



EVALUATION OF RESEARCH OUTCOMES IN WATER FOR DEVELOPMENT TASK 3.4. ACTIVITY 3.4.1

Guidance Notes for Research Programme Design

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Executive summary

This deliverable extends the work carried out in Work Package 3, by looking ahead to what happens after research has been completed, in terms of its outcomes, as a specific type of impact. The overall objective of the proposed activity is to increase the effectiveness and maximize the outcomes of research programmes on water for development supported by EU Member States. A framework is proposed through which the concept of outcome can be better understood and measured, intended as a tool for programme design, to assist in framing workable outcome level indicators. This deliverable seeks to contribute to our understanding and practice in this area by examining more closely the concept of research outcome and the different types of outcomes that are achievable by research programmes.

Firstly, the elements of the research 'impact chain' are defined, primarily to distinguish clearly between research outcomes and impacts. Impact is any significant and sustainable i.e. more than short term resultant change such as health benefits; this may be difficult to attribute directly to the research when other contributory variables are taken into account. Outcome is easier to attribute as it is the more direct effect of research ideas and outputs, such as their proven influence on and use in decision making in policy and practice. Planning for the measurement of research outcomes also provides a tool for effective evaluation and monitoring of the research at a later date.

For the case study elements, examples of research which are deemed to have had significant research outcomes were selected. These were suggested by the members of the SPLASH Scientific Advisory Council, the Strategic Management Board and the Technical Committee. These case studies were: Programme Solidarité Eau (pS-Eau), Paris; the CGIAR, Challenge Program for Food, Phase One; and the work of the African Development Bank, Development Research Department. A review of evaluations of two WEDC publications is also included.

The results are organised around three types of outcome indicators: knowledge and skills, behaviour and practice, and values, conditions and status (McNamara, 2006). Quantitative and qualitative indicators of each outcome are demonstrated by the case studies as suitable to evidencing progress in each category. Suggested means of verification, data collection methods and responsibility are also listed. Neither the outcomes nor indicators listed are intended to be comprehensive.

1 Introduction

This deliverable extends the work carried out in Work Package 3, by looking ahead to what happens after research has been completed, in terms of its outcomes. SPLASH Deliverable 3.1/3.2 outlines the types and methods of evaluation carried out in several EU countries, based on the review of research programmes in Deliverable 2.5. It also considers evaluation issues, questions addressed, and evaluation tasks. In contrast, this deliverable has a focus on research outcomes as a specific type of result, with the emphasis on work which relates specifically to outcomes and their measurement.

2 Deliverable purpose and expected results

2.1 Overall objective

The overall objective of the proposed activity is to increase the effectiveness and maximize the outcomes of research programmes on water for development supported by EU Member States.

2.2 Specific objectives

The specific objectives of this activity are:

- to contribute to our understanding and practice in this area;
- to propose a framework through which the concept of outcome can be better understood and measured; and
- to develop guidance parameters for programme design, including how to frame workable outcome level indicators.

This deliverable seeks to examine more closely the concept of research outcome and the different types of outcomes that are achievable by research projects and programmes.

3 Methodology

3.1 Literature review

The review of available literature in section 4 presents current thinking on the different types of research outcome and how these can be assessed effectively. In the literature, outcomes are also associated with interventions and development programmes rather than just research, therefore relevant literature related to these is included. The literature informs the definitions of terms that allow a clearer understanding of the concept of outcome.

3.2 Case studies

A number of initiatives and projects have been selected as case studies in section 5. These were suggested by members of the SPLASH Scientific Advisory Committee and the Strategic Management Board as having achieved a reasonable level of outcome. The nature of the research outcomes and

the reasons for this success are investigated. The analysis focuses on three main elements:

1. What was the level and type of outcome achieved? - To build up a picture of patterns of return of research.
2. How was this level of outcome achieved? - By looking at various stages of the research cycle e.g. planning, implementation.
3. Why was this level of outcome attributed to this research? - The indicators used by key informants and users.

The analysis also reviews the idea of 'distance' between the researcher and user and the extent to which specific research projects and programmes dictate the 'direction or trajectory' in a way that leads to desired outcomes e.g. the importance of whether projects/programmes are framed by commissioning or by open calls.

Part of the case studies were key-informant interviews with those involved in these examples. From the data, measurable indicators of outcome have been compiled, which could be used to improve the design of future research programmes (see Annex 1). A review of evaluations of two WEDC publications are also included.

Table 1: Key informant details

| Key informant | Role | Initiative |
|---------------------|---|---|
| Christophe Le Jallé | Programme Manager, in charge of Research and Development | Programme Solidarité Eau (pS-Eau), Paris, France |
| Dr. W.E.I. Andah | Coordinator of the Volta Basin, CSIR-Water Research Institute, Accra, Ghana | CGIAR, Challenge Program for Food – Phase One. |
| Dr. Marco Stampini | Principal Research Economist | African Development Bank, Development Research Department, Tunis Belvedere, Tunisia |

4 Defining the elements of the research 'impact chain'

Whilst water for development research is funded each year, very little is known about the actual impact of such research, and furthermore how this might be captured and quantified. The differences between the concepts of 'impact' and 'outcome' may not be clearly understood by those who are working on research projects, or by those who benefit from them. This is demonstrated by the case study interviews with key informants, where there was often a need for clarification of terms and constant checking that a shared understanding of the concept of outcome was held. As these concepts can be understood in different ways and are often used interchangeably, it is useful to begin with clear definitions and statements of what is meant here by these terms and what their parameters are.

The 'impact chain' (Roche, 1999) or 'results chain' (NORAD, 2008) demonstrates the continuum of the different stages of input, output, outcome and impact of research. The further up the chain, the greater the influence of the social, economic, environmental and political context is evident (Roche, 1999). Each of these stages is important and can be evaluated i.e. input measures (the level of resources allocated); output measures (what the research achieves and produces); and outcome measures (what are the results or effects caused by the research) (Hernon and Schwartz, 2002).

Further insight is given by DFID's Renewable Natural Resources Research Strategy (RNRRS, 2006). This defines outputs as being controlled by the research team, e.g. the increase in capability of groups to produce and market crops. Outcomes, however, are seen to be influenced rather than controlled by the research team, e.g. the scaling up of crop technology options. The proposed impact is the long term contribution of the research e.g. improved livelihoods through better food production. An example of these links is given in Figure 1 below.

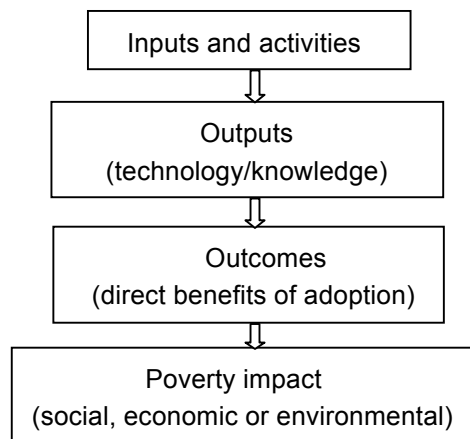


Figure 1: The logical framework sequence including pathways between different levels (RNRRS, 2006)

4.1 Definitions

4.1.1 What is research input?

Research input relates to the level of both human and financial resources allocated to the entire process of research.

This can include:

- turnover: government funding, indirect funding and contract funding;
- scientific and other staff per faculty/department; and
- the number of research staff (University of Utrecht, 2008).

4.1.2 What is research output?

Research output is the quantity and efficiency of products, goods and services produced.

The measurement of research output has grown in importance as it is synonymous with university rankings and research assessment procedures. At an organizational level, research output can include:

- the number of PhD graduates per faculty;
- the total number of publications (including specialist and scientific);
- results of research assessments;
- an organisation's share of individual grants (University of Utrecht, 2008);
- the number of patents (Pavitt, 1998); and
- project deliverables (Seath, 2006).

4.1.3 What is research outcome?

Research outcome is the immediate (short to medium term) effects of an activity

Much of the literature on outcomes originates in the health sector. Donabedian (1966) defined health outcome as a change as a result of antecedent healthcare. This concept became popular in the 1980s and 1990s, based on the premise that it is the ultimate indicator of quality of care, often measured by observed mortality and morbidity (Lilford et al, 2004). It is now most frequently used in regard to the health outcomes on patients of research or interventions (Bowling, 2002). For example, the EU-funded European Public Health Outcome Research and Indicators Collection (EUPHORIC) project¹ defines outcome indicators in the field of health as the measurement of the effects of medical procedures on the health of a population or patient (EUPHORIC, 2007:6).

In the context of research, the nature of an outcome can be seen to be one of three types (McNamara, 2006):

- Outcomes on knowledge or skills (short term outcomes);
- Outcomes on behaviour or practice (intermediate-term outcomes);
- Outcomes on values, conditions and status (long-term outcomes). These can also be viewed as outcomes on policy.

Knowledge outcomes usually occur within the closed or internal community of researchers, by extending the empirical knowledge base. Policy and practice outcomes are external to the research community, and reflect the degree of influence research findings have on policy formulation and how far they are incorporated into practice.

4.1.4 What is research impact?

Research impacts are the broader, longer term changes that occur as a result of outcomes

The seven UK Research Councils have agreed a definition of the impact of research as 'essentially the change for the good achieved, ultimately for society, in any timescale as a consequence of the

¹ <http://www.euphoric-project.eu/>

outcomes of that research' (BBSRC, undated, p.3). BBSRC (undated) extends the notion of impact beyond economic and commercial benefits, by encompassing the potential of the immediate outputs of the research and its outcomes. These can range from increasing human knowledge and understanding, to informing policy formulation and decision making, and in turn can impact on areas such as education, health care and international development. The impacts of research can therefore take many forms and are evident at different stages of the research cycle and beyond (EPSRC, 2009). An example is that of ActionAid, where impact assessment 'is about understanding the changes, both intended and unintended, which are brought about in men's, women's and children's lives as a result of our work' (ActionAid, 2006).

A basic distinction can be made between the impact and outcome of research. Impact is any significant and sustainable resultant **change** such as health benefits; this may be difficult to attribute directly to the research when other contributory variables are taken into account. Outcome is easier to attribute as it is the more direct **effect** of research ideas and outputs, such as their proven influence on and use in decision making in policy and practice.

5 Evaluating research outcome

The following section briefly reviews the literature on evaluating research outcomes, in terms of the need to do this, planning outcome measurement, and implementing measurement processes. The subsequent section presents the case study data in relation to these areas.

5.1 The need for research outcome measurement

Evaluations can be either formative or summative. **Formative evaluations** are carried out during the research development stage, determining the need for the research, strengthening and improving it. **Summative evaluation** occurs well into the project or post project and measures both the outcome and impact of the research (Jones and Young, 2004).

There has been a renewed interest in improving the evaluation of development activities and the returns on research investment amongst donors and development agencies (Gabarino and Holland, 2009; Wooding et al, 2005). The UK Research Councils are an example of this (EPSRC, 2009) as they need to demonstrate the benefits arising from their expenditure. In addition to demonstrating accountability and good research governance, research funding organizations need to build an evidence base to inform strategic decisions on how to fund research. NGOs also have to look at their own activities, due to the government funding they receive and their rising public profiles (Adams, 2001).

5.2 Planning research outcome measurement

Anticipating outcomes is an important aspect of research planning. Coffman (2001) describes the level of effort required to achieve this:

'Outcome evaluation requires more time, resources, and methodological rigor. It involves measuring the outcomes in the target population – usually at least before (pre) and after (post) the campaign's implementation and often at several points between – that the campaign was designed to affect, like attitude, behavior, or policy change' (p.13).

McNamara (2006) suggests the following useful sequence for planning an outcomes' evaluation:

1. Choose outcomes (short, intermediate and long term)
2. Select indicators for outcomes (use log frame model)
3. Identify data sources and methods to collect data
4. Pilot your outcomes evaluation
5. Analyze data
6. Evaluation report

It is important to establish a results framework with indicators, baselines and targets linking to a monitoring and evaluation plan (NORAD, 2008). This involves:

'putting required monitoring and reporting systems in place for measuring performance at appropriate institutional or organisational levels, ensuring availability of required data sources, agreeing on frequency of monitoring, and having competent personnel to collect information and assess whether desired results are being achieved according to plan and budget' (NORAD, 2008:15).

There is some debate, however, about the extent to which research outcomes can and need to be planned. Åkerlind (2008) defines research outcomes as anticipated or intended consequences of research. Mullen (2006) points out that outcome can be linked to 'identifiable, traceable interventions, at least in part' (p.85). However, outcomes may result from factors out of the control of the research (NORAD, 2008), with the research intervention being one amongst several factors contributing to an outcome. It is suggested that 'unusual and unexpected outcomes often prove to be most significant' (Research into Use, undated).

Planning and shaping research outcomes is also seen to be problematic by those who subscribe to a complexity theory approach. Complexity theory is a new approach to impact measurement within the development sector and incorporates the notion of power into the analysis. It suggests that the relationship between cause and effect cannot be predicted accurately; rather, change emerges over time as a series of small incremental changes, with some having more impact than other larger ones (Eyben et al, 2008). Parallels between complex adaptive systems and development have been identified, which has led to a move towards a concept of development based on complexity, i.e. 'a

long term process that involves a wide variety of inputs and outputs' (Rihani and Geyer, 2001:244). This means that we cannot accurately predict how a non-linear system will evolve and what outputs there will be from any set of inputs. There may also be unintended consequences from our actions (Varney, 2007). This means there will always be unexpected outcomes and comprehensive control cannot be imposed.

Given these caveats, the researcher should strive to define clear intended outcomes linked to the research and focus on the predicted effects of their interventions. It is also necessary to be aware of and record both unintended outcomes which may or may not be the result of the research, and other influencing factors on their intended outcomes.

5.3 Research outcome indicators

An **indicator** is evidence of the achievement of certain conditions or results (Brizius and Campbell, 1991). This section is around the issue of what indicators or 'measures of effect' (Coffman, 2001) to select in order to assess research outcomes. There is a range of perspectives and approaches on how to define indicators, some of which do not clearly differentiate between whether they are measurements of impact or outcome. A useful fundamental difference between **outcome indicators** and **impact indicators** is suggested by Fowler (1997) who asserts that assessing outcome is achieved through measuring effectiveness, and assessing impact is measured through change. Indicators of outcome are therefore defined as measures of the use of outputs and sustained production of benefits. **Effectiveness** can also be assessed by 'the use of inputs/services and the short-term results arising from these' (Souter, undated, slide 6).

The characteristics of good outcome indicators are suggested by the EUPHORIC project. These are:

- **Measurable** – easily detected and can be easily reproduced even within different contexts
- **Important** – pertinent to the phenomenon that needs to be measured
- **Simple** – clear and simple
- **Useable** – accurate and complete (better if accompanied by threshold or standard values)
- **Solvable** – relates to a problem that is possible to solve with the available resources
- **Acceptable** – by the person who has to detect and apply it (EUPHORIC, 2007).

Annex 1 presents an **outcomes indicator framework** based on these principles, and categorised according to the three aspects of outcomes: knowledge, practice and policy.

6 The case studies

Examples of research which are deemed to have had significant research outcomes were selected. These were suggested by the members of the SPLASH Scientific Advisory Council, the Strategic Management Board and the Technical Committee, according to their knowledge of which examples of research have been effective and achieved good outcomes.

6.1 DFID Guidance Manual on Water Supply and Sanitation Programmes (1998)

6.1.1 *Origins of the research*

The UK Department for Development commissioned this Guidance Manual in 1998 as 'a tool to help improve DFID's support for water supply and sanitation (WS&S) projects and programmes in developing countries' (DFID, 1998:iv). Its primary purpose, as stated in the Terms of Reference, is to 'set out principles, procedures, and practices that should guide decisions on the choice, design, and management of appropriate water supply and sanitation projects'. In 2000, DFID commissioned an evaluation (Bos and Ince, 2000) to assess whether this purpose had been achieved, if its target audience had been reached, and what could be learned about how to improve the manual and its dissemination. This evaluation took place two years after publication.

6.1.2 *Outcomes planning*

The manual states its primary purpose. From this, its planned objectives can be listed as:

- To set out principles, procedures, and practices on the choice, design, and management of appropriate water supply and sanitation projects; and
- To guide decisions on the choice, design, and management of appropriate water supply and sanitation projects.

6.1.3 *Evaluating outcomes*

In order to measure the planned outcomes, the following areas of questioning were used:

- Content of the manual
- Possible suggestions and recommendations for improvement of the manual.
- Who has access to the manual and in what format?
- Why was the manual obtained?
- How was it obtained?
- How/where the manual is used and for what purpose?

The survey instrument was a questionnaire, sent to a random sample of 302 recipients of the manual (resulting in 71 replies). There was a specific focus on those in South Africa, Ethiopia and India, and staff of DFID and WaterAid.

A subsidiary questionnaire on dissemination explored:

- whether people had heard of and obtained the manual;
- obstacles to obtaining the manual; and
- possible channels to reach the target audiences.

The third phase of the evaluation, involving focus group discussions, was not carried out due to a lack of willing respondents and the fact that many of them felt insufficient time had elapsed to measure impact. However, the planned areas to explore were:

- ◆ the usefulness of the content and its level;
- ◆ the use of the manual;
- ◆ its impact in different projects and programmes;
- ◆ whether the manual is practical to use;
- ◆ how the manual could be used more;
- ◆ how the manual has contributed to work directly and indirectly funded by DFID; and
- ◆ whether the manual influenced practice or has been useful to people and organisations working in the sector but who are not involved with DFID.

6.1.4 Nature of outcomes

There is evidence to suggest that the outcomes were achieved. The evaluation concludes that the manual was well received and used in practice, mainly for training, planning and project management. It was seen as practical tool to assist and improve the work of water and sanitation practitioners. Most respondents were satisfied with the level of detail. It is also known that the manual had an initial print run of 1200 copies in March 1999 with a further 1000 copies later that year. It has the highest number of sales for any WEDC publication in the period. Bos and Ince (2002) noted that insufficient time had elapsed between publication of the manual and its evaluation to fully assess its influence on other donors, consultants and NGOs.

6.1.5 Summary

The outcome indicators here relate to effective dissemination and communication of information, and the results of using that information. Two years elapsed between publication of the guidelines and the evaluation. Timing is an important consideration when assessing outcomes of dissemination, as users need a sufficient period of time to use the outputs. Researchers need to make an informed judgement about this based on what is known about recipients and the nature of the publication itself and its intended use.

6.2 Emergency Water Sources: Guidelines for Selection and Treatment, (House and Reed, 2004)

6.2.1 Origins of the research

These guidelines were published in 1997, as the output of a research project, 'Rapid Assessment of Emergency Water Sources' project (R6256A), funded by the UK Department for International

Development under its Knowledge and Research programme. The guidelines were developed by WEDC in collaboration with the International Committee of the Red Cross, International Federation of Red Cross and Red Crescent Societies, Médecins sans Frontières, OXFAM, RedR, UNICEF and UNHCR. They were designed to help those involved in the assessment

6.2.2 Outcomes planning

The guidelines refer to the objectives in the following way:

'designed to help those involved in the assessment of emergency water sources to collect relevant information in a systematic way, to use this information to select a source or sources and to determine the appropriate level of treatment required to make the water suitable for drinking' (p.1).

However, there are no stated outcomes in the guidelines. In this case, the measures of its success can be linked directly to the three elements of assistance to field staff outlined in the statement above, i.e. to collect information, to use information, and to make appropriate decisions.

6.2.3 Evaluating outcomes

An evaluation took place in 2001, again commissioned by DFID. Its purpose was:

- to evaluate the effectiveness of the documentation produced in assisting field staff in the selection and treatment of emergency water sources; and
- to determine strategies for increasing the usefulness of the documents to the emergency and other related sectors.

The first point links directly to its purpose. The second point allows the outcomes evaluation to inform future activities.

The evaluation report clearly states its limitations. It 'can only assess the opinions of the people who have used the publication, rather than measure direct impacts' (Baghri et al, 2001:vi). Other stated limitations are that it was difficult to trace users, and there was a low response rate from field workers due in part to the highly mobile nature of this group. Two linked activities were used for the evaluation – a postal questionnaire and a series of interviews that followed up the questionnaire results in more depth. Each section of the guidelines was assessed separately, against the following criteria: presentation, content, user-friendliness, relevance, usefulness, and format, using a scale from 'very unacceptable' to 'very acceptable'.

6.2.4 Nature of outcomes

The existing guidelines

The results of the evaluation show that the guidelines had mostly been used in emergency situations, with significant use in training. Geographical reach was extensive with a particular bias for use in East Africa. Overall, the content, relevance and usefulness were rated highly by users, but issues were

raised on presentation and format. The value and usefulness of the guidelines contributed highly to achieving the outcome of assisting field staff in selection and treatment of water sources.

Future recommendations

The main areas identified for improvement were:

- to improve the size of the format (although needs varied on this);
- to provide summaries and simpler guidance;
- production of an electronic format; and
- information provision for local technicians.

From this, the second outcome of increasing the usefulness of the documents was achieved.

This publication has had three print runs.

6.2.5 Summary

Again, the outcomes of this case study relate mainly to the use of the publications and are assessed on this and the users' opinions about them as documents. These are useful indicators, relating to effective communication and dissemination, which inform the framework in Annex 1. This provides some useful insights into effective dissemination, i.e. how to produce useful outputs and ensure that they are used.

6.3 The Challenge Program on Water and Food

6.3.1 *Origins of the research*

The CGIAR Challenge Program on Water and Food (CPWF) is an international, multi-institutional research initiative with a strong emphasis on North-South and South-South partnerships. Its goal is to increase the productivity of water used for agriculture, thereby leaving more water for other users and the environment. The initiative brings together research scientists, development specialists, and river basin communities in Africa, Asia and Latin America, aiming to improve the productivity of water in river basins in ways that are pro-poor, gender equitable and environmentally sustainable.

6.3.2 *Outcomes planning*

The work commissioned in the first phase of the Challenge Program on Water for Food (2003-2008) was in response to an open call. As a result of this, subsequent work was later commissioned by specific institutions. Originally phase one was designed to be research for development, that is to bridge the gap between research outputs and development. The first phase did not stipulate particular research outcomes due to the open nature of the call.

6.3.3 *Evaluating outcomes*

The CPWF is impact-oriented, meaning that the performance of the programme and its projects is evaluated on how research outputs are used, by whom and with what impact. In the second year of

phase one of CPWF, the **Impact Pathways methodology** was used. Its basic premise is that projects and programmes are better able to achieve and communicate impact if they describe their impact pathways and then monitor and evaluate progress along them. Impact pathways are the likely causal chains linking project outputs to intermediate outcomes to final impact, together with descriptions of which stakeholders do what (CPWF Impact Group, undated). Appropriate project partners, stakeholders and beneficiaries are identified and the relationships between them, to form a stakeholder network, which will be provided with project outputs and will give feedback.

6.3.4 Nature of outcomes

An interesting example of an **unintended outcome** of the CPWF work relates to the formerly illegal practice of waste water irrigation in urban areas. Due to the 'impact pathways' method used, interaction between the government and the researchers influenced the passing of new laws to allow irrigation using wastewater, based on CPWF research findings. This was later up-scaled to other regions. In this way, research findings directly influenced local bye laws as well as national policy formulation.

6.3.5 Summary

The impact pathways approach is a useful logic model for assessing research outcomes. It explains how project activities and outputs contribute to a sequence of outcomes and impacts, and provides a basis for monitoring and evaluation that fosters project learning and change, that can make achieving impact more likely.

6.4 Programme Solidarité Eau (pS-Eau)²

6.4.1 Origins of the research

pS-Eau is a knowledge network of partners in France and Africa, working on issues relating to water and sanitation in low income countries. Partners are from a range of NGOs, local networks, French Local Authorities (twinned with low income countries), consultant firms, utilities, and researchers. pS-Eau does not carry out research directly but has a coordinating role for its two research programmes. These are: Water Supply in Small Towns in Peri-urban Areas (1995-1999), and Sanitation and Solid Waste Management (2000-2004). The thematic areas for research are identified by its Scientific Committee, which also defines the research framework for the programme. The first programme was under the theme of management and institutional aspects of local services, and the second was the economics of water services and the role of small scale providers. The Call for Papers for programmes is open to both French and African researchers and practitioners, who suggest research areas within the themes. Fundamental research is considered which tests new approaches and analyses experiences.

² <http://www.pseau.org/cms/>

6.4.2 Outcomes planning

Expected outcomes are not formulated at the programme level, but rather, each research proposal identifies specific outcomes relevant to it. These then become the basis on which to formulate the research methodology. Translating outcomes into a methodology allows for maximum impact of the research.

Each proposal is assessed by the pS-Eau Scientific Committee against evaluation criteria relating to issues of scientific quality of the proposal, the research team, and the feasibility of the research.

Outcomes of the research are not specifically addressed but can be seen to be assessed in terms of the following:

- meeting the needs of practitioners working in the field;
- operational potential and perspectives;
- impacts on poverty reduction; and
- involvement of local communities.

The process of dissemination is important throughout the research cycle. Seminars on each research theme are open to partners, donors and other organizations to present a synthesis of main outcomes. Disseminating information on research outcomes is essential and the seminar format helps them to do this. Outcomes are shared with French partners and those who work in the low-income countries themselves through face to face fora, such as the African Congress, Africities, the AfWA and other networking events.

6.4.3 Evaluating outcomes

Outcomes can be difficult to identify and quantify. For this reason, the evaluation approach taken by pS-Eau is largely **qualitative** rather than quantitative. This approach accepts that judging what the outcomes of research are can often be better assessed through instinct and experience rather than using specific tools to define them more clearly.

In the first research programme, the Scientific Committee was involved in **monitoring** the research activities against the primary outcomes. Generally, a **quantitative approach** was taken for this, adapted to cope with the wide variety of outcomes of the different activities. A single approach to evaluating outcomes, using a specific tool is not an option. A mid-term evaluation process allows for changes to the research to be made at this stage to ensure outcomes are achieved. An important element of this is to invite **feedback** from all partners, to facilitate cross communication between the different research activities. Input from other activities strengthens the likelihood of achieving good outcomes and better long term impact.

The key informant interview revealed that for pS-Eau, citation counts of academic articles as a measurement of outcomes are not significant. Approximately 10 to 20% of research programmes are Africa-based and the remainder are concerned with applied research and experimentation. Consequently, pS-Eau research is less likely to generate scientific articles for peer reviewed journals. While partners are encouraged to write articles however, they are not used as a measure of outcomes.

6.4.4 Nature of outcomes

As previously stated the outcomes vary according to the different research projects and activities. The objectives of the programme include ensuring that these outcomes are achieved through a concerted municipal strategy, involving a strong dissemination component. This means translating outputs into useable and practical tools which partners themselves can use. pS-Eau have developed a collection of different guides for decisions makers and donors on technical topics in an attempt to achieve better outcomes leading to long term impact.

An example of this is the work on water supply in Western and Central Africa. As a result, local authorities in 15 towns and cities were encouraged to have a key role in working with national utilities to provide water and sanitation and to improve quality of services. The first experiment in 2005 saw a generally positive achievement of outcomes.

6.4.5 Summary

This study shows that a single approach (qualitative or quantitative) or tool for outcome assessment is not feasible as there is a diverse range of potential outcomes for each project and activity. However, the broad outcome categories of meeting the needs of practitioners, involving local communities, operational potential and longer term impacts on poverty reduction are useful. The importance of targeting different versions of research outputs to different audiences is also highlighted as a means of ensuring maximum engagement and take up by these groups, and in this way ensuring successful outcomes.

6.5 African Development Bank: Survey on Aid Effectiveness

6.6.1 Origins of the research

The final case study is not a research project but is a useful study by the African Development Bank on the effectiveness of development aid in sub-Saharan Africa. The objective is to identify a range of environmental, social, economic and political factors that have and have not contributed towards improving water and sanitation.

6.6.2 Outcomes planning

It is not known whether these were specifically identified at the beginning of the interventions.

6.6.3 Outcomes evaluation

The outcomes survey instrument was a questionnaire of 20 questions on the design and implementation of projects and those factors which worked against their success. Multiple-choice questions and questions requiring short comments were used. These sought to capture the impact of water and sanitation aid on the lives of ordinary people, in areas such as education, service delivery, the management of floods and droughts, and operation of maintenance issues. The 39 respondents included practitioners, policy makers and academics from 21 countries. Organizations represented include government, NGOs, international organizations, research institutes and universities and utilities.

6.6.4 Nature of outcomes

The survey revealed that in order to achieve a successful outcome, the following ranked indicators should be included:

- a clear focus;
- sufficient finance for sustainability;
- active community participation;
- operation and maintenance, and monitoring and training as components of the programme;

- appropriate technology;
- integrated and multidisciplinary; takes social and economic factors into account;
- long term programme in harmony with country policies;
- external input is needed; and
- political will

(Stampini, 2010).

Out of these, three were rated as the most important:

'The first is that the project must be clearly focused, well financed and sustainable (33%); this was closely followed by the suggestion that the project must have active community participation (32%). The third most popular feature was that any project must include training in operation, maintenance and monitoring, to ensure that the long term operation and maintenance of the system can be guaranteed (12%).'

The majority of respondents felt that between 10-20% of a project budget should be allocated to community training, awareness raising, sensitization and development of community associations, and a further 10% for project monitoring and evaluation. The most common reasons for failure are seen to be weaknesses in managerial and institutional capacity followed closely by technical failure. Both of these causes almost certainly stem from a lack of financial resources to provide the support required to maintain such projects.

6.6.5 Summary

Several key conditions for effective achievement of outcomes are highlighted in this case study, which inform the framework in Annex 1. The importance of achieving these outcomes is underlined as their absence is associated with project failure.

7 Recommendations for a measurable research outcome indicator framework

The following section is organized around the three categories of indicators used by McNamara (2006). Each section presents recommendations for that specific element of a measurable research outcomes indicator framework. However, neither the outcomes nor indicators listed are intended to be a comprehensive list. The outcomes and indicators chosen are generated by the case studies as suitable to evidencing progress in each category. There will inevitably be additional intended and unintended outcomes and potential indicators. Framework headings (NORAD, 2008: 16).

7.1 Knowledge and skills

The case studies of the DFID Guidance Manual on Water Supply and Sanitation Programmes and the Emergency Water Sources Guidelines for Selection and Treatment involve evaluation of effective dissemination and communication of research outputs and publications, through indicators of their appropriate content, formats and delivery. Additional outcomes are the use of outputs to improve

skills, knowledge, and practitioner decisions. Effective dissemination is an important outcome of research, if research into use is to be encouraged. pS-Eau produces different versions of research results as guideline documents to influence different actors and to ensure the uptake of these results.

Effective dissemination is key to the workings of the impact chain, if research outputs are to be transferred into immediate research outcomes, and developed further into long term impact.

Table 2 lists several quantitative and qualitative indicators of knowledge and skills related to dissemination and communication. Citation analysis is not included as an indicator of research outcome. At the individual level, attempts have been made to measure the output of research staff. Hirsch (2005) provides an h-index to quantify 'the cumulative impact and relevance of an individual's scientific research output' (p.16569). Another study into the research input and output of European central banks (Eijffinger et al, 2002) measures the number of publications per employee, adding a weighting scheme to take account of the different quality of international refereed journals, unpublished and published working and discussion papers, and the number of conferences and workshops organized. However, Leydesdorff (2008) points out that as publication and citation rates differ significantly among the different disciplines, among universities, and even among nations, accurate comparison and ranking of researchers is not possible. Furthermore, the trend towards open access self archiving in institutional repositories brings into question even more the value that can be attached to citation analysis. Harnad (2007) states that 'citation counts of papers whose full texts are freely accessible on the web are over 300% higher than those of papers that are only accessible on paper, or on toll-access websites' (p.1). Both definitions of individual research output and its reliable measurement are therefore problematic. For this reason, it is judged that measures such as citation, and the analysis of quantitative and qualitative aspects of citation, are unreliable indicators of outcome of research on research and on new ideas.

Another aspect of knowledge and skills is capacity development and improved skills in both carrying out research and in the topics of specific research projects. The DFID Guidance Manual on Water Supply and Sanitation Programmes and the Emergency Water Sources Guidelines for Selection and Treatment had outcomes relating to the development of the users' skills and knowledge for improved decision making. Training is listed in the AfDB survey and p-SEau lists meeting the needs of practitioners; both are key outcomes for effective research.

EVALUATION OF RESEARCH OUTCOMES

Table 2: KNOWLEDGE AND SKILLS OUTCOMES INDICATOR FRAMEWORK

| Intended outcomes | Key outcome indicators | Means of verification | Collection methods | Frequency | Responsibility |
|----------------------------------|--|---|---|--|--|
| Easy access to outputs | Level of positive feedback on formats Number of downloads of research outputs Number of requests for outputs | Results from feedback cards, questionnaire, interviews, focus groups etc Website hits and download statistics Output distribution figures | Survey recipients (e.g. by feedback card, questionnaire, interview, focus groups etc.) Record website hits and download statistics Record output distribution figures | Ongoing monitoring of website and output distribution statistics | Researchers, web managers, publications and marketing departments. |
| Appropriate content provided | Level of positive feedback on use and usefulness of content Level of positive feedback on content level Level of positive feedback on practicality of use | Results from feedback cards, questionnaire, interviews, focus groups etc. | Survey recipients (e.g. by feedback card, questionnaire, interview, focus groups etc.) | At least two years between publication and full evaluation. More frequent survey of immediate reactions to delivery and format. | Researchers, publications and marketing departments. |
| Improved knowledge and awareness | Level of positive feedback on improved knowledge and awareness | Results from feedback cards, questionnaire, interviews, focus groups etc. | Survey recipients (e.g. by feedback card, questionnaire, interview, focus groups etc.) | Prior to project, at appropriate intervals during project, and post project | Researchers/trainers |
| Improved skills | Level of positive feedback on improved skills | Results from feedback cards, questionnaire, interviews, focus groups etc. | Survey recipients (e.g. by feedback card, questionnaire, interview, focus groups etc.) | Prior to project, at appropriate intervals during project, and post project | Researchers/trainers |
| Capacity development | Development of research skills, personnel and overall research capacity Critical capability to appropriately utilise existing research Number of staff undergoing staff development and educational benefits | Feedback from capacity development participants Records of staff undergoing staff development and educational benefits | Survey capacity development participants | Prior to project, at appropriate intervals during project, and post project | Researchers/trainers |

7.2 Behaviour and practice

Table 3 suggests some recommended indicators of behaviour and practice outcomes, relating to meeting the needs of practitioners, involving local communities and stakeholders, effective service delivery, operation and maintenance, and appropriate technologies.

This section is in line with an outcomes mapping approach. 'Outcome Mapping focuses on one particular category of results - changes in the behaviour of people, groups, and organizations with whom a program works directly' (Earl et al, 2001). Relevant outcomes for meeting the needs of practitioners from the case studies are the DFID Guidance Manual's stated purpose to guide decisions on the choice, design and management of appropriate water supply and sanitation projects. Similarly the Emergency Water Sources Guidelines for Selection and Treatment is aimed at assisting field staff in the selection and treatment of emergency water sources. pS-Eau also has a vision of meeting the needs of practitioners working in the field.

Outcomes which make service delivery more efficient are seen to be vital in the African Development Bank Survey of Aid Effectiveness. Training on operation, maintenance and monitoring and the use of appropriate technologies are key to effectiveness.

Improvements in the level of local community involvement and stakeholder networking are also important behaviour and practice outcomes. The AfDB survey found that 32% of respondents identified greater active community participation as an indicator of outcome. Bringing together appropriate project partners, stakeholders and beneficiaries to form a stakeholder network, is essential to the impact pathways approach of the CPWF as it acts as a feedback mechanism which in turn allows the project to progress in an iterative way with changes and adaptations as necessary, for maximum impact.

| Table 3: BEHAVIOUR & PRACTICE OUTCOMES INDICATOR FRAMEWORK | | | | | |
|---|--|---|---|---|-----------------------|
| Intended outcomes | Performance indicators | Means of verification | Collection methods | Frequency | Responsibility |
| The needs of practitioners working in the field are met | Level of positive feedback by practitioners on needs met | Feedback from practitioners | Survey recipients (e.g. by feedback card, questionnaire, interview, focus groups etc.) | Prior to project, at appropriate intervals during project, and post project | Researchers |
| Improved training opportunities | Level of positive feedback on training opportunities | Feedback from practitioners | Survey recipients (e.g. by feedback card, questionnaire, interview, focus groups etc.) | Prior to project, at appropriate intervals during project, and post project | Researchers/trainers |
| Operational potential | Level of positive feedback by practitioners on scaling up potential | Feedback from practitioners | Survey recipients (e.g. by feedback card, questionnaire, interview, focus groups etc.) | Prior to project, at appropriate intervals during project, and post project | Researchers |
| Impacts on poverty reduction | Improved allocation of resources at an area level, better targeting and accessibility | Feedback from practitioners and community members | Survey respondents (e.g. by feedback card, questionnaire, interview, focus groups etc.) | Prior to project, at appropriate intervals during project, and post project | Researchers |
| Improved service delivery | Improvements in the process of service delivery Cost reduction in the delivery of existing services | Feedback from practitioners and community members | Survey respondents (e.g. by feedback card, questionnaire, interview, focus groups etc.) | Prior to project, at appropriate intervals during project, and post project | Researchers |
| Improved operation and maintenance | Improvements in the process of service delivery | Feedback from practitioners and community members | Survey respondents (e.g. by feedback card, questionnaire, interview, focus groups etc.) | Prior to project, at appropriate intervals during project, and post project | Researchers |
| Incorporation of appropriate tech | Appropriate technology options in use | Feedback from practitioners and community members | Survey respondents (e.g. by feedback card, questionnaire, interview, focus groups etc.) | Prior to project, at appropriate project, and post project | Researchers |
| Improved involvement of local communities | Number of people from local communities involved in research activities | Log of research activities | Scrutinise research log | Prior to project, at appropriate project, and post project | Researchers |

7.3 Values, conditions and status

Table 4 relates to outcomes of value, condition and status, and covers indicators such as attitudes and beliefs, multidisciplinary of research, uptake of research by policy, and evidence of economic benefit.

Examples of these are provided by the case studies:

- The AfDB survey found high priority given to community training, awareness raising and sensitization, which result in modified attitudes, beliefs and norms.
- Research which appeals to a wide sector audience can be facilitated by cross communication between different research activities. pS-Eau uses this method to strengthen the likelihood of achieving good outcomes and better long term impact.
- The CPWF demonstrates how interaction between decision makers and researchers can influence the development of policy and law making. This is a practical application of a specific piece of research.
- The AfDB survey confirms that financial viability and sustainability of projects is the highest ranked factor for successful outcomes. All the case study examples have a fundamental poverty focus in their outcomes, whether it is to inform practitioners about how to provide, to inform policy. However, other outcomes might include wider economic and commercial benefits of research.

Table 4: VALUES, CONDITIONS & STATUS OUTCOMES INDICATOR FRAMEWORK

| Intended outcomes | Performance indicators | Means of verification | Collection methods | Frequency | Responsibility |
|---|--|--|--|---|-----------------------|
| Affective change on beliefs, attitudes and social norms | Attitudes, beliefs and social norms of key users | Comparison of attitudes, beliefs and social norms prior to and post project | Survey key users | Prior to project, at appropriate intervals during project, and post project | Researchers |
| Improved links between research and policy | Political will and support for project exists Development of policy influenced by project Relevant information available for policy decisions Research in harmony with country policies | Recent policy decisions and developments in policy Content of information bases | Analysis of policy documentation Key informant interviews with policy makers Analysis of Information bases | Prior to project, at appropriate intervals during project, and post project | Researchers |
| Wider economic benefits of research | Commercial exploitation of innovations arising from R&D Economic benefits to the wider population Informing product development Revenues gained from intellectual property rights | Relevant fiscal records New products and innovations | Key informant interviews with innovators Analysis of fiscal records | Prior to project, at appropriate intervals during project, and post project | Researchers |
| Research is interdisciplinary and multidisciplinary | Evidence of relevance of project to wider sectors and disciplines Results informed by other sectors and disciplines Social and economic factors taken into account | Research outputs Target groups Actual user groups | Dissemination log | Prior to project, at appropriate intervals during project, and post project | Researchers |

8 Conclusions

The common confusion between impacts and outcomes of research is a fundamental challenge to those designing research programmes and those implementing various elements of them. This complexity has been addressed in this deliverable, which seeks to provide a degree of clarity and definition. The importance of putting in place measures to evaluate outcomes has been highlighted and suggestions for specific elements of a measurable research outcomes indicator framework are offered. It should be noted that neither the outcomes nor the indicators listed are intended to be comprehensive and others may be added or substituted. Researchers should also be aware of the likelihood of additional unanticipated outcomes and potential indicators. The outcomes and indicators included are generated by the case studies for this deliverable and their evidence of success in each outcomes category.

While funding bodies and research councils increasingly demand evidence of value for money and returns on their investment in all types of research, including that relating to water for development, it is incumbent on those delivering that research to be able to meet this challenge.

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