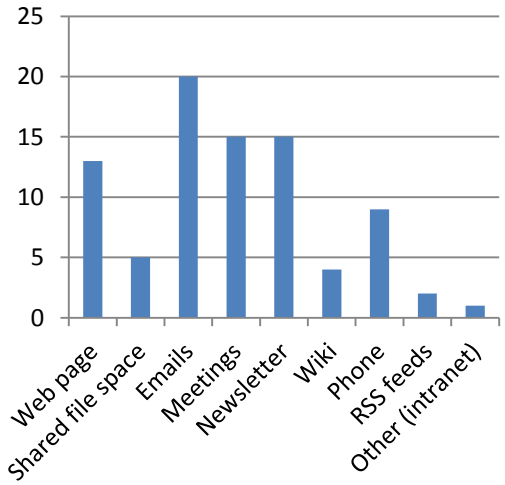
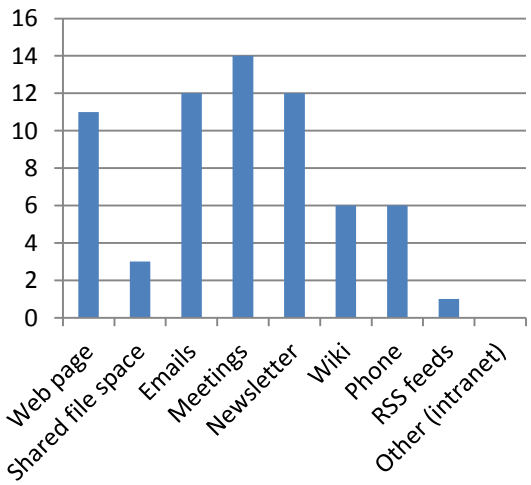


Figure 4.2: Policy Communication Preferences



4.1.2 Desired outputs from CREW

Within the policy responses key points included a desire for CREW to deliver timely support; to improve the scoping of policy-relevant research; improving communication between policy makers and researchers; and developing better relationships and partnership working. Within the science respondents, comments included: products; policy making; communication and scoping future research.

Tangible products, such as a website, research briefings and the call-down service were requested, written in jargon-free language. Other more generic requests were given for useful and up-to-date knowledge flow to policy that improved policymaking, improved understanding by scientists of the policy/operational needs, good practice in communication, open and transparent communication, and a model for joint working and coordination, resulting in an agreed research agenda.

4.1.3 Desired outcomes from CREW

Regarding outcomes, the policy respondents focused on policy support via improved awareness of policy needs and increased responsiveness; the impact of research; and improved networks, interaction and partnership working. The science respondents focussed on the impact of their KE products; development of relationships; increased recognition of the benefits of CREW and commitment to the process; and improved coordination between the relevant stakeholders and research programmes. One respondent wanted more focus on developing coastal or marine work within CREW.

Again, there are many commonalities between the two groups, which augur well for a common vision and objectives to work towards.

4.1.4 Anticipated challenges

There are a number of challenges recognised with setting up a new model of science-policy interface. The policy respondents highlighted the following: conflicting objectives/needs (publications vs practical advice and differing timetables); accessible products (differences in language, terminology and communication cultures); equal coverage of topics, in ensuring that CREW engaged across all policy areas; complexity of the water arena; avoiding duplication; and operationalizing the CREW model. Concerns were raised over how to engage properly with the HEI sector and to draw on all relevant expertise, not just within Scotland. In general, many found the CREW structure somewhat complicated and confusing, and some were unclear how to communicate or get dialogue going.

The science respondents raised several similar issues: different needs and objectives and the lack of understanding of how much time and money even synthesis and reviews can take, and a related concern that CREW needed to manage expectations. Issues with timescales, language and terminology for communication, how to get adequate ‘buy-in’ from policy makers; trust building; governance; wider engagement; and effective problem definition were also raised.

One respondent wanted to ensure CREW and its products were visible, and seen as credible, in what is a crowded arena of knowledge exchange programmes.

4.2 Evaluation of CREW structures

CREW structures include the website (vCREW), the call down service, capacity building projects, steering group (CSG), policy-research advisory group (PRAG), and the facilitation team (CFT). Baseline data show that all aspects had identified aims, outputs, KE mechanisms and target audiences during their planning phases. This was likely aided by a requirement to submit a standardised research plan which included pre-defined headings covering these features (see Appendix 5). The literature review shows that it is widely agreed that starting a KE project with clear aims and objectives is imperative for successful knowledge exchange, and also for evaluation of KE processes, outputs and outcomes, and ultimately, project impact.

4.2.1 vCREW

The vCREW PI has reported the project is largely on track, but some deliverables have not been met. The initial approach was chosen based on discussion with IT staff and stakeholder input from the initial PRAG meeting. A dynamic web site was set up in Drupal that allowed flexibility for policy needs with material from year one activities being published as it became available. A register of expertise was a key deliverable which has not been met due to the register in its current form not being fit for purpose.

Web site analytics show 50-100 site visits per month with an average duration of two minutes from the launch of VCREW to about 300 visits a month (figure 4.1) with an average visit lasting five minutes now. In year 1 there have been over 2000 visits. Over 900 separate individuals have visited CREW's website since it was set up at the start of June 2011. The majority (90 %) of these visitors are from the UK, with the rest originating from another 54 other countries (of these, visitors from the USA were greatest in number).

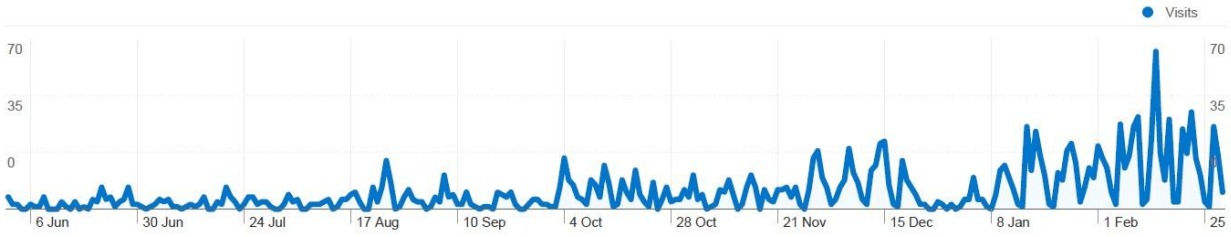


Figure 4.1 VCREW visits from June 2011 to February 2012

4.2.2 Call Down

The call down service is managed by the facilitation team, using a CREW register of expertise, which lists the experts across a range of academic disciplines within the JHI and Scottish universities who have been accepted to respond to call down enquiries. To date, the following HEIs have responded to enquiries or rapid response requests: University of Dundee; University of Stirling; University of Edinburgh; Heriot-Watt University; University of St Andrews.

CREW has received 18 enquiries or requests for rapid research from the policy community in year 1.

Enquiry from	Enquiry/request for information
Scottish Government	Joint draft of flooding teaching material for Education Scotland website
Scottish Government	Literature review on the value of Scottish Flood Forum type activities
Scottish Government	Provision of baseline data on the academic water sector in Scotland and on Water Institutes world-wide
Scottish Government	RBMP measure cost assessment (via themes)
SEPA	Examination of key ecosystem services provided by the water environment, and identification of an indicator/proxy to show the state of delivery of that indicator
SEPA	Higher Education Institute (HEI) to peer review paper produced by the Land Management and Flooding Task and Finish Group, SEPA
SEPA	Peer review of Jacobs Section 20 review and development of a GIS tool
Highlands and Islands Enterprise	Peer review of Dryden (consultant) report
Scottish Government	Briefing on mapping and considering good practice for water related advisory groups in Scotland
Scottish Government	Briefing note on water security
SEPA	Peer review of phase two of the Jacobs work
Scottish Government	Assessment of the affordability of insurance in flood risk areas in Scotland and determine the likely impact of the cessation of the Statement of Principles on flood insurance
Scottish Government	New digital rivers network; project-manage the design of the assembled datasets, collection of data from local authorities and the collation of the different data sets into a single unified set of GIS layers for Scotland.
SEPA	CREW expertise in SEPA workshops on diffuse pollution
Andrew Stains	Review of proposed research for SEPA on humic substances
Andrew Stains	Review of proposed research on the use of remote sensing to detect and monitor algal and cyanobacterial blooms
Scottish Water	Visibility of the potential value of co-mixing Macro Algae and SS for: -Bio-gas yield potential from a selection of mix ratios -Bio-mass derived secondary value
Scottish Water	Assessment of Oban WWTW AD plant.

Table 4.1 Enquirers, enquiries and requests

To date, the call down service has been well received by service users, and has been noted as the most useful aspect of CREW. Some unsolicited feedback has been provided, however, the call down coordinator has begun to seek informal feedback from service users on all work on a more routine basis.

All service user feedback to date has been positive. Examples include:

- "*the work put into this in a short timeframe is very much appreciated and very helpful";*
- *"very professionally handled and likely to be very productive";*

- *"the process really focussed people's thoughts and moved us forward"; "Can I just say how great it is to receive these and how they make my life much easier…….these are at the level I can understand and make decisions on".*

Based on this feedback, the call down service seems to be meeting its aims and the needs of the customers. It should be noted, however, that feedback was not received from all service users, and it may be that those who have not responded were not inclined to provide this information due to more negative opinions.

Feedback from scientist responding to call down enquiries was not sought during the year, although several scientists provided views. For example:

- *"I have enjoyed working on the call down activities and hope to do so again, it seems to provide a good variety of interesting projects. I think greater guidance (at the start) on the format expected for any specific outputs would be useful to avoid expending effort unnecessarily."*
- *"Great progress has been made in setting up this new mechanism for policy driven research/work. The working between CREW JHI and MASTS has not been 100% bridged. One issue has been sorting out of payment of HEI on projects. The process and guidance is not 100% there and working."*

4.2.3 Capacity building projects

CREW has jointly developed capacity-building research projects with Scottish Government and its agencies to help with the delivery of medium term policy needs.

In CREW year 1, capacity building was discussed at a stakeholder workshop, involving JHI researchers, Steering Group and PRAG members. The workshop resulted in a list of potential projects submitted for SG approval. The report of the workshop is published separately as a CREW report, Blackstock et al. (2011).

Nine capacity building projects were identified as priorities to be undertaken in 2011-2012, and projects were specified jointly by the steering group, CFT and JHI principal investigators (PIs). 2011-2012 capacity building projects:

- Evaluating Science Policy Practice Interfaces (ESPPI CREW)
- Natural Flood Management (NFM) Knowledge System
- River Functioning and Resilience - River Keeper's Handbook
- Diffuse Pollution Management
- Coastal Flooding
- Mapping of Climate Change on Water Demand-Supply Deficits in Scotland
- Fully Integrated Catchment Management Planning Catchment Advice Template and Exchange II (CATCH-II)
- Water, Health and Well-being (Blue Health)
- Hydro-literacy; Knowledge Exchange for Public Engagement

Interviews with principal investigators (PIs) of projects indicated that overall, PIs were happy with the progress made in year 1 capacity building projects. The main issue was delay in contracting HEI partners for collaboration on projects, but while this meant that most projects took a little longer to complete

than originally planned, contracting delays were not otherwise seen to have had significant impact on progressing project work. Lack of time for JHI staff to become involved was an issue for one project which was relying on buy-in to progress aspects of the project. More generally PIs stressed the need for time to build relationships and to develop collaborative working skills to promote effective knowledge exchange. In summary:

Project planning: PIs noted the value of clear project aims and objectives, and reported that action plans helped ensure clarity of aims and objectives at the project inception stage. PIs also noted that objectives became sharper and increasingly focused as work progressed. Good communication between PIs and the CREW facilitation team was seen as important for increasing understanding of CREW purpose and its overall aims and objectives, and in providing support for project processes.

Project activities: Capacity building projects in CREW Year 1 used a wide range of KE mechanisms, and KE took place both before projects started and while projects were ongoing. KE at these stages was seen as very useful in developing the project specification, and raising awareness of issues arising or other related work. PIs noted that feedback from stakeholders during project development and process enhances activities and outputs.

Project appraisal: PIs stressed that it is vital to appreciate the time needed to engage in KE. Developing relationships takes time and effort from all involved. PIs reported that workshops were valuable mechanisms for effective KE, but also stressed the need for time and skill in planning such stakeholder events.

Project impact: Good communication and ongoing relationships between scientists and stakeholders were seen as crucial in achieving project impact. Opportunities to build on previous research were seen as a key element in building capacity within CREW and increasing impact of research findings. PIs also felt impact was increased via direct delivery of information/outputs to policy staff working in relevant areas.

Based on these views and information from the PI interviews the ESPPI-CREW team made several recommendations for future capacity building projects:

- The CREW facilitation team should provide PIs with a checklist of essential steps in KE mechanisms, and this should include the timetabling of meetings/milestones at appropriate points in the project even if the project is small in terms of number of partners, nature and scale
- The CREW facilitation team should provide more support for PIs, including increased communication about the CREW initiative, timetabling of PI meetings to discuss progress/issues arising, and easily accessible project aids, e.g. templates, checklists and feedback forms for stakeholder events
- Future evaluation of projects should focus more on self assessment and the gathering of monitoring data during project processes.

4.2.4 CREW Facilitation Team

The CFT has largely met its objectives during year 1, including managing the call down service, vCREW; developing the standard operating procedures; administering and supporting capacity building projects in collaboration with MASTS partners; producing papers for CSG and PRAG meetings; producing

awareness raising and publicity materials for CREW (e.g. flyer, PowerPoint presentations, posters for conferences); presenting CREW at conferences and attendance at CREW and other water-related events**.**

Using the Terms of Reference (ToR) for the CREW Facilitation Team (CFT), which were set out with input from the CFT and CSG, the team is successful in that the aims are being met.

These include:

- undertaking all administrative and operational aspects of the delivery of CREW;
- supporting membership, registration, and skills audits for CREW members;
- acting as an information hub for CREW (through vCREW);
- jointly working with CXC;
- preparing and reporting on scoping workshops and horizon scanning events;
- evaluating and improving science, policy, practice interfaces (via ESPPI CREW);
- administering call down support for short-term responses; and
- promoting CREW to national and international audiences.

On the last aim, there has been a change from the original aim as the focus has been on promoting to national audiences. This was a decision taken however, to ensure the Centre was fit for purpose in its first year before expanding to a more International role.

As per the ToR, the group met monthly during CREW year 1, and supplements this with on-going, often daily, dialogue. Membership of the CFT has evolved over year 1. This was due to staff availability and to make the most of staff skills and knowledge areas. The CFT is a team of three, working part time on CREW, working not only on CFT but also in delivery of call down responses and capacity building projects.

4.2.5. Steering Group

CREW is governed by a steering group (CSG), which provides strategic advice and direction to CREW, overseeing its work and making recommendations to ensure that the Centre meets its primary objective. The Steering Group is chaired by the head of the SG Rural and Environment Science and Analysis Services Division (RESAS) and comprises the CREW director and representatives from SG directorates, SEPA, Scottish Water, University of Leeds, Centre for Ecology & Hydrology, MASTS, and the CFT.

The steering group has played a pivotal role in the first year of CREW. Its Terms of Reference envisage a wide remit: advising on performance indicators, progress, and impact; horizon scanning; KE; reviewing synergies arising; and advising on linkages and connections with other related research and initiatives in the UK, European and international arena.

Analysis of steering group meeting agendas, minutes, action points, and communications with CFT indicates that the group have been invaluable to the running of CREW in year 1. The level to which the group carries out its functions as stated in the ToR is not clear, and some functions have been emphasised more than others. The group has provided lots of assistance in the running of the CREW, particularly in providing advice, advising on direction, and ironing out operational issues arising.

4.2.6 Policy-Research Advisory Group

The remit of the Policy:Research Advisory Group (PRAG) as set out jointly by the steering group and the facilitation team:

- to act as the science:policy:practice interface;
- to review the activities and progress of CREW on a six monthly basis;
- to confirm peer review of applications for support; potential appointment of secondees to SG Policy teams;
- annual Policy Summit to identify key areas of waters-based policy and their stages of development and roll-out;
- horizon scanning to support future prioritisation. Based on this, the group were set to meet on a six monthly basis.

The degree to which these have been achieved differs across each of the aims. PRAG has met on two occasions as planned, but appears to be working less than optimally. Rationale for membership is not fully transparent, members do not represent the range of CREW stakeholders, and there appears to be only limited ownership of the group among current members. Major input this year was on prioritisation of capacity building projects for 2012-2013, but this was seen to be a difficult process.

Overall, it is the view of the evaluation team that PRAG in its current form is not being fully engaged and that there is a lack of widespread buy in from the group as a whole, rather just a few active members. They are not meeting their aims as set out in the terms of reference, for example, 'reviewing the activities and progress of CREW on a 6 monthly basis', which is likely due to a lack of steer from the facilitation team and steering group. A lack of practitioners on the group has also been noted, with the membership comprising policy makers and scientists.

5. CONCLUSIONS

5.1 Key conclusions

- Evaluation of KE including its processes and impact is poorly developed. Much of the literature focuses on the theory with very few worked examples. Whilst some insights can be gleaned on measuring the effectiveness of any processes put in place, measuring impact is extremely complex. It is difficult, perhaps impossible, to separate out the effects of a particular KE initiative given the influence of wider social, political, economic, institutional and cultural factors.
- Desired outcomes of KE should be integrated into research specifications, with assessment of performance proceeding on the basis of clearly specified aims and objectives; activities to achieve these; indicators of performance; research outputs; and a clear rationale of why these specifications are believed to be able to produce the desired KE outcomes and impacts.
- Participatory approaches to evaluation that include researchers and stakeholders provide opportunities for enhancing implementation and evaluation of KE interventions through their involvement in evaluation design, implementation and performance assessment.
- Evaluation of CREW in its first year focussed on measuring numbers of users of the services provided by CREW; coordination of activities; participation in CREW governance, projects and activities; and the KE mechanisms used. This needs to be expanded in year 2 to identify possible approaches to impact evaluation and a review of processes. The stakeholder baseline and PI interviews for example, highlighted that many found the CREW structure confusing, were unsure of how to initiate dialogue; and that staff resources were lacking in some of the capacity building projects. Conversely, a great deal of positive feedback has also been provided from the project PIs and call down, though overall obtaining feedback has been patchy in CREW's first year.
- CREW governance is highlighted as needing further work, notably PRAG which does not fully represent stakeholders nor engage its members on a regular basis.
- While insufficient time has passed to fully assess the degree to which ESPPI-CREW is helping CREW meet its aims, there is some evidence that progress is being made on these. Strong links are in place between CREW and its core customers, helping to increase networks; and researchers have noted an increase in their skills, KE capability and knowledge of the policy arena.

5.2 Note on the limitations of ESPPI-CREW

ESPPI-CREW was limited in that it measured success of the processes of CREW structures, governance, KE mechanisms and the degree to which each individual aspect of CREW has met its aims as originally stated. The year 1 evaluation does not attempt to assess the specificity, attainability, relevance or timeliness of the aims.

With the exception of interviews with JHI PIs, the evaluation relied on analysis of CREW documentation and feedback received informally from clients of the service. The documentary analysis this year will be followed up with a questionnaire to steering group members at the start of year 2 to evaluate year 1 and define the baseline for year 2. This will enable a more comprehensive evaluation in later years.

6. RECOMMENDATIONS

6.1 Recommendations for future CREW activities

Recommendations on areas needing to be addressed in year 2:

- More support for PIs should be available from 'CREW central', i.e. the facilitation team;
- A standardised research planning template, which includes pre-defined headings, should be completed for all aspects of CREW to help identify clear aims, outputs, KE mechanisms and target audiences;
- Member specific information should be available via a members section of vCREW, accessible to registered experts, policy clients, and researchers currently working on an aspect of CREW;
- Increase the amount of information available on vCREW about CREW;
- Clarify the CREW publication strategy and ensure as many outputs as possible are openly accessible on vCREW once they have been approved for publication;
- Increase the number of experts registered with CREW, and the range of expertise included; and
- Reconsider the role of PRAG and its membership.

6.2 Recommendations for future evaluation of CREW structures and governance

It is widely agreed that evaluation of KE impact is important in ensuring that research effort is linked to good policy making and practice, and to wider understanding of decisions made by other stakeholders. KE evaluation is widely viewed in the context of evaluation more generally but also as involving highly specific initiatives and unique contexts; making it unlikely that a matrix of types of KE mechanism and desired outcomes and impacts could be developed. This means that the design of KE needs to be part of project design in order to determine how best to exchange information and generate knowledge in that specific context.

Recommendations for future evaluation of CREW governance and structures:

- KE evaluation should be embedded in the processes of project/aspect implementation. That is, ensure that evaluation is used to encourage learning throughout projects and programmes and enhance the continued adaptive management of KE interventions. More focus on self-evaluation and the gathering of evaluation data during project processes should be a key element of CREW activities;
- A checklist for PIs of essential steps in KE mechanisms should be available, and projects should timetable meetings/milestones at appropriate points throughout the project regardless of the number of project partners, size and scale of the project; and
- Ideally, future evaluation of KE interfaces within CREW should take a partnership approach, involving programme and project managers working collaboratively from the outset to specify clear aims, objectives, activities, performance measures, and indicators of achievement for each aspect and capacity building project, and to make explicit the assumptions as to why they believe that interventions are likely to deliver the desired outcomes.

6.3 A proposed model for delivery of a KE programme of individual KE projects

The final section of this report presents a proposed model taking into account the key points identified from the literature review, for further consideration to help deliver a partnership approach. Key points for consideration in deciding whether this model is viable are:

- Collaborative development of projects and evaluations will probably require independent professional facilitators to help implement the process to ensure that all those involved are aware of the overall aims, objectives and planned outcomes, and are given opportunities to feed into the design of evaluation processes for KE at the same time as feeding into project design. The collaborative effort may include JHI researchers, representatives from the Steering Group and PRAG, HEI partners, and relevant policy champions.
- Effective evaluation that enhances understanding and delivery of KE will require considerable time and effort from evaluators and programme and project managers and stakeholders during initial, mid-term and end phases. This is needed to ensure there is shared understanding of project goals and activities and to enable re-orientation of activities as new information emerges.
- Application of empowerment evaluation principles requires evaluators to perceive themselves (and be perceived by others) as facilitators of the evaluation process rather than being external authorities of success. By doing so, adaptive learning about delivery of KE will be enhanced.
- The approach would rely on all projects starting at the same time.

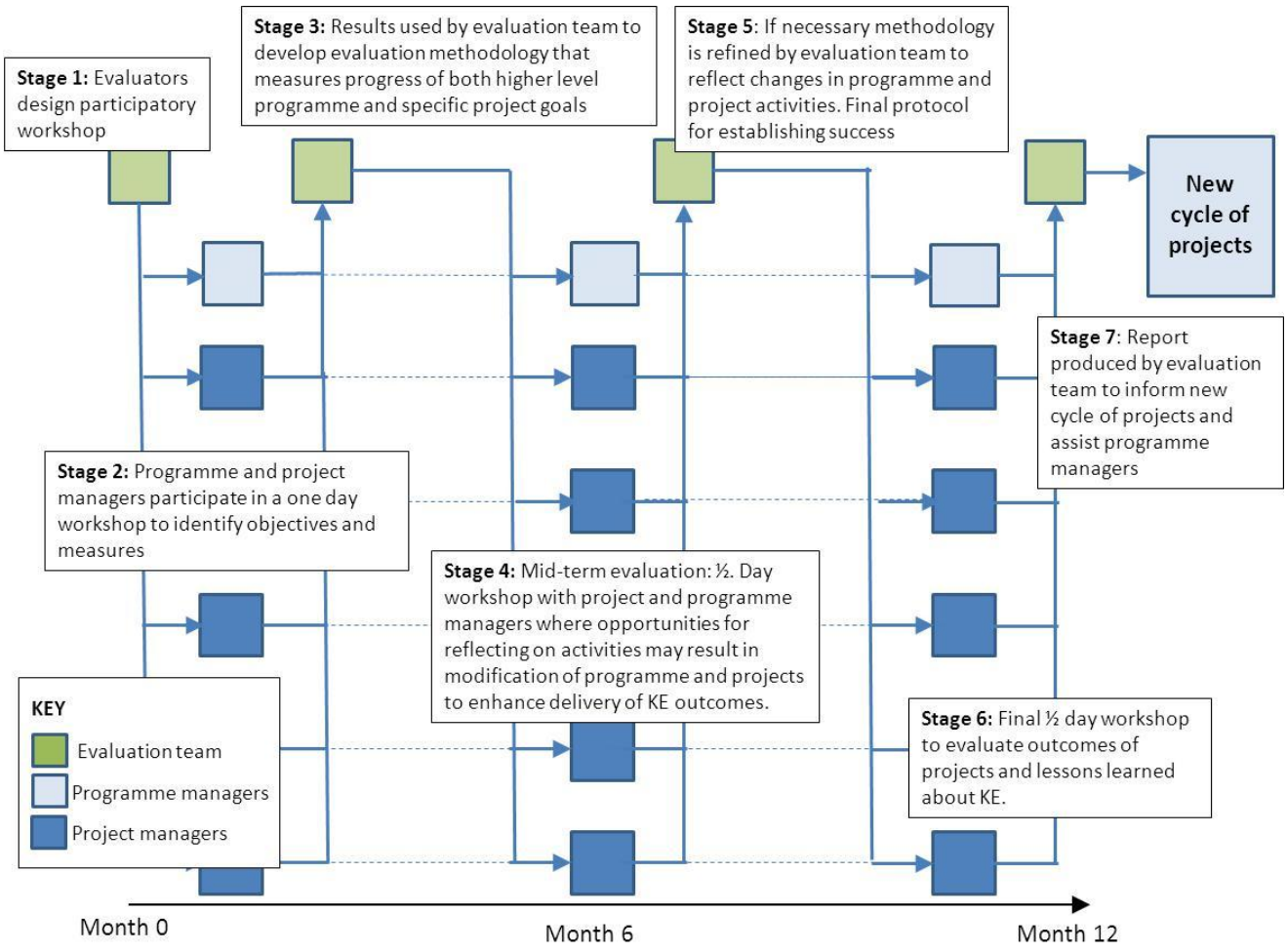
The design takes into account issues highlighted in the review of literature on evaluating KE, including the need to apply rigour in evaluation while also enabling flexibility of evaluation elements as understanding about KE and research activities increases through implementation of projects.

This approach can be conceived as a KE project in itself, where in carrying out the processes involved in evaluation design, project managers and other participants are learning from each other about experiences of what works and what does not in multi-way communications to increase the impact of policy needs on research and scientific evidence on policy. The process of evaluation can therefore play a key role in encouraging adaptive learning and improving management of the KE programme as a whole.

The model recommended for consideration has seven key stages that are to be implemented over a one year cycle of multiple KE activities associated with aspects of a programme and individual projects:

- Stage 1: Evaluators design a one day workshop with independent facilitators that will be held with all programme and project managers/implementers.
- Stage 2: Programme and project managers participate in the one day workshop. The aim is to identify key goals and measures etc. of individual projects. This would be a large workshop but where groups are defined by the projects they are working on. The workshop provides the basis for the final evaluation design at the programme level and more detailed project specific evaluation guidelines. The workshop will also enable project and programme managers to be more explicit about their objectives and how they will achieve them and to be able to share experiences with other projects and programmes.

- Stage 3: Results of the workshop are used by the evaluation team to develop an evaluation methodology that can inform both programme level and project level success.
- Stage 4: A half day workshop that again brings together participants to reassess their progress and the evaluation methodology. This stage is a critical opportunity for projects to learn from each other and adapt their activities if required.
- Stage 5: Evaluators refine methodology based on what has been learnt so far about KE delivery.
- Stage 6: Final half day workshop with all participants. This can be used to evaluate outcomes, and reflect on the success of projects. It enables the programme managers to consider what has been learnt from the individual projects and how this should relate to longer term outcomes.
- Stage 7: A report is produced to inform future cycles of projects in the programme.



Note: The blue arrows indicate flows of information over a one year time frame.

Figure 6.1: A possible approach for a programme of individual KE projects that encourages adaptive learning from evaluation, participation of key managers and stakeholders, and enables clarity of objectives to be identified

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8. APPENDICES

Appendix I Questionnaire used for the survey to establish the stakeholder baseline

Appendix II CREW baseline

Appendix III JHI PI interview schedule and summary evaluation plan

Appendix IV: ESPPI-CREW Year 1 Summary Project Plan (prepared for interviewees)

Appendix V: CREW Action Plan template

8.1 Appendix I: Stakeholder Baseline Questionnaire

As part of the ESPPI-CREW (evaluating science – policy – practice interfaces) project, we wish to collect baseline data on your views of CREW. Please spare five minutes to complete this questionnaire – all data will be anonymised & participation is voluntary. There are no wrong answers. Please type in the answers or delete the boxes that do NOT apply to you.

Some information about you:

1. What is your discipline and/or area of expertise?

   ……

2. Which organisation do you work for?

   ……

3. Have you worked on science to policy or science to practice interfaces before?

   □ No □ Once □ Frequently □ Throughout my career

4. Are you involved in any of these other initiatives? Please tick any that apply

   □ Other Scottish Government funded Centres of Expertise/Strategic partnerships

   □ CAMERAS □ SEARS □ Internal Scottish Government policy network

   □ Cross-organisation network related to water (please name :)

   ……..

   □ Other (please note :)

   …….

Your views on CREW:

5. How much did you know about the aims and objectives of CREW before this meeting?

   □ Nothing □ A little □ A fair amount □ A great deal

6. Had you been involved in commenting on CREW's activities before this meeting?

   □ Nothing □ A little □ A fair amount □ A great deal

7. What is the **output** you personally would most like to see arising from the 1st year of CREW:

   ……

   ……

   ……

8. What is the **outcome** you personally would most like to see arising from the 1st yr of CREW:

   ……

   ……

   ……

9. What, in your personal opinion, are the main challenges we will face trying to achieve CREW's objectives e.g. theoretical, practical, logistical, personal, others …

……

……

……

……

Your views on the PRAG meeting [attendees only]:

10. Has this meeting improved your understanding of CREW and its activities?

☐ Not at all ☐ A little ☐ A fair amount ☐ A great deal

11. Do you understand how you can contribute to the delivery of CREW's objectives?

☐ Not at all ☐ A little ☐ A fair amount ☐ A great deal

Working together in the future:

12. We are interested in how best to communicate with you. Please select the following communication options that you personally would like to see us use in future:

☐ web page ☐ shared file space ☐ Wiki blog ☐ RSS feed ☐ phone call

☐ emails ☐ newsletter ☐ meetings ☐ Other (please note below)

……

13. Do you have any specific skills or information that would inform the ESPPI-CREW project (e.g. working on KE as part of your job, have a useful report to pass on)?

……

……

……

Thank you very much for your contribution. Results will be returned to as part of the ESPPI-CREW baseline report in the autumn. Please do provide further comments below if you have more to say.

……

……

For more information about ESPPI-CREW, please contact Kirsty Blackstock (Kirsty.blackstock@hutton.ac.uk) or Emily Hastings (Emily.Hastings@hutton.ac.uk)

8.2 Appendix II: CREW Baseline

Governance	Aims	Outputs	KE Mechanisms	Target Audience
CREW Steering Group	• To advise on the development of performance management systems and indicators of performance, receive progress reports and provide advice and recommendations to the CREW Director on how to increase the effectiveness and impact of the Centre. • To consider the outputs of exercises to scope future work, and provide advice and recommendations on the resulting operational plans and work programme, and to keep these under review in order to ensure that emergent issues are taken into account . • To support knowledge exchange and to advise and make recommendations to enable CREW to meet the needs of key users of the Centre outputs. • To review and provide feedback on draft reports and other outputs from CREW prior to submission to the RESAS Strategic Research Programme Board. • To review the development of and synergies arising from the working relationships between CREW's partner organisations. To reconcile differences in opinion and approach by the partners and advise on resolving disputes arising from them. • To advise on linkages and connections with other related research and initiatives in the UK, European and international arena.	• Meets twice a year. Minutes and action points are prepared by the CREW Facilitation Team. All other supporting documentation and organisational support will be provided by the Director and Facilitation Team. The CREW Facilitation Team will indicate clearly whether the materials presented are for information, discussion, recommendation, or other action.	• Meetings • Written documents	• Policy • Practice • Science • SG
PRAG	• To act as the science:policy:practice interface • To review the activities and progress of CREW on a six monthly basis • To confirm peer-review of applications for support • Potential appointment of secondees to SG Policy teams, • Annual Policy Summit to identify key areas of waters-based policy and their stages of development and roll-out, • Horizon scanning to support future prioritisation	• Meets six monthly. Minutes and action points are prepared by the FT and open to CREW members on the internal website. All other supporting documentation will be available assuming no conflict of interest.	• Face to face meetings • Supporting documents and reports	• Policy • Research

Table A1: Governance aims, outputs, KE mechanisms and target audiences anticipated

Structure	Aims	Outputs	KE Mechanisms	Target Audiences
CREW Facilitation Team	• Undertake all administrative and operational aspects of the delivery of CREW; • support membership, registration, and skills audits for CREW members; • act as an information hub for CREW (V-CREW); • prepare and report on scoping workshops and horizon scanning events; • evaluate and improve science:policy:practice interfaces • administer call down support for short-term responses; • promote CREW to national and international audiences;	• Meets monthly. Minutes and action points will be recorded and made available to the Steering Group. All other supportive documentation will be available assuming no conflict of interest.	• Face to face meetings • Supporting documents and reports	•
vCREW	• Establish clear communication channels for advice to Scottish Government and partners; • Coordinate internationally leading research; • Provide an innovative vehicle for policy development and support • Act as a home/mechanism for CREW KE to underpin policy, operational and wider societal needs.	• An appropriate and functioning web presence to support all of CREWs activities. In the first instance a static web site so we can scope out the design and functionality required by stakeholders.	• Website • Online resources	• Policy • Practice • Science • SG • Public
Call Down	• Provide the policy community with access to rapid, reliable and impartial information from leading experts, which is free at the point of delivery.	• Outputs (where appropriate) will be included on dedicated pages on the CREW website, which will include additional information such as FAQs	• Written reports • Secondments • Seminars/training • Workshops	• Policy • Practice • Science • SG

Capacity building project	Aims	Outputs	KE Mechanisms	Target Audience
ESPPI CREW	• Understand existing science: policy: practice interfaces; • Measure how CREW contributes towards these interfaces; • Evaluate performance; and • Recommendations to improve interface	• Policy brief; good practice science-policy-practice KE, • Protocol for evaluating science-policy-practice, • Report on baseline findings, and • Report on evaluation findings	• Interviews • Questionnaire	• CREW CFT • PRAG • CREW Steering Group
Natural Flood Management (NFM) Knowledge System	• Contribute to the implementation of NFM in Scotland, • Support SG in developing a position statement on NFM, and • Improve education in NFM.	• Web format NFM database. • Paper; farmer's attitudes and NFM. • Contribution to SNIFFER/SEPA workshop 2011 "NFM implementation: Learning from practice".	• Workshop	• SG • SEPA • Local Authorities • Farmers • Land managers • NFUS • SRPBA
River Functioning and Resilience – River Keeper's Handbook	• Raise awareness of fluvial geomorphology and its importance in determining the habitat that river ecosystems rely on and its role in NFM, • Promote best practice for managing and restoring the geomorphology of rivers, and • Raise awareness of human induced geomorphic pressures.	• A soft bound thirty page, colour book of suitable size for field work, covering concepts in fluvial geomorphology and ecology, and fluvial geomorphology in Scotland	• Project team meeting • Book	• SG • SEPA • SNH • Catchment stakeholders (fishery boards, river basin planners, landowners) • General public.
Diffuse Pollution Management	• Co-construction of monitoring strategies to assess effectiveness of measures implemented on the priority catchments • Identification of priorities for SRDP measures which deliver water quality improvements, • Discussion of approaches to measure delivery of these measures for equitable, efficient, integrated, and targeted policy.	• Contribution to workshop on Linking DPMCs and DTCs • Field visit; Lunan catchment • Poster; DP mitigation • Workshop and site visit; DP mitigation effectiveness • Report and policy brief from the workshop • Policy brief; assessment of DP and mitigation effectiveness, • A Farmer focus group and science update meeting on Lunan DPMC	• Field visit • Presentation • Workshop • Face-2-face meetings • Report	• Scottish Government policy makers • SEPA • Scottish Water • CAMERAS partners

Capacity building project	Aims	Outputs	KE Mechanisms	Target Audience
Coastal Flooding	• Synthesise existing information relating to coastal flooding in Scotland, and • Produce a guidance document for local authorities and practitioners.	• Methods for evaluating the effectiveness of this work • Review of existing work and understanding • Explore mechanisms for stakeholder engagement, including emerging digital technologies-review document • Joint workshop and summary report with CXC to identify understanding, user needs, knowledge gaps and deliverables • Web pages • Guidance document • Report on effectiveness of activities	• Face 2 face meetings with project team • Questionnaire	• Practitioners • Local authority planning staff • SEPA • SNH • SG policy • CAMERAS partners
Mapping of Climate Change on Water Demand-Supply Deficits in Scotland	• Explore with stakeholders how climate change will modify the supply and demand for water in Scotland, and • Map these changes across Scotland to evaluate impact on the supply-demand balance and its implications for resource management.	• Workshop with stakeholders, Oct 2011 • Report with maps that describes the approach and findings • Policy brief based on the findings of this activity.	• Workshop • Report • Policy brief	• SG policy staff involved with Climate Change (Adaptation Framework) and Water issues, • Scottish Water • SEPA
Fully integrated catchment management planning Catchment Advice Template and Exchange II (CATCH-II)	• Establish an understanding of the activities and objectives of established integrated catchment management (ICM) projects • Use the knowledge and experience of ICM projects to identify opportunities and challenges to delivering Scotland's policy commitments to water management at the catchment-level, and • Disseminate the key messages to ICM policy makers, agencies and practitioners in Scotland, in the UK, and to international audiences via the HELP basin network.	• Start-up meeting to establish common understanding of goals. • Web-based version of the CATCH handbook. • Talking heads clips from catchment project officers, ICM researchers, policy partners. • Short videos on ICM • Interviews; establish the needs of Policy, Agency and catchment groups to inform workshop ppts • A workshop o Day 1 – presentations: headline knowledge and needs of each of the groups + research overview.o Day 2 – workshop building on the themes arising from Day 1 • Policy brief; 'Catchment-level delivery of national policy commitments to water	• Meetings • Web pages • Interviews • Workshop • Policy brief • Report	• Policy • Government agencies e.g. SEPA (RBMP, FRM), SNH, Scottish Water • Catchment management groups • Related stakeholders

Capacity building project	Aims	Outputs	KE Mechanisms	Target Audience
		management'. • Report for steering group that will include a synthesis of the workshop.		
Water, Health and Well-being – Blue Health	• Raising stakeholder awareness of the state of knowledge of the role of water in relation to well-being , • Collating, and reporting on, the state-of-art in evidence of the role of water in relation to well-being, and • Engaging in dialogue with relevant stakeholders to identify links across sectors	• Report for steering group that will include a synthesis of the workshop. • Report • Science briefing • Review database provided through VCREW • Relevant KE mechanisms supported by 'KnowledgeScotland 2'	• Reports • Web pages • Workshop •Face to face	• Policy officers linked to well-being and water
Hydro-literacy - Knowledge Exchange for Public Engagement	• Help develop public understanding of the issues involved in the management of water • Increase science engagement	• Water resources on VCREW • Recordings of cameos for WaterPast • Field work videos • Photo competition entries • Living Field web pages	• Webpages • Story telling • Radio • Video • Events • Education resources • Field visits	• Public and schools

Table A2 Aims, outputs, KE mechanisms and target audiences anticipated for CREW structures and for each capacity building project at the planning phase

8.3 Appendix III: Discussion points for JHI PI interviews

1. What KE mechanisms have you used in your CREW project?
2. Did you collect any evaluation feedback during the project? If so, what was it?
3. To what extent did your project's activities change from the plans, and why did this happen?
4. To what extent do you agree that your project/activity
    - Had clearly defined objectives?
    - Has increased the quality and quantity of interaction between scientists, policy makers and practitioners?
    - Will make interaction between scientists, policy makers and practitioners easier in the future?
    - Generated new skills, knowledge and capability for scientists, policy makers and practitioners?
    - Was able to respond to the needs scientists, policy makers and practitioners?
    - The needs of the scientists, policy makers and practitioners were clearly understood
    - Has already had an impact on policy making, practice and future science/research?
    - Will have an impact on policy making, practice and further science/research in future?
5. Do you feel you achieved the aim of the project? Why or why not?
6. Are you able to identify the most successful aspect of the project? Why was this a success?
7. Are you able to identify the least successful aspect of the project? Why was this a problem?
8. What is the main lesson about KE learnt that you'd like to pass on?
9. With hindsight, is there anything you would have done differently?
10. Any other aspects of the CREW experience you would like to raise?

8.4 Appendix IV: ESPPI-CREW Year 1 Summary Project Plan (prepared for interviewees)

Aims of ESPPI-CREW are to:

- Understand existing science: policy: practice interfaces;
- Measure and analyse how CREW's structure, members and activities contribute towards these interfaces; and
- Evaluate performance and suggest ways to improve links between research, policy and implementation.

ESPPI-CREW is designed to support the three aims of CREW to:

- build networks;
- create new capacity; and
- increase impact of, and from, the research.

Overview of the evaluation plan

This plan is for evaluation of the following aspects of CREW for 2011-2012:

- Policy : Research Advisory Group (PRAG) and Steering Group meetings
- V-CREW (virtual hub)
- Call-down service (enquiries and rapid response research)
- Year 1 CREW capacity building projects.

The Year 1 ESPPI-CREW evaluation aims to develop a facilitative tool (ie evaluation framework) that allows increased self-evaluation of CREW activities and enhances CREW outputs during the remaining years of the programme as a whole. However, the evaluation also aims to provide an account of the CREW knowledge exchange processes, mechanisms, and outcomes in its first year of operation. This evaluation will be undertaken in 3 main ways:

- Developing a baseline for the evaluation using CREW action plans and project documentation
- Collecting data on what actually happened via interviews with CREW project PIs
- Collecting data on perceived outcomes from CREW stakeholders

Developing a baseline for the evaluation

1. Establish the main JHI, HEI and Policy contacts
2. Establish the aims and objectives of each aspect of CREW and 2011-2012 projects
3. Establish the planned activities and timelines for each aspect of CREW and 2011-2012 projects
4. Prepare baseline report to include for all CREW aspects and projects: name of the JHI and HEI PI & Policy Champion; aims of project; planned activities; timelines; budgets; and outputs. Report to be peer reviewed by HEI partners.

Collect process data that record what actually happened

Preliminary review of the KE literature indicates that the most important aspect of evaluation is getting those involved in projects to do a lot of the evaluation, and be involved in multiple stages in order to encourage reflective learning. However, because of initial set up of CREW in Year 1, the ESPPI-CREW team will collect data for points 2, 3, 4, 7 and 8 through documentary analysis, and collect data for points 5 and 6 from face-to-face interviews. These interviews will also supplement data collected through documentary analysis, in particular changes in plans/people engaged.

5. Establish what activities took place, including timelines, budgets and outputs
6. Establish who was engaged in these activities, consulted on outputs and/or informed of the results (from science, policy and practice)

7. Collect data from those engaged, consulted and/or informed about the activities

We have a baseline report containing data collected from people who were engaged, consulted and informed at the start of CREW. We plan a small follow-up exercise to obtain data from these people at the end of Year 1.

Analysis and reporting

Analysis and reporting will by undertaken by the ESPPI-CREW team. We plan to:

- Analyse the data within each aspect of CREW and each specific CREW project. [networks, skills, responsiveness, impact]
- Consider context that may affect delivery
- Draft project specific recommendations (on how to improve the design and delivery of CREW activities 2012 onwards) and discuss with PIs and Policy champions.
- Analyse the data between activities and projects.
- Obtain peer review of analyses and recommendations from HEI partners,
- Draft overall recommendations (JHI/HEI partners) and discuss with Crew Facilitation Team and then PRAG/Steering Group
- Finalise an evaluation plan and protocol for future CREW activities.

8.5 Appendix V: CREW Action Plan template

CREW - UNAUTHORISED COPY IF PRINTED OUT (i.e. please check this is the correct version)			
CREW Action plan			
Version		Page	
Document ID		Name	
Updated by		Date	
Issued by		Date	

Project title

Named leader and contact details

Aims

Links to the objectives and aims of CREW

Identified CAMERAS/Policy/Operational champion(s)

Expected Target Audiences

Potential Links to other related national and international initiatives:

Project description

Background and policy/stakeholder relevance

Approach

Outputs

Outcomes

Expected HEI added value

Timescales to deliverables - e.g. month x (GANTT chart), interim reporting

	2011 months									**2012 months**		
Task/Deliverable (end of month)	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**

Cost breakdown

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