Economic benefits of supporting deployment of global knowledge and innovation for the delivery of water and sanitation services

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[1] Consortium comprises Harewelle International Limited, NR International, Practical Action Consulting, Cranfield University and AEA Energy and Environment

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1. Description of enquiry

Economic benefits of supporting deployment of global knowledge and innovation for the delivery of water and sanitation services

Investing in knowledge and innovation is a large part of what DFID's water policy team does. We need to do an analysis and make the economic case for investing in the development and deployment of knowledge and innovation in water and sanitation. This requires analysis and a narrative argument on the possible returns (with a view to attempting to quantify) of investing in the knowledge part of the supply chain. This is a generic argument that can be used for justifying investments in this area.

2. Exploring the Returns on (DFID) Investing in Global Knowledge and Innovation for the Delivery of Water and Sanitation Services[1]

1. Introduction

In the water and sanitation sector (WatSan), the primary purpose of research and innovation is to support the sustainable delivery[2] of WatSan services to the unserved or partially served populations, especially the poor[3].

However, scaling up WatSan services in low and lower-middle income countries has proven to be a multi-faceted and complex task, for several reasons, among them: (a) WatSan are seen simultaneously as both private and public goods; (b) they are traditionally under-prioritized, and sanitation remains a largely taboo subject; (c) WatSan has several institutions active in WatSan provision but often no single agency taking leadership responsibility, and therefore the sector is fragmented; and (d) historically there is only weak engagement of the private sector due to the perceived lack of market opportunity, especially in sanitation provision.

For these and other reasons, the WatSan sector needs the engagement and coordinated actions of several players simultaneously in order to scale up sustainable services and achieve universal coverage of what was recently declared by the UN as a human right:

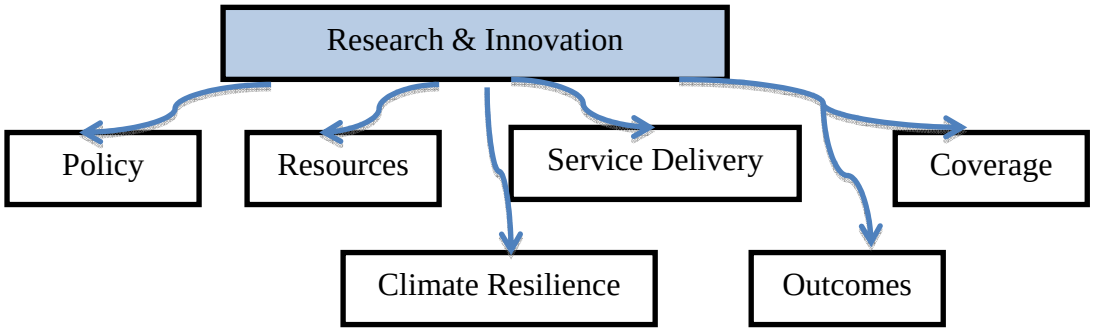
1. The Government, to lead the sector – regulation, target setting, monitoring, targeted financing, and selected service provision.
2. The private sector, to bring innovation and investment funds, and provide services.
3. International partners, to bring funds, research and technical expertise, to transfer international experiences, and to advocate for WatSan within the MDGs.
4. The community, to demand services and play a role in operations and maintenance, monitoring and finance.

Ambitious goals on scaling up WatSan services can only be achieved when supported by a number of 'enabling' factors, including research and development. Indeed, it is widely recognized that investment in R&D is behind the major gains in general productivity, competitiveness and growth in economic sectors. This is also true for the WatSan sector and has been recognized through, for example, the application of the Country Status Overview (CSO) process in Africa. The CSO defines and monitors a comprehensive set of indicators that are anticipated to determine the future progress of the WatSan sector. On closer examination, research and innovation are fundamental to many of these 'enabling' factors, covering policy development; resource mobilization and resource allocation; service delivery via programs and projects and via the private sector; resilience to climate change; and finally, monitoring and evaluation of service coverage and development outcomes.

[1] See Annex for specified task.

[2] There are various widely accepted criteria for provision of WatSan services: affordable, durable and easy to maintain, demanded by the population, meet minimum health and environmental criteria.

[3] Although it is largely the lower-middle and bottom income groups who lack improved WatSan services, special effort is needed to target services and subsidies to the most poor and vulnerable groups, who are less likely to be served by or afford services delivered by existing WatSan providers.



These enabling factors are summarized, with examples, in Table 1.

Table 1. The Research Value Chain- from policies to outcomes

Enabling factors for increasing WatSan coverage	**Research focus, with examples**
A.Governments and partners have to be convinced and capable of providing resources to WatSan, and making it a priority through updated published policy, strategy and specific time-bound targets ("POLICY DEVELOPMENT")	Needs internal dialogue as well as with external partners to explore the arguments for devoting more serious attention to WatSan, drawing on advocacy materials and research that assess: • Health impact • Economic arguments • Stakeholder interests
B.Governments and partners have to understand current spending on WatSan and future resource needs, and mobilise additional resources ("RESOURCES TO MEET TARGETS")	Needs the follow data and information: • Inventory of resources and resource needs (financial, infrastructure, human resources) • Current expenditure: National WatSan accounts • Costs of meeting national targets
C.Governments and partners have to initiate and lead WatSan programs which are targeted towards providing everyone with a basic standard of WatSan facility, especially poor and vulnerable populations ("PRO-POOR PROGRAMMES")	Research should show how to implement (poor-focused) WatSan programmes: • Criteria for targeting mechanisms • Performance of subsidy policies • Evidence-based guidance on program implementation • Evidence-based training courses

Table 1 (cont.).The Research Value Chain- from policies to outcomes

Enabling factors for increasing WatSan coverage	**Research focus, with examples**
D.Appropriate technologies have to be tested and disseminated, and lessons learned on their effective implementation and economic performance, especially in challenging environments ("TECHNOLOGY SELECTION")	A menu of technology options in different contexts should be available, and their costs and benefits understood: • Culturally appropriate options • Resource re-use options (EcoSan, biogas) • Low-cost urban solutions (e.g. decentralized treatment, simplified sewerage) and options for challenging environments (slums, ethnic groups, flooding, floating communities, emergencies) • Performance according to health and socio-economic performance criteria • Price/cost assessment based on income and willingness to pay Dissemination in simple-to-use technology option manuals
E.The private sector has to be convinced of the market opportunities and have opportunity to invest resources	Research on market potential: • Analysis of the supply chain • Market assessment • Leveraging financing
The government needs to understand how to guide, regulate and support the private sector development ("PRIVATE SECTOR DEVELOPMENT")	Supporting information to help government play its role to nurture and regulate the private sector: • Price guidance • Market segmentation • Subsidy and concession options/performance • Private sector capacity assessment
F.Populations have to be sensitized and motivated to accept/invest in WatSan and to maintain it ("PROMOTION")	Social research is crucial to understanding population behavior, needs and preferences, to inform social marketing (e.g. TSSM) or community motivation techniques (e.g. CLTS) and these latter need to be evaluated by research
G.Actions in the sector have to increasingly take into account future climate and environmental change ("PLANNING FOR THE FUTURE")	Prioritization processes and technology selection need to take into account future scenarios. Adaptation alternatives need to be evaluated and disseminated, such as low-water use sanitation systems; reducing non-revenue water loss. The impact of climate change on WatSan services is assessed for future periods and under alternative scenarios.
H.Understanding population coverage ("MONITORING PROGRESS")	Definitions and system of classification of different levels of improved WatSan services, and their

	periodic monitoring, analysis and reporting.

2. Evaluation framework

It is important to understand the mechanisms, or causal chains, by which research and innovation influence the outcomes and impacts that define activities in the WatSan sector. For activities that are not involved with direct service provision, they must be evaluated in terms of how they lead to the achievement of sustainable service delivery via improved financing, prioritization, planning, implementation and monitoring of water supply and sanitation services.

Research and policy support activities should therefore be firmly grounded in a results chain defined by a results framework. Depending on the nature of the research, this may occur at one or all of global, regional, national and sub-national levels.

In the results chain there are five crucial links, which if quantifiable, would allow a more concrete assessment of the benefits of spending on research and innovation[4]. Starting at the lowest level, the evidence available and main issues are briefly described for the five links:

- Link 1: from research to project activities: is research used to define the actions of different stakeholders?
- Link 2: from project activities to outputs: are activities defined, in very concrete terms, to achieve the desired outputs?
- Link 3: from outputs to intermediate outcomes: are outputs leading to changes in the 'enabling' environment – policies, financial flows and programs?
- Link 4: from intermediate outcomes to outcomes: do improvements in the enabling environment lead to improved coverage?
- Link 5: from outcomes to impacts: does improved coverage lead to the hypothesized health and socio-economic gains?

Example of the link between research and impact

Research	**Activities**	**Output**	**Intermediate outcomes**	**Outcomes**	**Impact**
ESI study conducted	Workshop held; publications disseminated	Technical guidance to national and sub-national levels	Resource allocation increased; costs of reaching MDG estimated	Sustainable and affordable coverage increase	Lives saved
CSO country reports	Workshop held; publications	Government pledges commitments and new	New national policies and strategies with	Sustainable and affordable coverage	Lives saved

[4]The results framework used here is from WSP.

	disseminated	policies	financing plan	increase	

It is worth briefly exploring each link in turn, and the contribution of other factors to the successful attainment of each level of indicator:

Activity to output: activities are relatively easy to define and conduct, but selecting the right activity at the right place and the right time to have an impact is much more difficult. To gain backing to publish a guideline that will be adopted by the government requires trust of both partners, and requires the right process for developing the guidelines (i.e. with government co-leadership and technical contribution).

Output to intermediate outcome: an output is a necessary but not sole contributor to an intermediate outcome. The achievement of an intermediate outcome may take years of careful preparation, and require a whole series of actions. It may also require some favourable circumstances – for example, a budget increase for WatSan is more likely to result from an increase in government tax revenues than years of lobbying for more resources.

Intermediate outcome to outcome: coverage increases are not achieved with the improvement in any single intermediate outcome, but usually need several factors such as policies, financing and implementing capacity to come together simultaneously. Rarely are they achieved all at once, but they grow over time and are mutually nurturing. Hence precise attribution is difficult if not impossible.

Outcome to impact: to attribute impacts to an outcome requires careful scientific research – which is not possible for all WatSan interventions but must be selectively evaluated. For example, assessment of health impacts is best through randomization or matched case control studies which require special circumstances.

In conclusion, being able to precisely attributed development outcomes to specific pieces of research is an impossible task that defies quantification. The pathways of effect are numerous and complex. This fact should be borne in mind when reading the next section, which explores the importance of research in different parts of the policy to outcome continuum.

3. Assessment of enabling factors

This section makes a brief assessment of each type of enabling factor that research contributes to, from the classification outlined in Table 1. Each sub-section assesses the key role of research in supporting an improvement in the enabling factors, and explores the implications if certain types of research were not conducted. Some examples of research are given, and their intended or actual impact. Some quantitative assessment is provided where feasible.

A. Policy development

Government policies form the very basis for sustainable sector development. Line ministries need to identify areas of government responsibility, sector targets and means of achieving targets. This requires an understanding of the current sector status, and the implications of inadequate services for the population. Also, an understanding of the

stakeholders operating in the WatSan sphere – their interests, their power and their relationships – will help identify the opportunities and potential constraints for sector development.

Although not traditionally fitting within research and innovation – technical support to governments on the development of **sector policy and strategy** documents is crucial to the future prospects of the sector. Policies and strategies rely on 'intelligence' such as sector status, sector expenditures, costs-of-inaction studies, and learning from the results of policy development efforts in similar countries. Furthermore, governments need to be motivated by a variety of arguments for WatSan services – such as health, dignity, economic, or MDG targets. Such evidence has multiple target audiences, but most importantly it is targeted at the responsible line ministries and the central planning and financing ministries. Mobilisation can be done in either direction: line ministries use evidence to argue the case with central ministries; also it may be the central ministry that recognizes the importance of WatSan leading to mobilization of the line ministry (-ies). Donors and NGOs also play a key role in refining and disseminating messages to government via workshops, briefings and pressure from media reporting.

As well as for mobilization purposes, research also needs to be conducted to understand better the bottlenecks in the sector, and to guide targeted inputs that attempt to remove these bottlenecks. Research can identify crucial gaps in political support, institutional capacity, coordination or financing. Also, countries that have made major sector developments can be analysed for success factors, and these experiences used to help refine donor and government actions in countries with slow progress. The Country Status Overview lead by WSP has been an important mobilizing factor for the WatSan sector in Africa. The CSO has provided snapshots of the sector, bringing together data and information in an easily understandable format, and comparable between countries. Having the support of AMCOW has been a critical determinant of CSO's acceptance by governments. CSO indicators are now being adapted by other initiatives such as GLASS and are also being used in WSP's own global results framework.

In the absence of donor support to policy development in low-income countries, it is unlikely that any significant developments would take place. Without policy development, there would be no basis for increased budget allocations or there would only be limited private sector development, and therefore it can be expected that WatSan coverage would stagnate and even decline. Independent efforts of NGOs and the private sector in service provision may counteract this declining trend, but not significantly. Hence, policy development is a cornerstone of meeting and going beyond MDG targets.

Examples of research and innovation to support policy development

Research area	Research example	Lead agency	Intended or actual consequence
Advocacy	Economics of Sanitation Initiative (ESI)	WSP	Governments of countries in Southeast Asia have been sensitized to economic losses of inadequate sanitation
	Country Environmental Analyses (with damage cost)	World Bank	Governments where CEAs have been conducted better understand the health costs of poor environment, including poor WASH
	Advocacy publications*	SIWI, OECD, WaterAid, WSSCC, DFID, UNICEF, WSP, WHO, UNESCO, UNDP, WTO, IWA	Sector professionals can better argue for improved WASH and target audiences better understand the various impacts of poor WASH
	Advocacy initiatives	Regional sanitation conferences / water summits, SWA HLM, Stockholm WWW, Water Forum	High level decision makers are sensitized to current status and issues in WASH sector and pressured to make commitments and to act
Understanding the sector	GLASS (with JMP stats)	WHO/UNICEF	All stakeholders better understand the enabling factors for success and how they relate to their spheres
	Country status overview (CSO)	WSP / AMCOW	
	Sector status assessments (link with M&E)	Various donors	The specific issues of a country's WatSan sector are evaluated and recommendations made for concrete actions
Understanding stakeholders	Political economy of sanitation studies	WSP, World Bank	It is better understood why sanitation is not prioritized and identify ways of changing the situation

* The number and range of advocacy papers and articles are too numerous to list here.

Quantifying the link between policy studies / advocacy materials and overall outcomes is difficult if not impossible, due to the fact that no single study is significant enough to have an identifiable effect through the results chain. In specific contexts, some causality may be possible. For example, the CSO process – given its high profile and its support by AMCOW – could be argued to have galvanized some countries to act, when without the CSO they may not have. Likewise, but with weaker causality than the CSO example, the ESI study in Southeast Asia has helped countries justify greater attention to sanitation. On the one hand, the ESI results came at a time when countries were already being mobilized through EASAN and the IYS. On the other hand, the ESI messages were

powerful and were cited widely – and even quoted by Ministers – and were used to help justify new policies. A third example is the SWA – which is still in its early stages – but can already claim success at its first High Level Meeting in Washington in 2010 which was used as a platform to announce and launch new initiatives, such as the Compact in Ghana. Quantitative examples from WSP's contributions in selected DFID priority countries are provided in section F.

B. Resources to meet targets

No progress can be made without resources. Countries that are on-track to meet MDG targets have been able to mobilize additional resources while off-track countries have not. Due to the large deficits in resources for the WatSan sector in most low-income countries, resource mobilization efforts need to target several players. First, the government plays a key role in mobilizing – additional resources raised by the government can leverage other resources from private sector and households, and often external partners (e.g. development bank loans). The resource mobilization efforts of the governments should be informed by a technically sound and broadly consulted sector financing strategy. Target resource mobilization from various sources should be realistic. Financial strategies should aim to reduce dependence on external sources, and gradually move towards full cost recovery from households. Hence different ways of developing the private sector need to be explored (see E below). Governments' own capacity needs for achieving targets also have to be costed and justified to central ministries. This may require additional staff and more budgets at decentralized levels. Research and assessments form a crucial part of mobilizing finances. Without a sound financial plan, there is limited scope for increasing resources to the sector in a sustained way in low-income countries.

Examples of research and innovation to support resource mobilization

Research area	**Research example**	**Lead agency**	**Intended or actual consequence**
Measuring expenditures	National WatSan Accounts	GLASS (planned)	Provide a clear picture on the resources in the sector
	WSS Public Expenditure Review (Lebanon, Rwanda, Tanzania, Zambia)	World Bank	
	ODA to water sector	WWC, OECD, World Bank	Provide a clear picture on the external resources in the sector
Assessing resource needs	Human resources	DFID	Identify HR available and the HR gap to meet MDG
	Costing of national targets	WHO	Calculate approximate costs of MDG and universal coverage
	Financing water structure	Camdessus Report	Identify size and source of finances to water
Financing strategy	FEASIBLE model - applied in E. Europe, C. Asia, Cambodia, N. Africa	OECD/COWI, WSP	Estimate financing needs precisely and sources of sector financing and how to fill gaps
	Smart finance solutions	IRC	Promote thinking on a broad range of financing sources
Other financing	Review potential for CDM	SNV, Winrock	Explore innovations in

sources	financing in sanitation	International	financing sources
	OBA	World Bank, WSP	Improve sector performance via the financing mechanism
	Water Bond	ADB	Explore innovations in financing sources
	GSF	WSSCC	Demand creation and increasing willingness to pay of populations

Additional resources mobilized by research can be assessed for their impact on overall sector spending, and expected increase in WatSan coverage. There are various channels: one is via a comprehensive sector financing strategy, such as provided by the FEASIBLE model. This model attempts to bring together key sector players and agree a medium- to long-term sector financing plan, including raising more resources internally. However, no research has been done to-date on the impacts of FEASIBLE. A second channel is via research on innovative financing mechanisms, such as CDM, OBA or water bond – which may include evaluation of pilot schemes. These innovative schemes are still in early development.

C. Pro-poor programmes

Many WatSan services are delivered via government, donor and NGO programmes. These are usually time- and budget-bound projects that are targeted to specified geographical areas. Some programmes are nationwide in scope, like the Total Sanitation Campaign in India. Through understanding the lack of impact found in many supply-driven projects of the past, more programmes now take into account the preferences and needs of the community. Furthermore, as research has shown non-poor households to be more successful at capturing subsidies than poor households, greater attention is now given to subsidy targeting mechanisms that have a higher rate of targeting success.

Examples of research and innovation to support pro-poor programmes

Research area	**Research example**	**Lead agency**	**Intended or actual consequence**
Programme performance	Performance of water districts in Philippines	WSP	Compares performance across number of indicators, and establishes benchmarks / targets
	ESI	WSP	Calculates economic returns based on ideal versus actual performance
Subsidy targeting	Financing mechanisms impact on the poor	WSP	6-country study with lessons learned for appropriate targeting of the poor
	Public funding for sanitation	WSSCC	Advocacy for public funding targeting the poor

Research that can be shown to increase the efficiency of WatSan services can be converted to expected costs saved, or increases in coverage, resulting from the research. However, while lessons learned from program implementation are routinely fed back to

the sector professionals in many forms to improve programme design and performance, there are no published examples of how research has actually lead to efficiency gains.

D. Technology selection

While often an integral part of programmes, covered in C above, technology selection is a crucial aspect of program success. While most water and sanitation technologies used today have been around for decades if not centuries, technology development and refinement is still a key aspect of meeting sector targets. Advancements in material technology (e.g. plastics) can make WatSan hardware lighter, more robust and cheaper – and therefore more durable and more attractive for households to invest their own resources. Refinements to traditional WatSan technology models can make them more acceptable to local communities. For households willing to recycle and reuse human waste, there have also been many design options made available to the market. Furthermore, especially in the developing world there are challenging environments, such as those living over water or those affected by flooding and natural or human disasters, which all require refinements to existing technologies or definition of new technologies. While centralized sewerage has been the option of choice for many developing world cities, it is very costly per capita, and given the competition for tight budgets, simply not affordable. Alternatives are now available such as decentralized, simplified, condominial or small bore sewerage. These have yet to 'take off' fully in terms of widespread adoption in the developing world.

As well as technology development itself, it is crucial to utilize established economic and decision making tools that enable explicit comparison of alternative WatSan technologies, and lead to an 'optimal' choice – taking into account the specific constraints and opportunities operating in each and every context. One fundamental criterion is that of cost – the investment or upfront costs, as well as the recurrent costs. The expected duration of the technology, as well as the capital and annual maintenance costs needed during its lifetime, are both important determinants of the overall lifecycle cost. The annual equivalent lifecycle cost is an important indicator for decision makers, as it incorporates all these elements. Technologies with low investment costs but short lifespan and frequent maintenance costs may not – ultimately – be better value-for-money than a technology that has a high investment cost but uses high quality components and has long life span. Financial and economic assessments are crucial to better understand the cost performance of technologies. However, it also needs to be recognized that performance varies between technologies in terms of the benefits, covering environmental, health and socio-economic indicators. Cost-benefit analysis incorporates both the cost and benefit elements, thus allowing decision makers to choose technologies based on their overall efficiency. Decision makers better understand how much extra cost must be paid for an extra benefit. Hence, economic research is crucial in enabling decision makers to select technologies that provide value-for-money.

Dissemination of technology options, their general performance as well as detailed assessment of key outcomes through research studies, needs to be made via materials targeted to different levels – national, sub-national as well as community and household. For example, instruction manuals for dug well, borehole or pit latrine construction will be different whether targeted at households, masons, engineers or district offices. It will be key to reflect in easy-to-grasp format all the relevant

information for each user, without overloading them with unnecessary or complex information. This is the task of international and local organisations alike, incorporating the skills from a variety of disciplines covering engineering, economics, social science and media/communication.

Examples of research and innovation to support technologies

Research area	Research example	Lead agency	Intended or actual consequence
Technology development	Simplified sewerage / low cost sanitation	University of Leeds	Provide improved, more appropriate and lower cost options to populations in developing countries
	DEWATS	Borda	
	EcoSan	GTZ / SEI EcoSanRes	
	Biogas	SNV	
	Septage management	USAID	
	Sanitation in challenging environments	WSP, IWA	
	Point-of-use treatment	IDE, WSP, USAID, SDC, LSHTM….	
Technology evaluation & selection	Global study on WatSan cost-benefit	WHO	Assess overall cost-benefit of WASH interventions
	ESI Country studies	WSP (pending)	Compare economic performance of sanitation options
	Review of economics of WASH	WHO (pending), Copenhagen Consensus Center, UNC	Provide global overview of economic performance of different WASH interventions
	EcoSan economics	GTZ, WSP, IRC	Assess and promote the re-use value of nutrient and energy by-product of human waste
	Wastewater economics	IWMI, GWP	
	Health benefits	WHO, LSHTM, various	Assess health gains of WASH interventions
	Multi-criteria analysis for urban sanitation (Peru, Ghana)	UNESCO	Incorporate a range of factors in selection of appropriate sanitation interventions
Guidelines	Water safety plans	WHO	Provide best practice on how to regulate water quality
	Sanitation informed choice manual	WSP, IDE	Provide guidance on how to select and construct facility
Technology or target coverage costing	Lifecycle costs	IRC WASHCost	Focus greater attention on costs that occur after the initial investment, and extending technology life span
	Global costing study	WHO, Water Academy, GWP, UN Mill. Project	Estimate global and regional costs of attaining the MDG target
	ESI	WSP	Estimate annual equivalent life cycle costs of alternative sanitation options
	Program costs	Plan International	Assess comparative costs of Plan investments across country
	Africa Infrastructure Country Diagnostic	World Bank	Estimate costs of infrastructure needs in Africa
	Costing tool	WHO	Provide tool for estimating

			costs in a standard way

Quantification of the expected impacts of research on technology developments and performance comparison is difficult to do. In practice, if cheaper technology is selected that has the same performance, then it will lead to a welfare gain – either more funds are available for coverage of other populations, or the saved funds are used for other purposes. Much of the research on technology selection such as WASHCost and ESI is too recent to have had any impacts yet. However, experiences have been gained from the use of cheaper technologies in some settings – such as through CLTS and low cost latrines in Bangladesh. However, an assessment of the comparative performance has not yet been conducted. Evidence from Cambodia under ESI suggests that low cost self-build latrine options have a short length of life, and also incurs relatively high programme costs (of the NGO) in implementing the intervention. Hence, in the future, research that enables comparison of the cost and economic performance of different options will be extremely valuable in avoiding options with poor performance. A major research agenda remains on this issue.

E. Private sector development

Given the limitation of government and donor budgets, the development of the private sector in delivering WatSan services represents the single greatest opportunity to achieve the MDG targets. This is true of low-income as well as lower-middle income countries. Given the major proven economic returns on WatSan investments, opportunities exist to capture that value through opening the market up to the private sector, especially through public-private partnerships. PPPs are not a magic bullet or single solution – there are many types that exist, and they have differing success in different contexts. There are many factors of success, and failure. These need to be understood through research.

In the absence of further development of the private sector, narrowing the coverage gap would need to be achieved through government and donor programmes, including production of hardware. In some countries where national programmes have been set up (Ethiopia, India) – and capacity enhanced – it has been found to be necessary to involve the private sector in the supply of hardware.

Examples of research and innovation to support the private sector

Research area	Research example	Lead agency	Intended or actual consequence
Developing the private sector	PPPs	World Bank, ADB, AfDB	Implement, with research, partnerships with the private sector
	Supporting small and medium-scale service providers - DPSP	WSP	Provide lessons learned on how to optimally support private sector providers
	Microfinance	World Bank, IFC, IRC	Implement, with research, means of supplying households with credit
Regulation	Concessionary agreements, BOT	World Bank	Appropriate contract definition for sustainable and value-for-money provision from private sector
	Price guidance and setting (e.g. water tariffs)	World Bank	Identify appropriate tariff structures, balancing cost of supply and population ability to pay
Market assessments	Supply chain analyses	WSP	Explore the value-added and private sector potential in the supply chain
	Water markets	World Bank	Assess potential for private sector involvement
	Assessment of externalities and market potential	WSP, WHO WSFF	Valuation of the private versus social benefits of WatSan, and what can be captured in a market
	Sanitation as a business	SuSanA, LSHTM, BMGF, WTO	Different avenues for stimulating business involvement in sanitation
Innovative financing mechanisms	Leveraging financing from the bond market for social investment	WSFF	Prove that large sums of funds can be mobilized from the international money markets for social causes

Where research has led to an identifiable investment from the private sector, the impacts on coverage can be estimated. However, most research in this field has been of a general and global nature. Some research is still ongoing, with as yet unknown impact. The most country examples are from actual PPP deals that have been arranged, which in lower income countries have been mainly with the involvement of development banks (finances and technical support). Each PPP arrangement involves research in the project identification phase; but underlying this is the lessons learned from previous research and project evaluations.

F. Promotion

WatSan projects of previous decades have given inadequate attention to the preferences of individuals and communities. It was common for donor and government programmes to decide what type of WatSan service would be provided and arrive in the community with the plans already made. In the past decade, new techniques of community involvement have been found to be highly successful in igniting community demand for

sanitation. In water, community management of water supply has also been promoted widely. These techniques, although motivated by outsiders, aim to put communities in the driving seat – making them take responsibility and exercise choice in the services provided. Research and learning mechanisms have been fundamental in this change. However, even widely tried and tested techniques need to continue to evolve through research and feedback mechanisms. Indeed, some schemes have not been as successful as expected, and hence there is still much learning to be done.

In the absence of community participation, there would be 'business as usual' – services are delivered that have not been demanded; facilities that are less likely to be used properly by the targeted beneficiaries and with lower likelihood of being maintained and replaced once dysfunctional. With populations not using services that have been delivered, and not looking after them properly, then actual coverage would only increase very slowly, if at all. While coverage as measured by the presence of a physical facility would increase in the short term, the development benefits would not be gained from these facilities.

Examples of research and innovation to support promotion

Research area	Research example	Lead agency	Intended or actual consequence
Community awareness of the benefits of sanitation	CLTS, TSSM	IDS, Plan International, UNICEF, WSP …	Demand from communities is ignited and sustained which motivates them to move up the sanitation ladder

Quantitative assessment of gains from research and policy support is made for the WSP TSSM programme in India, under the Global Scaling Up Project funded in large part by the BMGF. The WSP has spent until June 2010 US$ 1.9 million in two states – Himachel Pradesh (HP) and Madya Pradesh. In HP the programme has been supported by State government spending of US$ 7 million and household spending of US$ 18.8 million. If the WSP expenditure is assumed to be split equally between the two States, it is estimated that 1 Dollar of WSP spending has leveraged 7 Dollars from the State and almost 20 Dollars from the population. The average cost per person – for a claimed[5] 3 million people with improved access – is US$ 9, which equates with roughly US$ 45 per latrine. This project involved more than sanitation marketing at community level, but also actions to improve the enabling environment at district, State and national levels. Such a programme demonstrates extremely good value-for-money.

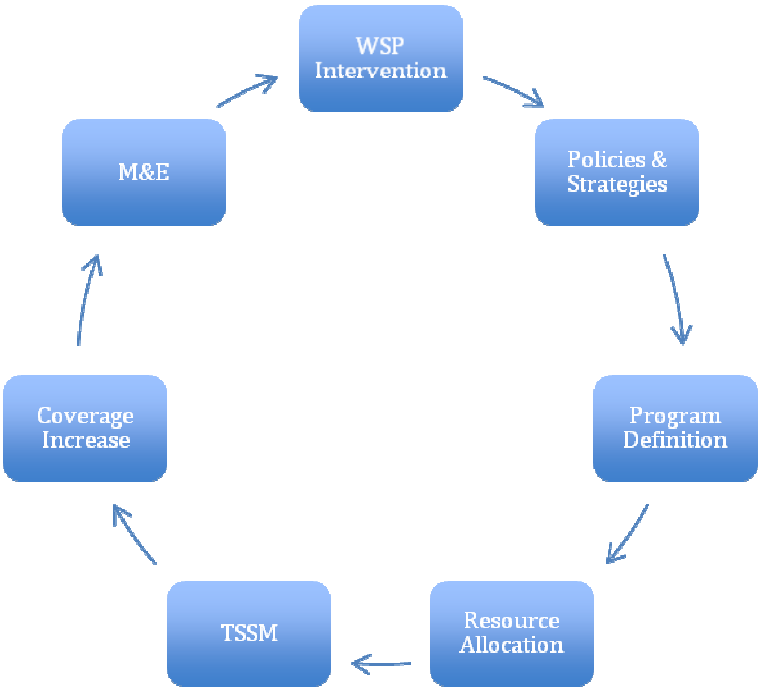
A second country example is Ethiopia where rural sanitation is WSP's main focus. For this quantitative exercise, different data were obtained and the calculations are based on more assumptions than the India example above. From 2010 to 2015, a further 32.2 million rural dwellers in Ethiopia should gain access to sanitation to meet the MDG target. Cost per person covered per year has been estimated at US$ 10, from a Plan International in 2008, cited at 2010 prices. This gives a 5-year cost of US$ 1.6 billion to reach the MDG target. The WSP budget for this period is US$ 8.4 million. If it is assumed

[5] Until June 2010, there were 876,000 people verified as ODF and 2,148,380 people claimed but not yet verified as ODF.

that WSP's contribution to the enabling environment is 25% of all contributions (taking into account the efforts and spending of other external partners and the Ethiopian government itself); and it is assumed that in the five year period Ethiopia succeeds in meeting its rural sanitation MDG target; it is calculated that WSP's leverage is 48. In other words, for every US$1 spent by WSP on the enabling environment, US$48 is actually spent on rural sanitation improvement. While this quantitative example requires major assumptions (as listed), it does illustrate the potential returns on investing in the enabling environment generally, and WSP's contribution specifically. Similar exercises carried out for Mozambique and Zambia reveal leverage values of 36 and 25, respectively. For Bangladesh, the leverage is higher at 140 (covering both rural and urban areas, and both water and sanitation).

For assessment of socio-economic benefit, the leverage values cited above should be adjusted for the economic returns on investments. Taking an average global benefit-cost ratio of 8 from previous studies, a leverage value of 48 would lead to benefits of 384 units per unit invested by WSP. Although several assumptions have been used, returns of 400 units or even 100 units per unit of investment through WSP is extremely good value for money.

The diagram below shows the steps for achieving increased coverage through WSP intervention to improve the 'enabling environment', with the example of TSSM to scale up rural sanitation services, and via M&E back to improved WSP interventions (including global knowledge products and cross-country learning).



G. Planning for the future

While the attribution of single extreme weather events to climate change are hard to do with statistical certainty, there is sufficient evidence that climate change is taking place. Major implications for the WatSan sector are increase in average and extreme temperatures, change in rainfall patterns (flooding, drought) and increased incidence of storms, among others. Therefore, the WatSan technologies selected should also take into account performance in the face of these climate-related risks.

- Water supply systems should have less leakage; they should be robust to flooding; households should be encouraged to reduce water consumption; water resources used for drinking water supplies have to be safeguarded; and water should be reused and recycled more, especially in arid and semi-arid regions.
- Sewerage systems have to be designed to be able to handle or react to increased rainfall in short periods; flush toilets have to be designed to use less water in water-scarce areas; there should be consideration of a switch to dry sanitation systems in arid or semi-arid regions; pit latrines and septic tanks should be able to withstand flooding.

All these requirements need more research to identify new designs or technologies, and the performance of existing technologies has to be assessed in the face of more extreme weather patterns. Furthermore, research is needed on how to optimally implement new technologies or get populations to change their behavior.

Examples of research and innovation to support resilience to climate change

Research area	Research example	Lead agency	Intended or actual consequence
Water conservation	SAWAP (China, Vietnam)	WSP	How municipal governments should plan for changes in rainfall patterns
Policy responses	2030 Vision	WHO / DFID	Raise awareness and explore how WatSan is affected by CC and what can be done
Water desalination		Various	More effective and cheaper technologies for desalination
Virtual water markets		IWMI	Incorporate water footprint into decision making
Impacts of climate change	Freshwater impact	IPCC	Increase awareness on future freshwater availability
	Disease impacts	WHO	Increase awareness of climate change on waterborne diseases
Early warning systems	Water quality alert	US EPA	How to respond to changes in water quality due to CC

H. Measuring progress

Monitoring and evaluation are crucial in establishing how well programmes have performed, and in determining future actions and focus areas needed to reduce the number of unserved. To date, the definitions of WatSan services used by the JMP have been relatively simple– either 'improved' or 'unimproved'. This is largely due t the recognition of the weaknesses of the national surveys underlying the data gathering process. However, much of the WatSan community is ready to move beyond these indicators for monitoring post-2015. Currently there are plans to more comprehensively capture the different service levels provided – according to a ladder concept – with the intention to better reflect actual population welfare levels from a broader range of service definitions.

Examples of research and innovation to support progress measurement

Research area	Research example	Lead agency	Intended or actual consequence
Monitoring	JMP*	WHO / UNICEF	
	DHS	USAID …	Provide basis for JMP, also waterborne diseases
	MICS	UNICEF	
Evaluation	GLASS CSO	WHO / UNICEF WSP	Determine what factors explain improved sector performance
Performance benchmarking	IBNET	World Bank	Standard means of assessing utility performance
	Sanitation city ranking in India	Government of India	Mobilise municipal governments to improve sanitation
Other publications	Global Water Intelligence		Publish statistics on market developments including investment values (e.g. wastewater, desalination, PPPs)

* Many publications cite JMP stats such as HDI, WDR, HDR, Little Green Data Book (World Bank)

Conclusions

The impact of specific pieces of research or policy support are difficult, if not impossible, to quantify in terms of coverage impact or population benefit. Much of the research cited here feeds a global pool of knowledge which is increasingly used to – explicitly or implicitly, consciously or unconsciously – influence various levels of decision. Country level research is more likely to directly and tangibly influence decisions by national stakeholders (including donors at national level); while global research forms the background and unarguably influences the country activities. While research findings are often transferred from one country to another, decision makers at national level may not trust it as it does not reflect their specific decision making context. Therefore, more and better quality research is needed at local level that is broadly representative

of the national context. This should be guided by international standards and, preferably, aided by simple-to-use tools provided by internationally-recognized research organizations.