What makes water institutions 'work' for pro-poor and sustainable growth?

Summary findings of DFID systematic mapping of evidence on the performance of institutional mechanisms for water resource management in developing countries[1].

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Background

Ensuring adequate water resources for health, ecosystems and production is a priority within international development. Although changing climate and patterns of water use create an challenging backdrop to water security[2] there is consensus that the primary challenge is one of poor water governance. Effective rules, laws, strategies, systems, agreements and organisational frameworks are needed to prevent depletion and degradation of lakes, rivers, streams and aquifers whilst delivering reliable water for social, economic and environmental uses. Such institutional mechanisms, capable of allocating water, maintaining flow and controlling pollution in ways which support sustainable and equitable development are an urgent priority. This is particularly the case in developing countries where demand for water is increasing rapidly and where the consequences of getting water resource management 'wrong' may have significant implications for health and wellbeing.

Over the past two decades institutional mechanisms for water resource management (WRM) which emphasise greater participation; economic valuation and market instruments; and decentralisation and devolution of roles have been promoted. But evidence of what works, where and why is difficult to find and this presents problems for decision makers and practitioners. In 2011, in response to this, the UK's Department for International Development (DFID) commissioned a systematic mapping exercise to find information relating to the question:

> *What factors determine the performance of institutional mechanisms for water resources management in developing countries in terms of delivering pro-poor outcomes, and supporting sustainable economic growth?*

In response a team of researchers from the University of East Anglia and Water Witness International examined almost 30 000 pieces of available evidence over eighteen months. This document is an addendum to the full report of that work and summarises its most important findings.

Understanding the methodology

Systematic reviews and mapping have been used in the health sector for over 30 years to help find unambiguous answers to important questions posed by policy makers and practitioners. A rigorous, standardised methodology is applied. For example, each stage of the process is peer reviewed, and a consistent approach within the research team is verified through testing. This particular work was also guided by an advisory group of international WRM experts. As a systematic map, the work identified, organised and described the evidence relevant to the question. Systematic review, involving a full and detailed quality review of each piece of evidence was not appropriate because of the very large number of articles found. The methodology involved:

1. Identification of relevant academic work, research papers, organisational evaluations or reports. To be included studies had to link WRM institutions to pro-poor or sustainable economic growth outcomes using primary, empirical data; concern developing countries; and be in English.

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[1] Hepworth, N., Hooper, V., Hellebrandt, D., and Lankford, B. 2013. What factors determine the performance of institutional mechanisms for water resources management in developing countries in delivering pro-poor outcomes and supporting sustainable economic growth? CEE review 11-006. Collaboration for Environmental Evidence. Available for download at http://www.environmentalevidence.org/SR11006.html

[2] Defined by Grey and Sadoff (2007) as '*the reliable availability of an acceptable quantity and quality of water for production, livelihoods and health, coupled with an acceptable level of risk to society of unpredictable water-related impacts*'

2. Screening for relevance at abstract, title and full text level, prior to coding and mapping against criteria of interest.
3. Analysis and cross-tabulation of summary data in a spreadsheet to support interpretation.

Although the methodology was shown to be rigorous, with consistent handling of papers, the following limitations should be considered when interpreting the results. They include the exclusion of non-Anglophone evidence; a geographical focus on Africa, Asia and Latin America (although comparative studies were included) and a requirement for empirical evidence based on primary research, whether qualitative or quantitative, rather than studies reliant on secondary data such as government statistics or census data. Around 10% of articles identified as relevant at abstract level could not be downloaded as full text.

The results of the systematic map

i. **Only 38 papers of the 29,844 returned by the initial search were relevant**: containing empirical evidence linking poverty and growth outcomes to water resource institutions in developing countries, written in English (Figure 1 sets out the results of the search and screening process).

Figure 1. Schematic showing the results of the search and screening exercise
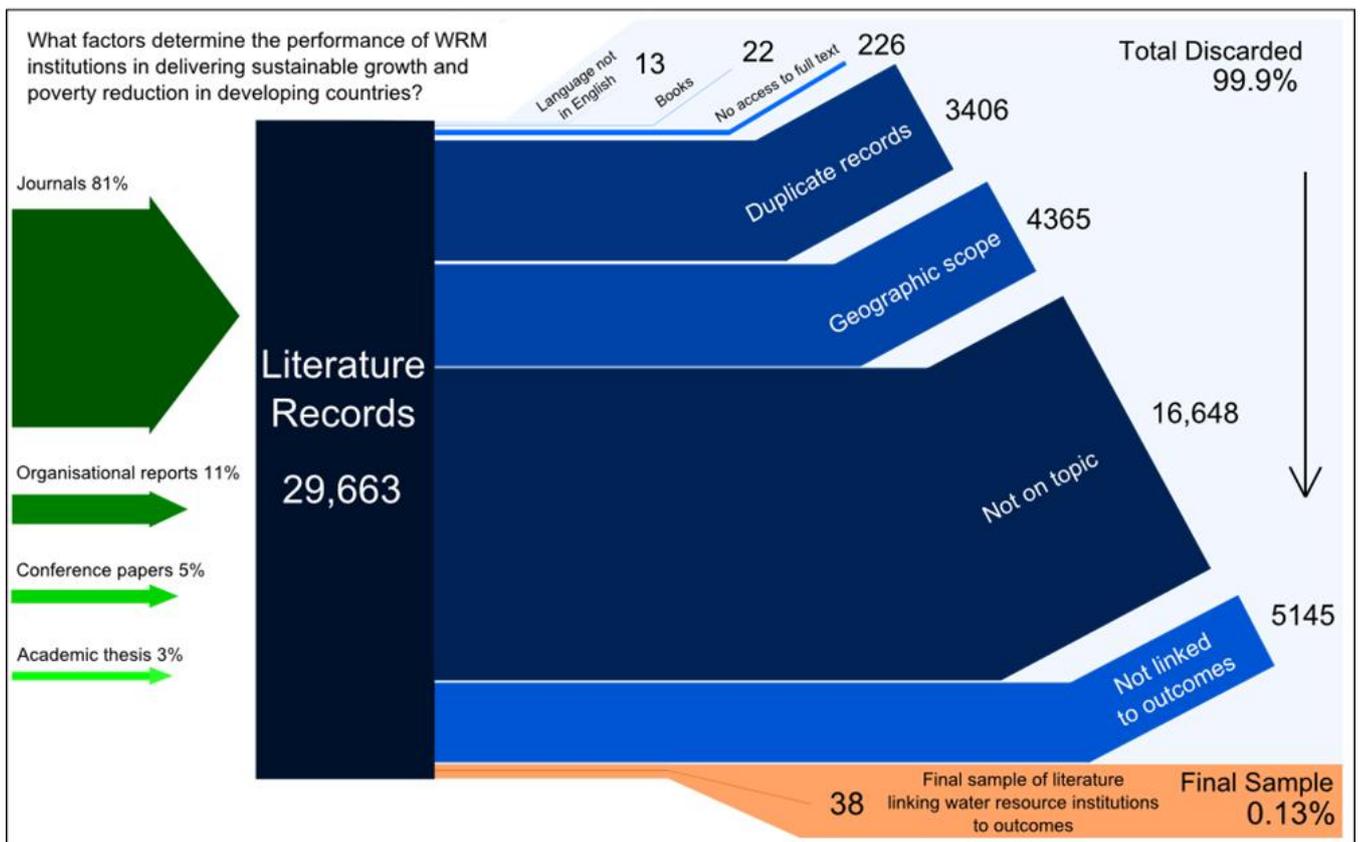
ii. **Only 42% of these relevant papers contained an adequate description of the methodology, sufficient to permit the replication of the study.** Almost 20% provided no methodological description at all.
iii. **A quarter of relevant papers exhibited a weak 'chain of reasoning'.** They contained bold claims regarding the relationship between explanatory factors, performance of WRM institutions and outcomes - stepping from reported data to concluding insights which were not necessarily substantiated by empirical evidence. Only 11% of relevant papers were categorised as possessing a strong chain of reasoning, where conclusions regarding causal linkages were based on triangulated, tested or validated evidence and arguments.
iv. **In 20% of relevant papers, the source of funding for the research was not disclosed.** DFID (6), the International Water Management Institute (IWMI, 5), the World Bank (5) and the Natural Sciences Foundation of China (4) are important sources of funding for research on the topic, with each funding studies reported in the relevant papers.

19 countries feature in the final sample of articles, with clusters of research in India, China, Tanzania and Chile. Most of the included papers were published since 2002,

v. **Institutional mechanisms for water resource management reported can be grouped into seven types**: organisational; legal; participation; decentralisation; markets; privatisation and infrastructure. Most articles consider a mixture of these mechanisms, and 'clusters' emerge with several studies of the same type of mechanism in the same geography (i.e. IWRM in East Africa, water markets in Chile).

vi. **Papers relevant to the systematic map question describe twenty six factors which explain the performance of water resource institutions.** These can be organised using six typologies (contextual, relational, design issues, capacity, organisational behaviour and sector co-dependence). These factors can also be organised according to their origins (after Saleth and Dinar 2005): exogenous, with a source outside the water sector (such as political and socio-economic contexts), endogenous, from within the sector itself (such as leadership, capacity and organisational behaviour) or interface, shaped by interactions between the sector actors and the context of operation (such as social legitimacy and affordability).

The implications for policy and practice

1. **Available evidence is extremely modest in size, coverage and quality.** Despite reviewing a very large number of publications, the mapping team found limited evidence linking WRM institutional performance to tangible outcomes for growth and poverty reduction. This should not be inferred to suggest that the linkages between effective WRM, poverty reduction and growth are weak, but rather, there is not much objective evidence of 'what works and why'. The reasons for this, such as the challenges of conducting research on the topic and tracing attribution of socio-economic outcomes across a tangled web of multiple, interacting causative variables, are discussed in the full report. Policy makers and practitioners should therefore proceed with caution. Unquestioning, simplistic or dogmatic promotion or adoption of any of the range of institutional approaches to WRM should be guarded against.

2. **Efforts towards optimal institutional design, support and operation should instead be based on local situation analysis which takes into account the full range of factors identified in the map on a case-by-case basis.** To support understanding of these diverse factors which influence performance they are described and organised within taxonomy in Sections 4.3.3 and 4.4. of the full report. The map also provides a one-stop shop to help find and examine existing research on the topic.

3. **A concerted global effort is required to strengthen the available evidence base.** This can be achieved via improved commissioning of studies and research practice, and the development of reliable, cost-effective instruments for measuring progress in WRM. Much greater attention needs to be paid to building monitoring and outcome evaluations into interventions in the WRM sub-sector.

Implications for research

1. **Given the urgency of evidence based policy making and action for more effective WRM, the mapping team highlight the need for much more sobriety and professional integrity in the design, conduct, reporting and publishing of research on the topic.** In particular we warn against the unhelpful tendency for authors to tag far-reaching assurances, recommendations and conclusions about institutional performance on to almost any type of research on water. Specifically there is a need for improved report structure to make clear the rigour of the methodology and the chain of evidence between results and conclusions   and for accurate labelling of the true nature of research in titles, abstracts and key words. **Opinion pieces are important within the literature, but should be clearly labelled as such.**

4. **Greater transparency within research on WRM institutions is needed.** Funding sources; research limitations; confounding variables; alternative explanations; the role of researcher and observer bias; and reflections on reliability should be reported as a matter of course to support the legitimacy of knowledge generated.

5. **In order to build the evidence base the following should be considered:**
   a. Research activity should aim to balance exploratory theory generation and deductive theory testing.
   b. Large scale comparative studies, rigorous case study research and longitudinal studies, particularly at global, multi- country and transboundary scale are under-represented in the mapped sample.

c. Case study research is ideally suited to the type of question explored, although the quality of case study design, conduct and reporting needs to be radically improved to conform with contemporary best practice (see Yin 2009).

d. Longer-term (>5 year) adaptive action-research involving collaborative teams of researchers, funders, communities and government personnel could usefully demonstrate and study the practice and theory of WRM mechanisms.

e. Expansion of geographical coverage beyond the handful of landmark studies and clusters documented in this review.

f. A full systematic review of the mapped articles would be useful to extract a more detailed understanding for how factors influence WRM performance and outcomes.

6. **The exercise also flags clear and urgent priorities for research publishing, editing and commissioning:**
   a. A need for clearer guidelines for authors, reviewers and editors on acceptable methodological and reporting standards.
   b. Clearer differentiation between articles reporting research which generates genuine evidence, versus reviews, rhetorical or opinion pieces.
   c. Improved indexing and integrity of literature databases and search engines and open-source access to full text articles, to make available the widest possible spectrum of knowledge.
   d. A reassessment of research funding focus and timescales, in order to adequately reflect the time lags between interventions, institutional performance and outcome generation.

Conclusions

This exercise confirms that the pool of reliable knowledge from which to draw is small when the exacting standards of systematic mapping are applied. Whilst the imperatives for getting WRM 'right' are intuitively strong, we currently lack the evidence to: a) confirm whether WRM institutions are performing; and b) comprehend and manage the range of factors which shape that performance. Whilst clear cut evidence for universal determinants of institutional performance is not anticipated, it is startling how little good quality research links policy and institutions to outcomes, or diagnoses the root causes of performance.

The implications for international policy and practice are significant and demand an urgent response. Without adequate knowledge or metrics of the social and economic outcomes, and determinants of WRM, efforts to improve performance lack strategic direction and operational accountability, and funding, political and other support for improved performance is at risk. These findings demonstrate the need for radical improvement across the research cycle, including in commissioning, design, delivery, reporting, review and publishing.