



DFID Research

**Scoping Study for the
Sanitation Research Programme**

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Scoping Study for Sanitation Research Programme

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Acronyms and abbreviations

BPD	Building Partnerships for Development
CLTS	Community-Led Total Sanitation
EcoSan	Ecological Sanitation
HCES	Household Centred Environmental Sanitation
MDG	Millennium Development Goal
OD	Open Defecation
ODF	Open Defecation Free
PPP	Private-Public Partnership
PRSP	Poverty Reduction Strategies
SSA	Strategic Sanitation Approach
TSSM	Total Sanitation and Sanitation Marketing
WASH	Water, Sanitation and Health for all
WSP	Water and Sanitation Programme

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Executive Summary

INTRODUCTION

Background

1 DFID's present Research Strategy (DFID 2008) commits DFID to undertake research that will contribute to the achievement of the hardest-to-reach Millennium Development Goals (MDGs). MDG 7 (Environmental Sustainability) Target 10 includes halving the proportion of people living without improved water and adequate sanitation by 2015. Since the sanitation goal was included in 2002 at the first AFRISAN meeting, progress has been slow with only scattered success stories. This led the global health community to be castigated for its inertia (LANCET 2008) and other commentators to expose the paucity of hard evidence to support the case for selected interventions being taken to scale. However, people are at least moving away from open defecation (up the virtual ladder) and expressing their demand for improved sanitation options albeit at a pace too slow to hit MDG targets (WHO UNICEF 2008). Government commitments to meet the sanitation targets and prepare action plans to attain country goals have been re-affirmed at recent regional conferences on sanitation. Recognising the significant challenges that remain in the sanitation sector, DFID Research commissioned this scoping study to identify potential areas of research that could have significant impacts towards helping meet the MDG sanitation target.

LITERATURE REVIEW

The Major Shortfall in Safe Sanitation

2. The literature on sanitation is extensive and the statistics are formidable, if increasingly questionable, as epidemiologists challenge the original source: a Lancet editorial suggests that 200 million tonnes of human waste goes uncollected every year and the WHO/UNICEF Joint Monitoring Report states that over 2.5 billion people, or 40% of the world's population, are without access to improved sanitation, and that the MDG target will be missed by over half a billion people and is off-track in 74 countries worldwide. On this basis even if the MDG targets were to be met, 25% of the world's population would remain without access to safe sanitation facilities and thus forced to defecate in open or unsanitary places. Even this potentially understates the extent of the problem, particularly in urban areas, where toilets are only one element of systems to remove excreta from people's living environment and dispose of or reuse them safely.

3. The health impact of sanitation is based on plausible inference deriving from wide sectoral acceptance of Esrey's analysis¹ of 144 studies in 1991 and 1996, corroborated by Fewtrell's expanded study in 2004. Their analysis suggested that when improvements in sanitation and hygiene are widely practiced then the following health impacts can be achieved: safe excreta disposal can result in an estimated 36% reduction in diarrhoea, while hygiene promotion can account for an additional 48% reduction in diarrhoea (Esrey et al 1991, Fewtrell et al 2004). However, out of the studies selected, Fewtrell only found two sanitation related studies with sufficient rigour for inclusion in her meta analysis adding weight to the call of Buekens et al (2008), writing in the American Journal of Medicine, for less assumption and more rigour when assessing the effectiveness of those interventions which genuinely improve health. The recommended level of rigour can be found in the randomised control trials of Emerson and Luby et al (2005) Emerson et al (1999 and 2004) demonstrated the importance of latrine construction and hygiene promotion in controlling fly breeding, reducing diarrhoea by 23% and infection by the flies that cause trachoma by 30% while Luby showed that handwashing with soap could reduce diarrhoeal incidence by 51% and Acute Respiratory Infections by 50%. Everybody benefits from safe sanitation and women, and the children they care for, may also benefit from time and energy savings and other significant but less tangible benefits. Limitations in gender sensitive programming – specially in being responsive to and strengthening voice for women's demands - may have restricted the effective demand for safe sanitation (de Bruinje et al 2007).

4. In their economic analysis, Hutton and Haller (2004) based their global impact assessment for WHO on the widely accepted figures that the lack of adequate sanitation and hygiene results in 5.4 billion cases of diarrhoea leading to 1.6 million deaths mainly among young children, each year. They estimate that the global cost of not meeting the MDG targets on water and sanitation at US\$38 billion per year, with sanitation accounting for 92% of this value (Hutton *et al.* 2006). The World Bank suggests that by not including the malnutrition-mediated health effects, the long term costs of lower school performance and the reduced cognitive development of WaSH related infections, this assessment understates the costs by as much as 40% or more. Extending this expanded economic analysis to Pakistan and Ghana the report shows that environmental health risks consume up to 9% of the these countries' GDP.

Current Knowledge on Improving the Use of Safe Sanitation

5. For decades, the most common government approach to improving sanitation in rural and urban areas was to provide latrines at full or partial subsidy. As this approach was not having the intended impact and more was learnt about the complex range of issues related to sanitation, different approaches to improve the availability and use of safe sanitation were developed. There was also recognition that different approaches were required in rural and urban areas as the social, economic and cultural characteristics of the two locations are very different. The most promising approaches include:

- *Participatory and community-based approaches* including, in urban areas, community members taking full responsibility for financing and managing local sanitation facilities or, in rural areas, community-Led Total Sanitation (CLTS). The latter uses PRA methods to enable local communities to analyse their sanitation conditions and collectively internalise the terrible impact (largely based on shame) of open defecation (OD) on public health and the entire neighbourhood environment. Those engaged in CLTSⁱⁱ believe it is an effective approach to stopping the practice of open defecation and there has been considerable reported success in establishing better hygiene and sanitation practices at least in the short term. However, there are several concerns (such as issues of inclusion, equity, gender parity and sustainability) that need corrective actionⁱⁱⁱ. One major contribution of CLTS to the sanitation sector has been the change the focus on achieving **outcomes**, like Open Defecation Free (ODF) communities, rather than **outputs** (numbers of toilets built or used). Whether or not ODF status is achieved, and some of those consulted questioned the extent of the achievement, the change of focus from outputs to outcomes appears to be a positive development. The potential for exploiting the links between CLTS and Sanitation Marketing are being tested through the DFID supported SAWAP^{iv} programme in the Mekong region
- *Sanitation marketing* has harnessed the principles of social marketing, widely applied to condom and impregnated bed net distribution. It creates opportunities for public and private sectors and non-profit making organisations to work together on improving household sanitation. Sanitation marketing is a consumer-based approach to promoting safe hygiene behaviours. Central to the approach is an understanding of the target audience, how and why they behave as they do and what drives and prevents adoption of the product or new behaviour (Jenkins 1999). The approach recognises the relevance of commercial lessons such as the importance of substantial upfront investment in promotion and consumer education and a longer timeframe to launch a new product category in a social context (Jenkins and Sugden 2006). This makes it different from other promotional approaches that focus on technology or health education materials. In sanitation marketing, the products and their promotion are based on consumer motivation and preferences which, as Jenkins found in Benin, were not just about hardware or health.

- *Strategic Sanitation and Household-Centred Sanitation Approaches.* The strategic Sanitation Approach (SSA) was developed to recognise that improving urban sanitation requires attention not just to toilets but also to the systems to which they connect and that conversely, engineering solutions that focus only on sewers but neglect the toilets that connect to them and the treatment and disposal systems to which they discharge cannot provide a complete response to sanitation needs. Subsequent research into the practical implementation of the approach (Tayler, Parkinson and Colin 2003) suggested that the need was not for the SSA as a blueprint but rather for a broadly strategic approach that recognised existing realities, identified overall objectives and provided guidance on how to move from the first to the second. Subsequently, the Household-Centred Sanitation concept was developed (Eawag 2005). The most important aspect of the HCES is its emphasis on dealing with wastes as close as possible to the point at which they are generated.

6. All of these approaches focus on how to promote and provide sanitation. There are also approaches that focus on the type of sanitation that is provided. These include the UNICEF/Sulabh twin pit approach, which attempts to minimise health risks by ensuring that faeces are stored for at least six months before being handled, ecological sanitation and low-cost sewerage.

- *Ecological Sanitation (EcoSan)* is based on three fundamental aspects: rendering human excreta safe, preventing pollution rather than attempting to control it after we pollute, and using the safe products of sanitized human excreta for agricultural purposes (Esrey et al 1998). In this approach human excreta is considered as a resource. Human excreta are processed on site and then, if necessary, further processed off site until they are completely free of disease organisms. The nutrients contained in the excreta are then recycled by using them in agriculture. Most EcoSan technologies developed to date incorporate urine separation on the basis that the majority of nutrients in excreta are contained in urine while most pathogens are present in faeces.
- *Low cost sewerage.* Where housing densities are high and water is available it is possible, to design low-cost sewage systems. The best-known approaches to sewerage provision in low-income countries and neighbourhoods are the Brazilian and Orangi Pilot Project models (Watson 1995 and Hasan 2008). The term *simplified* sewerage is often used to describe low cost sewerage and Mara and Broome (2009) argue that it is the best option for delivering adequate sanitation to the urban poor. The main problems with low-cost sewerage in South Asia relate to maintenance (Tayler 2008, Alam and Parkinson 2002) and the disposal of sewage, much of which is which is rarely treated and often used to irrigate crops.

Knowledge Gaps Contributing to the Shortfall in Safe Sanitation

7. As the complexities of improving sanitation are better understood, there are still several factors that have been identified as constraints to improving sanitation and where more understanding is required to fill knowledge gaps, including:

- Lack of rigorous evidence of the impact of interventions, with clear explanation of the parameters necessary to achieve certain outcomes e.g. the critical mass of adopters of a given practice needed to achieve at scale impact
- How to translate demand for sanitation into sustainable uptake and to ensure women's priorities are taken into account.
- Households' willingness and ability to pay for sanitation and hygiene investments, including knowledge of mechanisms to spread the financial burden
- The multiple impacts of HIV and AIDS on service provision:
- The potential role of improved WASH in improving quality of life and extending life for

People Living with HiV and AIDS^v

- How to deal with the fact that sanitation and hygiene are intensely personal and difficult to discuss.
- Interventions focus on building toilets, not changing behaviours or other important requirements such as ensuring availability and easy access to adequate water.
- Political and institutional barriers, weak institutions and the options for overcoming barriers and strengthening institutions.
- Inadequate Range of Technologies in terms of both engineering and consumer preference
- Inadequate public or private funds for investment and misuse of subsidies
- Low political and budgetary priority
- Poor Households are difficult to access as safe sanitation may be a low priority and unaffordable.
- Lack of human and technical capacity
- Lack of providers of sanitation services/ Weak supply chains

8. Identification and understanding of these gaps and constraints is important since appropriate action depends on their being correctly defined. So, developing a better understanding of gaps and constraints will be a vital first step in any research programme. This understanding should cover the main lessons learnt from activities to improve sanitation for poor households, achieve behaviour change, stimulate demand, and develop effective supply arrangements.

Rural Sanitation

9. Community Led Total Sanitation (CLTS) has reinvigorated the flagging^{vi} Participatory Hygiene and Sanitation Transformation (PHAST)^{vii} approaches to promote rural sanitation. In a perverse shift from accentuating the positive^{viii} to a strong focus on the shame of open defecation, CLTS has been heralded as an answer to scaling up coverage^{ix}. but some have adapted the core principles of CLTS to develop new approaches while others have fundamental concerns with its sustainability. Markets to provide the services required to support safe sanitation are being actively developed either through sanitation or social marketing.

Urban Sanitation

10. The largest number of people without access to sanitation is in rural areas, but the population living in urban areas is growing fast and in almost all urban areas there is a very real sanitation crisis and the poor are living in deplorable conditions. Although there are a number of promising approaches to improving rural sanitation, there has been much less success in developing approaches to improve sanitation in low income urban settlements. Challenges facing urban sanitation include insufficient infrastructure, limitations to access and use of services, weak planning systems and poor enforcement of public health and environmental regulations, availability of appropriate technology and financing, and community mobilization. Weak planning and environmental control systems are a particular problem in urban fringe areas. There appears to be scope for investigation of alternatives to the comprehensive development control-based approach to planning based on Western practice that is currently the norm in many countries.

Sanitation Research Programme:

11. There are several large and numerous small research projects working on increasing understanding and providing knowledge to improve sanitation. Some of the larger projects are:

- *Going to Scale? The Potential of Community-Led Total Sanitation. The project is researching on-the-ground realities of CLTS and issues of spread, scale and quality; participatory action research to engage with practice and improve processes and*

- outcomes; and networking and sharing between organisations and countries to influence policy and practice.
- *RiPPLE* is a five-year research programme that aims to advance evidence-based learning on water supply (WSS) focusing specifically on issues of planning, financing, delivery and sustainability and the links between sector improvements and pro-poor economic growth.
 - *EcoSanRes Programme* is in its second phase and addresses the general lack of expertise in the area of sustainable sanitation, shifting its emphasis towards capacity development, knowledge development, communications, networking and international coordination with other major actors to promote policy development.
 - *The Total Sanitation and Sanitation Marketing project (TSSM)* has the goal to generate sanitation demand at scale and increase the supply of sanitation products and services. TSSM's objectives are to increase access to hygienic sanitation and improved health for poor households and communities in rural villages, small towns and informal urban settlements in Tanzania, India and Indonesia.
 - SPLASH-Net is a consortium of 15 ministries, funding agencies and national research and technological development authorities from 11 European countries and provides a framework through which European partners can work together to fund water and sanitation research more effectively, aiming to improve water research for poverty reduction and to contribute to achieving the
 - *ESPA Programme* The DFID ESPA Programme implemented in partnership with NERC and ESRC explores the potential for a multi-disciplinary research programme that will address how to achieve sustainably managed ecosystems contributing to poverty reduction and wellbeing improvements in developing countries. While not directly concerned with sanitation, the ESPA programme does perhaps offer lessons in how a sanitation research programme might be organised.

FINDINGS FROM THE CONSULTATIONS

Consultation Process

12. Consultations were held with key stakeholders to seek their views on the importance of sanitation sector research and appropriate research topics for possible DFID funding. Consultations were undertaken to ensure that the findings of the Scoping Study are based on analysis of a wide range of opinions. A wide range of people were consulted including DFID staff, staff of multi-lateral and research organisations and non-government organisations working on sanitations. The resources and time available to the Scoping Team limited the extent of consultation possible with potential end-users and overseas researchers.

Points Emerging from the Consultation

13. During consultations, stakeholders were asked for their views on factors that are important in the prioritization of possible sanitation research themes. The consultation asked questions on why, what and how should DFID fund future research; as well as asking for views on the drivers of change and constraints, that will change sanitation use/availability for the poor.

Why should DFID fund Sanitation Research?

14. The responses indicated a strong opinion that DFID should fund research on sanitation for various reasons ranging from 'sanitation is the most off-track MDG and it is important to research what might be done to address this fact' to 'By prioritizing sanitation research, DFID increases the credibility of the sector. It can give a lead to the rest of the donor community and thus leverage more much needed support for the sector'.

Where does DFID bring its comparative advantage to sanitation research?

15. Several respondents emphasised that DFID was one of the first donors to fund sanitation research and was willing to engage with cutting-edge research issues such as social marketing, demand assessment and evidence-base for behavioural change. This emphasis on DFID's strengths was balanced by some respondents who noted that its capacity to manage and use research has reduced in recent years.

Drivers of Change and Constraints

16. The majority of those interviewed identified urbanisation as a driver of change. Other drivers identified as important by many respondents included improved understanding of the benefits of sanitation and hygiene, participatory approaches, cultural pressure to improve sanitation and increasing opportunities to access affordable sanitation. Some of these drivers of change, for instance urbanisation, affect the overall situation while others, for instance improved understanding of the benefits of sanitation and hygiene, affect the ways in which decision-makers and sanitation users respond to sanitation deficiencies.

17. With respect to constraints, more than three out of every four respondents identified political indifference as a constraint. Around half believed that inappropriate and unaffordable technologies constrain action while almost as many identified lack of service providers as a constraint. This could be tied to the view, shared by a significant number of those consulted, that shortage of human and technical capacity and resistance to change are key constraints.

18. The number of respondents was not sufficient to provide numerically reliable evidence on attitudes to change and constraints but they do provide a qualitative view of attitudes and assumptions among concerned professionals.

Research Themes

19. Research themes identified during the consultation and literature review are:

- Financing of Sanitation.
- Water and Governance.
- Mainstreaming gender and social inclusion
- Political Economy of Sanitation.
- Sanitation In Challenging Environments.
- Urban sanitation.
- Sewerage for the poor.
- Community-Led Total Sanitation (CLTS).
- Sanitation and Economic Growth.
- Components of Sanitation
- Sanitation marketing and promotion.
- Health Impacts
- Hygiene Promotion
- School sanitation

SCOPE OF A POSSIBLE PROGRAMME AND PROGRAMME MODALITIES

Guiding Principles used to develop the Research Programme

21. Based on the DFID's current approach to research activities, several considerations are likely to feature in the sanitation research programme, including being **Relevant** to policy and practice to make sure research outputs have an impact policy demands; being **Collaborative** with existing initiatives and programmes of other relevant actors and related research communities such as health and education; **Enhance local research capacity** including support to ensure that global knowledge is available at the local level, customised to local circumstances with local involvement and champions and having **Communications and dissemination** strategies with end-user participation from an early stage.

Programme Description

22. The **goal** of the programme is to contribute to sustained poverty reduction in countries in Sub-Saharan Africa, South and South-East Asia, by improving access to safe water and basic sanitation for poor households.

23. The **purpose** of the programme is to ensure that new and existing knowledge is developed and utilised to improve systems for sanitation and hygiene service delivery. This requires: (a) improved understanding of why safe sanitation is not being adopted at a greater rate by poor households and how to change this; (b) better or improved approaches to promoting and providing sanitation by mobilising public, private and beneficiary resources (c) information and data on the health benefits of safe sanitation and the consequences of not improving sanitation on other MDGs and (d) increased utilisation and adoption of outputs from DFID's EngKaR programme and other DFID research and analytical work. The programme will include a research-into-use component to build on and optimise use of earlier DFID funded research and knowledge from the EngKaR and other programmes.

24. The key to achieving this purpose will be to develop a demand-led research process that brings together developing country stakeholders, DFID country offices, the central research function and knowledge about technical, social, economic and environmental issues to identify researchable sanitation problems. The problems researched should be resolvable and apply across a group of countries or are so significant within a single country that it is clearly worthwhile to invest in researching new knowledge or further developing existing knowledge in the expectation that it can be re-used will be of general use in the country or region.

Programme Duration

25. A recurring issue that was raised by many people consulted and also in reports evaluating DFID previous research programmes (for example Technopolis and ODI 2005), was the need for long-term support to develop the capacity of research collaborators and to research selected topics fully. To address these requirements, the minimum length of time required for the programme would be 5 years, although up to 10 years would be preferable to allow a greater consolidation of capacity building and time to research more complex issues that constrain sanitation.

Management of the Programme

26. Of the six mechanisms of funding research identified, the most appropriate for the programme is:

Research Programme Consortia (RPC). RPC is a consortium of several research organisations, including developing country members that will manage and deliver identified outcomes that address a researchable problem. DFID are developing a third-generation of RPCs, building on the strengths of previous models but introducing changes to support the aims of their research strategy. Many respondents (both from the north and the south) expressed the need for north-south linkages between research institutions to be maintained. The RPC would be managed directly by DFID Research. Overall RPCs would be a suitable management mechanism for the sanitation research programme because if RPCs are implemented properly, they can result in significant building of southern research capacity which is very much needed in sanitation.

27. The above approaches are not necessarily mutually exclusive and a combined model approach could be supported that, for example, uses RPCs with significant international involvement along with supporting joint funded research projects.

GEOGRAPHICAL FOCUS

28. DFID developed and promoted the 'Five Ones' framework to deliver more effective global action on water and sanitation (DFID 2008). DFID is proposing to support at least five countries (starting with Ethiopia, Sierra Leone, Tanzania, Mozambique and Bangladesh) in their efforts to deliver on the national Five Ones objectives. In addition, DFID will continue to support urban initiatives, particularly in South Asia.

29. There is general agreement that sanitation research should be firmly based in southern countries, and one option is to support the development of regional research facilities that would work in neighbouring countries with similar researchable issues. If the focus of research activities was more regionally-based, there would be scope for local field-level projects researching specific issues in a country that could contribute more directly to achieving the MDGs locally or regionally.

30. Other factors that should influence the location of the programme include: whether DFID is funding water, sanitation and hygiene activities or programmes in the country; no other large-scale DFID-funded water and sanitation research programme operational; local environment is conducive to research; established and respected local research institutions.

31. Based on consideration of these factors, possible locations for the programme include:

General Location	Specific Location
Sub-Saharan Africa	Tanzania, Mozambique, Malawi
South Asia	West Bengal with links to Orissa and Bihar
South-East Asia	Cambodia and Vietnam

Level of Funding

32. The appropriate level of funding for the sanitation research programme depends on several factors including the complexity of the research themes (that require a greater body of research to generate the knowledge and identify solutions), the involvement of different institutions (the mix of UK/northern-based and southern-based research institutions), the extent of developing research capacity in southern research institutions (for example provision of funds for equipment, facilities, overhead costs etc.), and the location of the main research partners (whether regionally based or UK based).

33. The funds for the RiPPLE programme implemented through an RPC are £3.75 million over five years. If the programme is to work in three locations as suggested above, an appropriate level of funding would be about £10 million over at least a five year period. DFID indicated that funding of possible research projects under SPLASH will be funded from other sources and should not be included as part of this programme.

CONCLUSIONS AND RECOMMENDATIONS

35. Inadequate and unsafe sanitation remains a major constraint on health and livelihoods, particularly of poor households, and improving access and use of safe sanitation are major challenges to meeting the Millennium Development Goals. There are significant knowledge gaps in the sanitation sector, particularly on how to improve sanitation for poor people and to be responsive to the needs of women and children whose demands for safe sanitation are not easily captured. As part of their contribution to the global effort to achieve

the MDGs, DFID funding of a sanitation research programme would have significant impacts on improving the lives of poor people and achieving the Millennium Development Goals. DFID is well-placed to fund a sanitation and hygiene research programme by building on its leading role with promoting sanitation and will be able to ensure sensitivity to gender and social inclusion in the global learning agenda on sanitation.

36. The Scoping Team therefore recommend that:

- DFID Should fund a Sanitation and Hygiene Research Programme.
- The research themes selected by the programme should be based on local demand for new or existing knowledge to fill sanitation.
- The appropriate management structures for the programme is one Research Programme Consortia (RPC) managing research activities in Sub-Saharan Africa (Tanzania, Mozambique and Malawi) South Asia (West Bengal) and South-East Asia (Vietnam or Cambodia).
- DFID should provide £10 million as funding for the programme. In addition and as an indicator of demand, the RPC should seek local contributions (up to 10%) for new research projects and research into use activities.

1. INTRODUCTION

Background

1.1 DFID's present Research Strategy (DFID 2008) commits DFID to undertake research that will contribute to the achievement of the hardest-to-reach Millennium Development Goal's (MDG's). MDG 7 (Environmental Sustainability) Target 10 includes halving the proportion of people living without improved water and adequate sanitation by 2015. Since the sanitation goal was included in 2002 at the first AFRISAN meeting, progress has been slow with only scattered success stories. This has led to the global health community being castigated for its inertia (LANCET 2008) and other commentators exposing the paucity of hard evidence to support the case for selected interventions being taken to scale (LANCET 2008). However, people are at least moving away from open defecation (up the virtual ladder) and expressing their demand for improved sanitation options albeit at a pace too slow to hit the MDG target (WHO/UNICEF 2008). Government commitments to meet the sanitation targets and prepare action plans to attain country goals have been re-affirmed at recent regional conferences on sanitation in both Africa (AFRISAN+5 and the e-Thekwini Declaration) and South Asia (SACOSAN-III).

1.2 In their updated Water and Sanitation Policy (DFID 2008), DFID placed a stronger emphasis on sanitation in order to raise the prominence of sanitation, recognising that sanitation tends to lose out to water in policies and budgets. The Sanitation Background Paper to the Strategy (DFID 2007) recognises that:

- **Sanitation and hygiene are fundamental to all the MDGs** and deliver broad development outcomes. Evidence shows that sanitation and hygiene support and increase the impact of health, education and other development programmes and have a positive impact on the lives of poor women and children.
- **Inaction on sanitation and hygiene is *not* a viable development option:** failure to invest in improvement of sanitation and hygiene undermines efforts to promote economic growth and poverty reduction.

Unfortunately, this situation persists, despite the considerable efforts that have gone into developing appropriate technologies, supporting participatory approaches and strengthening governance. Current approaches are generally not working, or where they are working are not proceeding at an appropriate scale. There is clearly a need to understand why this is so and to identify approaches, methodologies and technologies that can work at the scale required to make a real difference. This implies the need for further research into the factors that drive and constrain change.

1.3 Recognising the significant challenges that remain in the sanitation sector, DFID Research commissioned this scoping study to identify potential areas of research into the production of new knowledge or the application or adaptation of existing knowledge that could have a significant impact on improving sanitation for the poor and thereby contribute towards helping meet the MDG target of sanitation.

Objectives and Methodology of the Scoping Study

1.4 The objectives of the Scoping Study are to identify the programme content and implementation modalities of a DFID Research Programme to improve sustainably the health and livelihoods of poor and vulnerable people and stimulate pro-poor growth by increasing access and use of sanitation for urban and rural communities.

1.5 The Terms of Reference for the Scoping Study are given in Annex A. The Scoping Study was carried out in two phases. In the first Phase, activities included reviewing current literature on sanitation, consulting with stakeholders in sanitation and sanitation research and mapping of current and planned research activities being undertaken in this field. A draft Scoping Report was then prepared with a range of possible sanitation research themes and modalities for implementation and discussed with DFID. In the second Phase, following discussions with DFID about their preferences, the Scoping Study was finalised and a draft Project Concept note and draft Programme Document for the Sanitation And Hygiene Research Programme were prepared.

1.6 The consultation process involved interviews and e-mail exchanges with key staff from different stakeholders and individuals representing different sectors and interests within sanitation, and also a questionnaire sent to national and international organisations and individuals working on sanitation. The information from the questionnaire and interviews was analysed to identify the main issues for possible research themes and possible management structure for the future sanitation research programme. The list of people consulted and contacted during the Scoping is given in Annex B, and the questionnaire is given in Annex C.

1.7 The Scoping Study was prepared by ITAD~Water with a team comprising of Ian Tod, (Team Coordinator), Don Brown, Kevin Talyer, Jeremy Colin, Simon Bibby and Saleha Begum. The study started in January 2009 and was completed by the end of March 2009.

This Draft Scoping Study Report

1.8 This Draft Scoping Study Report describes the findings of the consultations, literature review and mapping, and identifies a range of research themes and programme modalities that could be part of the sanitation and hygiene research programme.

Defining Sanitation

1.9 The term 'sanitation' is used to cover a wide range of activities and the broad components are shown in Table 1.

Table 1 Broad Elements of Sanitation, Hygiene and Water Management

Sanitation	<ul style="list-style-type: none"> ○ Safe collection, storage, treatment and disposal/re-use/cycling of human excreta (faeces and urine) and the related behaviour required for safe usage and maintenance ○ Management/re-use/recycling of solid waste ○ Collection and management of industrial waste products ○ Management of hazardous wastes (including hospital wastes, chemical/radio-active and other dangerous substances)
Hygiene	<ul style="list-style-type: none"> ○ Safe usage and maintenance of sanitation facilities ○ Safe water storage ○ Safe hand-washing practices ○ Safe treatment of foodstuffs
Waste Water Management	<ul style="list-style-type: none"> ○ Drainage and disposal /re-use/recycling of household waste water (also referred to as 'grey water') ○ Drainage of storm water ○ Treatment and disposal/re-use/recycling of sewage effluent

Source: Adapted from Evans (2005)

1.10 Since different contexts (e.g. urban/rural) involve different means of delivering sanitation and hygiene services, the scope of sanitation and hygiene activities can be very

broad. The sanitation and hygiene 'sector' may extend from investment in large and costly items of infrastructure, such as trunk sewers, via simple 'on-site' latrines for individual households, to provision of 'soft' items, such as support to women's groups seeking to improve hygiene behaviours in their community. It is further recognized that a *good* sanitation system minimizes negative impacts on the environment (DFID 2007)

1.11 Based on discussions with DFID and other stakeholders, the Scoping Study focused on sanitation related to the "safe collection, storage, treatment and disposal/re-use/cycling of human excreta (faeces and urine)" and hygiene related to "safe hand-washing practices" and "safe usage and maintenance of sanitation facilities" and aspects of waste water management including "drainage and disposal /re-use/recycling of household waste water (also referred to as 'grey water')", and "treatment and disposal/re-use/recycling of sewage effluent".

2 LITERATURE REVIEW

The Major Shortfall in Safe Sanitation

2.1 The literature on sanitation is extensive and the statistics are formidable: 200 million tonnes of human waste goes uncollected every year (LANCET 2008); over 2.5 billion people, or 40% of the world's population, are without access to improved sanitation (WHO/UNICEF 2008) and the MDG target will be missed by over half a billion people and is off-track in 74 countries worldwide (LANCET 2008). Even if the MDG target was on track, 25% of the world's population would remain without access to safe sanitation facilities and thus forced to defecate in open or unsanitary places. Furthermore, the extent of the problem may be understated, particularly in urban areas, where the challenge of removing urine and excreta from people's living environment for safe disposal or re-use is more complex than in rural areas.

2.2 An assessment of the costs, benefits and sustainability of interventions to promote better health found that 9.1 percent of the global burden of disease or 6 percent of deaths are preventable through improved Water Supply, Sanitation and Hygiene (Pruss-Ustun et al 2008). This study does not factor in the findings that rigorous handwashing with soap could reduce impetigo by 34% and pneumonia by 50% (Luby et al 2005). Indeed, acute respiratory infections (ARIs) continue to be the leading cause of acute illnesses worldwide and remain the most important cause of infant and young child mortality, accounting for about two million deaths each year and ranking first among causes of disability-adjusted life-years (DALYs) lost in developing countries (94.6 millions, 6.3 percent of the total) (WHO 2008).

2.3 The global burden of disease associated with water, sanitation and hygiene is given in Table 2. Those infections falling within the water related and excreta related environmental classification (Cairncross and Feacham 1993) contribute 9.1 percent of the total burden of disease. Diarrhoeal diseases account for 3.90 percent of the global burden of disease and are responsible for 1.5 million deaths per year, of which 90 percent are children under 5 (WHO 2004/8). Eighty-eight percent of diarrhoeal diseases are attributable to poor water supply, sanitation and hygiene but the supporting evidence remains limited (Fewtrell and Colford 2004). In South East Asia and the Pacific, an estimated 80,000 deaths of children under five are caused by diarrhoeal diseases each year (WVA and WAAus 2007).

Table 2 Global burden of disease associated with Water, Sanitation and Hygiene

Disease	Deaths	Impairment Millions	Preventable by Improved WASH	Diseases contributing to the WatSan DALY Burden	Environmental Fraction of Total Global Burden of disease
	(million)	(million)	(%)	(%)	(%)
Diarrhoeal Disease	1.50		88%	39%	3.90%
Malnutrition	0.86		35%	21% 5% PEM	1.75% .70%
Intestinal Nematodes		2000	100%	2%	0.25%
Lymphatic Filariasis		25	66%	3%	0.40%
Trachoma		5	100%	2%	0.15%
Malaria	0.50		42%	14%	1.15%
Drowning	0.28	Issue of Near drowning	72%	6%	0.70%
Schistosomiasis		200	100%	1%	0.10%
TOTAL					9.1%

Source: Pruss-Utan (2008)

2.4 The vast majority of diarrhoeal diseases are caused by pathogens (e.g. viruses, bacteria, parasitic worms) located in human excreta (faeces and urine) (Cumming 2008 and WHO 2008). The primary transmission routes of these pathogens are from the faeces of an infected person to the mouth of a new host (faecal-oral transmission). Providing primary and secondary barriers can prevent this from happening. The primary barriers are the most effective way of reducing disease transmission and include:

- Constructing sanitation facilities for the safe removal of faeces from the environment in order to prevent contact with humans, stop spread of disease by flies and prevent contamination of drinking water, fields and floors; and
- Removing traces of faecal material from hands by washing hands with soap after defecation or after handling children's faeces, and before contact with food (WSSCC and WHO 2005).

2.5 Increasingly, the more established linkages between environmental health risks and malnutrition have been overlooked by policy-makers and key synergies for delivering MDGs are being missed (World Bank 2008). Malnutrition is implicated in over half of all child deaths and contributes significantly to morbidity and cognitive underdevelopment (Gillespies and Haddad 2003). Some health practitioners believe that chronic asymptomatic enteric infections such as giardiasis destroy the stomach lining, inhibiting food absorption, perpetuating malnutrition and related negative synergies (Procop 2001).

2.6 Less research has been carried out on helminth-related and insect vector-related diseases leading Stephenson and Holland (2002) to make the case for more research to establish the extent of the linkages between helminth infections and malnutrition. Helminth infections are widespread in developing countries although actual worm loads will differ between individuals. They normally cause chronic debilitation and are widely implicated in negative synergies so that their morbidity are not as great as those of diarrhoeal diseases. Nevertheless, they are significant and their effects can reduce capacity to learn and to work and so may have important consequences for livelihoods and the economy. Worldwide, the prevalence of roundworm (ascaris), hookworm and whipworm, the three most common forms of helminth infection, are estimated to be 1.47 billion, 1.3 billion and 1 billion respectively (Bundy et al cited in Hunt 2006). Together, sanitation and water supply have

been found to reduce the incidence of ascariasis and hookworm by an average of 28% and 4% respectively. It appears, moreover, that sanitation alone has a significant effect in reducing both the prevalence and intensity of helminth infection (Cairncross 2003).

2.7 Insect vector-related diseases associated with poor sanitation include filariasis, which is transmitted by mosquitoes that breed in dirty water and trachoma, which can be transmitted by flies that come into contact with excreta. It has been estimated that worldwide, 6 million people are blind because of trachoma with another 150 million in need of treatment (Hunt 2006). Emerson et al (2004) have shown that providing even basic pit latrine facilities reduced exposure to the flies that spread trachoma by 30%. An earlier study (Emerson et al 2000) demonstrated the importance of latrine construction and hygiene promotion in controlling fly breeding, reducing diarrhoea by 23% and trachoma by 75%.

2.8 There is overall consensus among sector specialists that improved water supply, sanitation and hygiene prevent disease transmission particularly diarrhoea and worms. For many years the sector has relied on an analysis of a limited number of robust epidemiological studies by Esrey^x in the 1980s and 90s (Esrey et al 1991 and Esrey et al 1996) which demonstrated the following:

- Pit latrines, when used by adults themselves and for the disposal of infant's stools, can reduce: diarrhoea by 36% (Cholera by 66%) or more and worm infestations by between 12-86%:
- Hand-washing with soap (or substitute) and water after contact with stools can reduce diarrhoeal disease by 35% - 48% or more. Eye and skin infections can also be reduced with more frequent face and body washing.
- Improved water supply can generally be associated with a reduction in diarrhoea by 20%.

2.9 Drawing on information from 30 studies, Esrey arrived at a lower but still significant figure for the reduction in diarrhoeal disease resulting from improved sanitation (Esrey 1996). Twenty-one out of the 30 studies showed some reduction with a median reduction of 22%.

2.10 Fewtrell(2004)^{xi} carried out a long-awaited sequel to Esry's work by looking at 2120 titles selecting 60 distinct studies which detailed water supply, water quality, sanitation, hygiene or multifactorial interventions and examined diarrhoea morbidity as a health outcome in non-outbreak conditions. As observed by (Scott 2006), only 2 studies on diarrhoea and sanitation were considered to be robust enough for inclusion in the review but these mirror the reduction found by Esrey, suggesting a pooled relative risk of 0.68 (0.57 – 0.87), indicating that latrine ownership could reduce diarrhoea incidence by 32 percent. The results for developing country studies found that all interventions reduced diarrhoea morbidity. The authors placed strong emphasis on results which supported the efficacy of 'point-of-use' treatment mainly with household connections. Multi-factorial interventions were also shown to impact on diarrhoea but were not seen to be more effective than individual interventions. The authors emphasised the paucity of robust studies demonstrating the impact of sanitation.

2.11 Despite the uncertainty about exact figures, there is little doubt that provision and use of good sanitation facilities reduces diarrhoeal and other diseases. Curtis and Cairncross (2003) suggested that if anything Esrey (1996) underestimated the impact. While Fewtrell placed greater weight on the benefits deriving from water treatment in the home, Curtis and Cairncross (2003) suggested that it is compliance with hand washing after defecation which could reduce sanitation and water-related diseases by up to 43% (cholera by 48%). There is also evidence that promoting a single hygiene practice has greater impact than attempts to

promote several different ones. Cairncross and Valdmanis (2006) emphasize the importance of hand washing, noting that studies of the successful impact of water quality interventions on diarrhoea relate mainly to yard connections and also included hygiene promotion. In addition, convincing evidence is offered that most endemic diarrhoeal disease is transmitted through water-washed routes, and is not water-borne emphasizing the importance of food hygiene particularly to prevent the contamination of weaning foods. Cairncross (2003) also introduced evidence of the impact of hand washing on the control of acute respiratory infections.

2.12 It is interesting to note that there is no evidence from the studies that combined interventions have a greater impact than single interventions. Both Fewtrell et al (2004) and Hunt (2001) note that the difficulties inherent in applying epidemiological studies and the consequent shortage of robust empirical evidence.

2.13 In economic terms, the global cost of not meeting the MDG targets on water and sanitation has been estimated at US\$38 billion per year, with sanitation accounting for 92% of this value (Hutton *et al.* 2006). Financial losses due to poor sanitation and hygiene from only four countries -Cambodia, Indonesia, the Philippines and Vietnam- have been estimated at US\$9 billion per year (Hutton *et al.* 2007). These losses include an annual US\$4.8 billion in health-related economic costs (including the cost of health care treatment, reduced productivity and premature mortality) as well as wider water resource, environmental and welfare impacts. Further studies were carried out in Ghana and Pakistan (World Bank 2008). The studies applied similar analysis as Hutton et al (2006) and showed that environmental health risks consume up to 9% of the GDP.

2.14 Despite the known health risks posed by open defecation, the health impacts of poor sanitation have long been considered a 'hidden epidemic' that has simply not been a priority on national development agendas. Even though the global sanitation gap is double that of water supply, sanitation is viewed as water supply's 'poor cousin' and enjoys far less interest or investment. Sanitation is essential for human dignity, safety, security and comfort and improved use of safe sanitation is fundamental to human development. Everybody benefits from safe sanitation but limitations in gender sensitive programming, particularly with respect to being responsive to and strengthening voice for women's demands, may have restricted the effective demand for safe sanitation (de Bruinje et al 2007).

2.15 The editorial in the LANCET (2008) asked how "*arguments for separating human waste from direct human contact—what improved sanitation actually means—need to be made and won again?*" The editorial blamed the weak presence of the health sector, querying how it could lead the advances made in child health through immunization and bednets, while children continue to die from diarrhoeal disease. It went on to *emphasise the health sector's responsibility for advocacy in lobbying the fund holders to channel more support to sanitation and water supply. A possible reason given by Buekens et al (2004) for the poor showing by the health sector is the lack of hard empirical evidence supporting the "know-do gap". They suggest that "evidence-based global health requires use of the evidence from randomized controlled trials (RCTs) and other scientifically valid studies to evaluate global health interventions and to measure progress in improving global health".*

2.16 There is not complete agreement within the sanitation sector about the need for RCTs. For example, Ethiopia's strong public health focus offers a positive example of health engagement without the need for RCTs, as captured by Shiferaw (2007). The Regional Health Bureau in the Southern Nations, Nationalities and Peoples Region made sanitation one of its core broad reach public health interventions, shifting access to basic sanitation from 14% to 80% in just three years and arguably indicating that where there is political will there is no need for further evidence for the health benefits of sanitation. However, there is recognition that in these challenging economic times, governments need to be convinced

that selective investments will achieve multiple impacts notably relating to economic development. Plausible inference was a convenient peg to promote action in the 90s but may not be sufficient for the new millennium where arguments are required to simulate progress towards the sanitation MDG and ensure that poor households can access and use sustainable sanitation services.

Current Knowledge on Improving the Use of Safe Sanitation

2.17 For decades, the most common government approach to improving sanitation in rural and urban areas was to provide latrines at full or partial subsidy. As this approach was not having the intended impact and more was learnt about the complex range of issues related to sanitation, different approaches to improve the availability and use of safe sanitation have been developed. These include participatory approaches, such as CLTS and sanitation marketing, and approaches that focus on the type of sanitation that is provided such as ecological sanitation and low cost sewerage. In addition, there are WSP's Strategic Sanitation Approach (SSA) and Household Centred Environmental Sanitation (HCES) among others. There is also recognition that different approaches are required in rural and urban areas as the social, economic and cultural characteristics of the two locations are very different. Both the SSA and HCES are intended for use primarily in urban areas, recognising that concern with sanitation in these areas goes beyond that with toilets. Indeed, it is important to think of the 'elements' of sanitation technologies and the ways in which they are combined into complete sanitation systems (Netherlands Water Partnership 2006). Considerable investments in sanitation are still made following more traditional approaches through a range of government and non-government projects, even though the limitations of the traditional approaches are well documented. Some of the current approaches to improving sanitation are discussed below.

Participatory Approaches

2.18 Over the years, various organisations have advocated and implemented participatory and community-based approaches to sanitation provision. In the urban field, examples include the Orangi Pilot Project in Pakistan with its insistence that community members should be fully responsible for financing and managing local sanitation facilities (Hasan 2008) and SPARC/Indian Alliance in India, with its focus on community responsibility for planning, constructing and managing communal toilet blocks (Burra, Patel and Kerr 2003).

2.19 In rural areas, the most promising participatory approach is **Community-Led Total Sanitation (CLTS)**. This uses PRA methods to enable local communities to analyse their sanitation conditions and collectively internalise the terrible impact of open defecation (OD) on public health and the entire neighbourhood environment (Kar and Chambers 2008). When triggered systematically and combined with 'no-hardware subsidy' and a hands-off approach by the facilitator, CLTS provokes communities to appraise and analyse their sanitation practices so that they are shocked, disgusted and shamed into taking actions to become totally open-defecation free. The style is provocative and leaves decisions and actions to the community. The approach concentrates on the whole community rather than individual behaviours and relies on social solidarity, help and cooperation in the community. CLTS was developed in Bangladesh in 1999/2000 and has since spread to other countries in South and South-East Asia, Africa, Latin America, the Pacific and the Middle East. Kar and Pasteur (2005) and Teak (2008) discusses some of the challenges and successes of scaling-up CLTS.

2.20 Evaluations of CLTS provide wide ranging though mainly anecdotal evidence that CLTS can be an effective approach to reducing open defecation and sometimes establishing better hygiene and sanitation practices. To date evidence relates to short term improvements. The effectiveness of CLTS varies depending on local conditions and this will

need to be taken into consideration when scaling up the initiative (Chambers 2009). This presents an important research opportunity to consider alternative delivery mechanisms for sanitation programming where conditions are not favourable for standard CLTS approaches. One major contribution of CLTS to the sanitation sector has been to change the focus to achieving **outcomes**, like Open Defecation Free (ODF) communities, rather than **outputs** (numbers of toilets built or used). If evaluation is to be sufficiently 'robust', it will be important to find ways of strengthening the reliability of community monitoring systems (to help keep the pressure on) and the validity of external systems of verification to avoid 'optimistic' reporting.

2.21 The CLTS approach was followed in Nigeria where targeted communities reported health improvements such as fewer skin infections and reduction in diarrhoea and vomiting particularly amongst children (WaterAid 2007). Large numbers of latrines were constructed with locally available materials such that almost half the communities studied had either 100% or nearly 100% access to latrines. Consistent with the improvements in access to latrine use were improvements in the overall environmental sanitation and personal hygiene. One of the most significant results was the positive effect of CLTS on the dignity of women and girls who do not now risk being assaulted on their way to and from the bush. Despite these benefits to women and girls, concerns were expressed about a lack of gender sensitivity in CLTS implementation, and that gender considerations have been *accidental* rather than *intentional* which suggests that more effort should be placed on gender mainstreaming if greater efficiency is to be achieved. An earlier study on CLTS performance in one community in Loga district, Nigeria provides important insights into what is likely to happen when CLTS is not implemented in a truly participatory manner and community mobilization facilitators lack gender sensitivity, PRA skills and understanding of the CLTS approach (WaterAid 2006). The case study flags the following concerns in implementation of CLTS: (a) inclusion of a pro-poor approach; (b) the extent of support needed by the communities from the project for coaching, monitoring and support.

2.22 Some observations about the CLTS made in different evaluations (WSP 2005, WaterAid 2007, Chambers 2009 et al, IRC undated) include:

- CLTS is more effective in communities where it is used as the only approach to promoting hygiene and sanitation.
- CLTS works better in smaller communities below 3000 people.
- CLTS is less effective in the more urbanized communities
- Effectiveness of CLTS was directly linked to the way the entry processes were established and the clarity of the initial message.
- Skilled, gender sensitive, community facilitators were required with sound understanding of PRA tools and CLTS concept
- Gender balance was required for implementing teams and CLTS community committees. For example, the number of female staff in almost all of the local government's Water & Sanitation Units was very small, even though female staff were key to conveying CLTS messages to female members of the community.
- Effective CLTS required availability and easy access to adequate water.
- In African communities, there were other 'triggers' in addition to 'shame' and 'disgust' that led to change in hygiene and sanitation improvements.
- Opposition at senior levels, pressure to disburse large budgets, demands to go to scale rapidly and programmes to subsidise hardware remain threats and obstacles.
- Other key variables include – level of bush cover available, homogeneity of the community, population density (if populations are too dispersed poor effect)
- IDS research yielding ongoing concerns about equity
- There are question about sustainability as there is some anecdotal evidence of people reverting
- The importance of availability and easy access to water for effective CLTS.

2.23 Community Health Clubs. The innovative methodology of Community Health Clubs was used in Zimbabwe to significantly change hygiene behaviour and build rural demand for sanitation (Waterkeyn and Cairncross 2005). In 1 year in Makoni District, 1244 health promotion sessions were held by 14 trainers, costing an average of US\$0.21 per beneficiary and involving 11,450 club members (68,700 beneficiaries). In Tsholotsho District, 2105 members participated in 182 sessions held by three trainers which cost US\$ 0.55 for each of the 12,630 beneficiaries. Within 2 years, 2400 latrines had been built in Makoni, and in Tsholotsho latrine coverage rose to 43% contrasted to 2% in the control area, with 1200 latrines being built in 18 months. Although Zimbabwe has historically relied on subsidies to stimulate sanitation, this intervention shows how total sanitation could be achievable. The remaining 57% of club members without latrines in Tsholotsho all practiced faecal burial, a method previously unknown to them. Club members' hygiene was significantly different ($p < 0.0001$) from a control group across 17 key hygiene practices including hand washing, showing that if a strong community structure is developed and the norms of a community are altered, sanitation and hygiene behaviour are likely to improve. This methodology could be scaled up to contribute to ambitious global targets.

2.24 Sanitation marketing is a consumer-based approach to promoting safe hygiene behaviours (Curtis and Kanki). Central to the social marketing approach is an understanding of the target audience, how and why they behave and what drives and prevents adoption of the product or new behaviour. The approach recognises the relevance of commercial lessons such as the importance of substantial upfront investment in promotion and consumer education and the need for a longer timeframe to launch a new product category in a social context (Jenkins and Sugden 2006). It starts from the premise that the low uptake of household sanitation facilities is due to the users and their needs not being sufficiently understood. This is in contrast to programmes in which users are given a say in which products they buy. The distinction lies in seeing people not as passive beneficiaries, but as active citizens and consumers. There are some indications that the latter kind of 'social marketing' increases demand and uptake of sanitation in line with the global experience of condom and bednet marketing.(Jenkins and Sugden (2006). Some health professionals in public agencies not familiar with social marketing success stories may be instinctively skeptical of marketing techniques, at least those practiced by private sector companies (Newborne and Caplan 2006) although USAID has thrown its weight behind sanitation marketing as one of its key areas of comparative advantage (USAID 2008). A recent report for Building Partnerships for Development (BPD) highlights potential barriers for social marketing: where, for example, potential 'consumers' of sanitation products (e.g. latrines) are tenants of low-grade rented dwellings/sites with little interest or incentive to invest their own resources in sanitation (Schaub-Jones *et al* 2006).

2.25 The majority of toilets in low income areas in less developed countries are built by the 'informal private sector' (small independent providers) and paid for by the house owner, tenants or a combination of both, and the basis of sanitation marketing is that sustainable access to sanitation can be achieved by supporting the informal sector to develop the sanitation market (Obika 2004 and Cairncross 2004). In marketing, the key is to ensure the right 'marketing mix' (of product, price, place and promotion) and the same rule applies to sanitation marketing. To develop the sanitation markets, suppliers need to make reasonable profits and consumers need to feel satisfied with the products and services that they are getting. Sanitation therefore needs to be treated like a consumer product, attractively packaged to suit various wealth categories and marketed widely. Sanitation marketing creates opportunities for public and private sectors and non-profit making organisations to work together on improving household sanitation. Sanitation marketing is consumer-focused, which makes it different from other promotional approaches that focus on technology or health education materials. In sanitation marketing, the products and their promotion are based on consumer motivation and preferences. There are several projects promoting sanitation marketing, the largest of which is the Total Sanitation and Sanitation Marketing

project (TSSM). TSSM is an innovative initiative, combining elements of the CLTS and sanitation marketing approaches with the goal of generating sanitation demand at scale and increasing the supply of sanitation products and services. The project, funded by the Bill and Melinda Gates Foundation and implemented by WSP in Tanzania, India and Indonesia.

2.26 Sanitation demand and choice are potentially affected by gender. There are many reasons why women need to be included in the decision-making process: not just because they are regarded as those most responsible for hygiene in the household, but because their sanitation needs are greater and different from men's. For many men, urinating in public is neither shameful nor unacceptable. Men also have more ready access to public places to use toilets. In contrast, public toilets are associated with violence against women, rape, lack of privacy and often appalling hygiene situations. Women often prefer to walk before sunrise or after sunset several kilometres to defecate in open places rather than to visit public toilets closer to home. During menstruation women need to visit sanitation facilities more frequently and are therefore more in need of a nearby and clean toilet than men (de Bruijne *et al* p.24).

Approaches focusing on Different Types of Sanitation

2.27 **Ecological Sanitation (EcoSan)** is based on three fundamental aspects: rendering human excreta safe, preventing pollution rather than attempting to control it after we pollute, and using the safe products of sanitized human excreta for agricultural purposes (Esrey *et al* 1998). In this approach human excreta is considered as a resource. Human excreta are processed on site and then, if necessary, further processed off site until they are completely free of disease organisms. The nutrients contained in the excreta are then recycled by using them in agriculture. Most EcoSan technologies developed to date incorporate urine separation on the basis that the majority of nutrients in excreta are contained in urine while most pathogens are present in faeces.

2.28 Advocates describe EcoSan as a philosophy, the basic tenet of the philosophy being the need to 'close the loop' so that resources are conserved rather than being dissipated through river flows into the sea. (See <http://www2.gtz.de/ecosan/english/thema2.htm> and Esrey *et al* (2001) for information on the philosophy). Recognising that urine is not a carrier of most diseases (one important exception being schistosomiasis) while containing a high proportion of the nutrients contained in excreta, many EcoSan initiatives are centred on the introduction of urine separating toilets. The assumption is that urine can be collected and used as an alternative to artificial fertilizers. There is evidence from various donor-funded initiatives that this can happen on a small scale where crops are grown locally in gardens and agricultural holdings. (http://www.scopetrichy.com/First_ECOSAN_Village.asp provides one example). However, there is limited evidence of urine separation technologies going to scale. Perhaps the most progress in this respect has been made in China, where there is a tradition of using human waste for fertilizer and at least one attempt is being made to implement an EcoSan project to serve apartment blocks as part of a new town development. (For further information on EcoSan projects in China: <http://www.ecosanres.org/asia.htm>).

2.29 Whatever is done with urine, the problems of dealing with faeces remain. Many EcoSan technologies rely on a double vault approach, which in theory allows for faeces to be stored for sufficient time for all pathogens to be removed. The assumption is that one vault is used until it is full and is then sealed and left to decompose until the second vault is full, at which time, it is opened, the sanitized contents are removed and the vault is used again while the second vault is sealed. This concept is also used in the double pit latrines developed by UNICEF and Sulabh International in India. It is dependent on household members using the latrine as intended and strictly following the cycle required for storing and emptying the pit contents. The available evidence suggests that this can be a problem for both double vault EcoSan toilets and double pit latrines. Cotton and Saywell (1998) note the need for investment in education and support for users if latrines are to be used as

intended. While this information relates to double pit latrines, the basic findings are likely to be equally applicable to double vault ecological latrines. Another option suggested by the Netherlands-based organisation WASTE, is to develop a 'containerized approach to faeces collection and storage. The concept is that a container, typically about 100 litres in capacity, would be placed in the vault and removed when almost full. This concept has probably been tested at a pilot scale but raises obvious issues relating to the health of the workers charged with removing the containers and dealing with the contents. In many ways, this approach resembles the old bucket-latrines approach, which was officially discontinued in most countries many years ago because of its perceived health risks.

2.30 The main support for the EcoSan approach is from the Swedish, German and Netherlands aid agencies, and much of the activity is in pilot stages. Some EcoSan programmes are expanding. For instance, the ISSUE programme, implemented by WASTE with funding from the Netherlands Government, is now in its second stage and is committed to move beyond pilot projects to more widespread provision and use of ecological sanitation. However, China remains the only country in which EcoSan approaches might be said to have been implemented on a significant scale to date. While the basic technology is undoubtedly theoretically sound, issues remain as to systems for collecting wastes, cross-contamination, treating them and marketing them to potential users. Also, it is by no means clear that users will favour EcoSan solutions.

2.31 **Low cost sewerage.** Some commentators assume that sewerage is too expensive to provide a viable sanitation option in developing countries, particularly in low-income settlements. Indeed, this will often be true of sewerage constructed to 'western' standards. However where housing densities are high and water is available, it is possible, indeed probable, that appropriately designed sewerage will be a viable sanitation technology (Mara ed. 1996). The best-known approaches to sewerage provision in low-income countries and neighbourhoods are the Brazilian and Orangi Pilot Project models (Watson 1995 and Hasan 2008). The former is an 'engineered' model, with a strong focus on the development of appropriate design methodologies and engineering details (Mara 2008) although it also claims to provide for community participation and choice (Watson 1995). The latter focuses strongly on social and organizational aspects of sewer provision. Its use of local materials and an essentially informal approach to contracting makes it significantly cheaper than the Brazilian model. The main problems with low-cost sewerage in South Asia relate to maintenance (Tayler 2008, Alam and Parkinson 2002) and the disposal of sewage, much of which is used untreated to irrigate crops. (Ensink et al 2004 and 2007 and van der Hoek 2002). One response to these problems has been the promotion of decentralized sewage treatment. (Parkinson and Tayler 2003, Sasse 1998). However, there are relatively few examples of institutionalized citywide implementation of decentralized approaches.

2.32 Maintenance problems are particularly significant where the topography is flat so that it is difficult to dispose of sewage without pumping. In such circumstances, particularly where the water table is high, some have argued for the use of solids-free sewers (Rizo Pombo 1996, Otis 1996). Such approaches give rise to a need for periodic emptying of interceptor chambers but this requirement may be outweighed by a reduction in the need for regular desilting and unblocking of sewers.

2.33 **The Strategic Sanitation and Household-Centred Sanitation Approaches.** As previously discussed, improving urban sanitation requires attention not just to toilets but also to the systems to which they connect. Conversely, engineering solutions that focus only on sewers but neglect the toilets that connect to them and the treatment and disposal systems to which they discharge cannot provide a complete response to sanitation needs. Recognising this, WSP developed its Strategic Sanitation Approach (SSA) in the mid 1990s (Wright 1997). This incorporated a number of concepts taken from mainstream World Bank thinking, including an emphasis on demand, the need for appropriate incentives, unbundling

of sanitation systems and responsibilities, taking account of the needs of cities as a whole, the desirability of an incremental small-steps approach and the importance of sound finances. Subsequent research into the practical implementation of the approach (Tayler, Parkinson and Colin 2003) suggested that the need was not for the SSA as a blueprint but rather for a broadly strategic approach that recognised existing realities, identified overall objectives and provided guidance on how to move from the first to the second. Recognition of existing realities meant recognising that demand may need to be informed, that developing capacity to respond to demand is important, that incentives are usually decided by higher levels of government and that existing systems may already be fragmented and 'unbundled' so that the need is for better coordination rather than unbundling. While it is important to take have a citywide vision, resource limitations and institutional weaknesses may create a need to work at a more local level in the first instance.

2.34 A little later, a workshop attended by a wide range of urban sanitation specialists developed the Household-Centred Sanitation concept (Eawag 2005). The most important aspect of the HCES is its emphasis on dealing with wastes as close as possible to the point at which they are generated. In this, it arguably links with the SSA's emphasis on unbundling of systems into smaller more local entities. HCES also has much in common with approaches that emphasise the need for decentralised wastewater management. Like the SSA, the HCES appears to work best as a general guide as to how to approach problems rather than as a rigid blueprint. For instance, there are likely to be many situations in which a household centred approach leads to acceptance of existing centralised systems, at least in the short term, because they already exist and represent sunk investment.

2.35 A problem with both the SSA and the HCES is that they work best when the conditions are right. Wright says that the SSA is only possible if adjustable and flexible institutional systems already exist, a statement that mirrors that of Chambers that CLTS requires continuous learning, adaptation and innovation, which in turn require major institutional, professional and personal shifts (Chambers 2009). In practice, flexibility and a propensity for continuous learning are often conspicuous for their absence in existing provider organisations and this is would appear to be a major barrier to the spread and improvement of sanitation services. The challenge is to move forward through this barrier rather than to assume that it is possible to move forward from its far side.

Knowledge Gaps Contributing to the Shortfall in Safe Sanitation

2.36 The complexities of improving sanitation are being better understood, but there are still several factors that have been identified as constraints to improving sanitation and where more understanding is required to fill knowledge gaps. Some of the factors relate to sanitation in general while other factors relate specifically to either rural or urban sanitation.

General Factors

2.37 General factors that contribute to the shortfall in safe sanitation in both rural and urban areas include (IWC and Water Aid Australia (2008):

Demand for sanitation is low or not fully expressed,

2.38 Few unserved households are fully aware of the invisible costs of inadequate sanitation, including poor health, lower productivity, inconvenience and environmental degradation. Since these households are usually the poor and marginalised, existing demand for sanitation is often ignored (Robinson 2007). Although women may express desire for sanitation facilities, they may have only limited influence on household decision-making. And even if demand for latrines is high, if affordable options do not exist households will be unwilling to invest. Sanitation marketing can be more effective through more systematic recognition of poor households as potential customers of their products. This would encourage developing a wide range of low-cost latrines to match affordability for

different households.

Sanitation and hygiene are intensely personal and difficult to discuss.

2.39 In many cultures, sanitation is not a comfortable topic of discussion. Social norms and cultural taboos governing relationships may hinder frank discussion and complicate efforts to bring sensitive issues to the fore. Sanitation and hygiene education programs, messages and materials are often adapted from outside sources, with little relevance to local modes of transferring knowledge (Crennan 2005).

Analysis not sufficiently gender sensitive

2.40 Even though the need for understanding the attitudes and needs of women, and through them their children, is widely recognized, gender mainstreaming has not always featured significantly in sanitation interventions. Although women may express desire for sanitation facilities, they may have only limited influence on household decision-making. Community based approaches such as CLTS usually do attempt to capture women's voice and understand women's agency but there is not usually specific attempt to use such gender dimensions of understanding systematically. Yet, women usually stand to gain most in terms of health and labour gains as well as dignity from improved sanitation. How to create effective expression to their demands, and to nurture those demands, is a significant knowledge gap in planning appropriate and effective sanitation interventions.

Interventions focus on building toilets, not changing behaviours.

2.41 Sanitation projects often focus on toilet construction or 'latrinisation' rather than sustained behaviour change (WaterAid 2006). Success is most often measured by the number of toilets built rather than the actual use of these facilities or of the adoption of hand washing and other hygiene practices. However compelling the 'societal' reasons may be for investing in sanitation – less disease, reduced public health costs, increased school attendance for girls, greater economic productivity etc – people's 'private' motivations for better sanitation at home may be different. As commentators have pointed out, an individual is likely to be prompted to improve his/her sanitation facilities by a mix of motives, including privacy, safety, convenience and increased social status (WSP and WaterAid 2000). Predicting when other motivations might become persuasive or compelling for an individual, household or community is a matter of considerable complexity and subtlety.

Political and institutional barriers remain high.

2.42 Sanitation has not been a priority in the policies and budgets of national governments. Lack of clear responsibility for sanitation activities created by 'institutional fragmentation' and the absence of national level sanitation policies are compounded by capacity gaps at the local government level (ODI 2006). The coupling of sanitation and hygiene with water supply, despite the very different issues surrounding each, has resulted in most investment going to water supply (WVA and WAAus 2007)).

Inadequate Range of Technologies.

2.43 Progress has been made on finding effective ways of collecting and confining faeces but there has been less development of cost-effective and durable technologies to deal with other aspects, for example, of sustainable excreta management such as storage, disposal and treatment of sludge and treatment and disposal of waste water. There is a great need for product innovation to meet consumer preferences and be technically sound. For example, people want latrines that are easy to clean and maintain, but are also modern and safe. Cement-products for latrines are difficult to transport, and often unavailable or expensive or of poor quality, particularly in rural areas. Although plastic-products for latrines may be more modern, easier to clean and can be more-easily personalised, they are not widely available. In addition, the whole supply chain needs to be in place for products to be available where there is demand and financing is available.

Household Financing

2.44 Although provision of safe sanitation is often considered to be the responsibility of individual households, there is a shortage of information and understanding of how households can finance investments in sanitation and the related issues such as availability of flexible financing and credit options, and availability of products that households prefer and can afford.

2.45 Bangladesh Rural Advancement Committee's (BRAC) Research & Evaluation Division conducted a study on willingness to pay for sanitation to provide some insight into sanitation related strategies taken by the BRAC WASH Programme (BRAC 2008). The study found economic hardship to be the main reason for not installing a latrine. The study suggests that credit facilities along with convenient location of the village sanitation centres are necessary to fulfil the sanitation-related targets set by the WASH programme - 100% latrine coverage in the target areas. However, the study emphasises that even if all these enabling conditions are met, there will be some households who would not be able to pay for their latrines and will need some sort of cash incentive or subsidy. How to include the poorest households is a challenge for most sanitation projects. An important avenue to explore in this context is sanitation service provision linked to or integrated within targeted poverty reduction programmes. Globally, social protection programmes targeted on the extreme poor are growing in significance; these programmes seek to address the risks and vulnerabilities faced by these extreme poor households. Weak health seeking behaviour including poor sanitation practices is central to those risks and vulnerabilities. Several such programmes do include household sanitation but there is considerable scope to extend this and to promote truly comprehensive hygiene education programmes (GTZ 2007).

Programme Financing

2.46 Inadequate public or private funds for investment are often seen as a limiting factor to improving sanitation. Adequate financing of the sector is not reflected in national budgets. Analysis suggest that approximately USD 26 billion is needed to achieve the national sanitation goals in Africa which means that the investment pace needs to more than doubled. Although studies have repeatedly shown return on investment is high for sanitation, since most investment happens at the household level (because of on-site sanitation) it is hard to convince individuals of the benefits. Another issue identified is the need to mobilize greater private sector involvement, and to ensure that policies and strategies allow for this involvement. In particular, small-scale private businesses could play a greater role in the sector if they were given more organizational and marketing assistance and had access to legal security and credit. Spending in this sector has historically been low so there is a question as to how quickly increased finance can be absorbed effectively. It cannot simply be assumed that more resources will translate rapidly into improved outcomes. All development interventions need to take into account constraints in '*absorptive capacity*' (ODI 2005). As well as funds being available, it is important that they '*be used in the right way*' (Tearfund 2005).

2.47 Related to financing is the question of subsidies. Varying levels of subsidy have been included in most sanitation projects whether in the form of subsidizing hardware (latrines, sewerage systems etc.) or software (community facilitators). Subsidies for sanitation can be justified on the basis that sanitation is both a merit and a public good and hence it is economically justified to spend public money to change individual behaviours (DFID 2007). The use of subsidies can also be justified on the grounds of equity in which case public funds can be used to enable poorer households to access the benefits of sanitation. However, these economic arguments break down if the mechanisms used to deliver the subsidy fail. Thus, while most sector professionals agree that subsidies in the sector make sense, many feel that conventional approaches which provide a direct subsidy for the latrine itself are not justified because they have limited reach (constrained by the absolute size of the budget available and the tendency to support higher-cost latrines), they don't

significantly increase use of latrines and they have usually failed to reach the poor. (Water Aid 2006).

2.48 Both water and sanitation have been losing out to other sectoral interests in the contest for scarce public funds. For example, in a 2003–2004 survey of Poverty Reduction Strategy Papers (PRSPs) and budget allocations in three countries in sub-Saharan Africa (ODI 2002; ODI 2004), other ‘social’ sectors, such as education and health, attracted much larger budgetary allocations than water; sanitation was especially under-funded. The low level of budgetary funding indicates the low political priority of sanitation. The low political priority may reflect suppressed demand at the local level which may be due a number of factors including people have not been educated fully about the links between sanitation and poor health, or the demands of men have more influence than the demands of women.

Accessing Poor Households

2.49 Reaching ODF status requires that all households including the poor, vulnerable and disabled have access to and can use safe sanitation, but often poor households are severely constrained in improving their household sanitation for various reasons including not being able to afford to invest in sanitation or insufficient space to construct a latrine. How to include the poorest households is a challenge for most sanitation projects.

Weak Institutions.

2.50 Within the sector, there is fragmentation within and between institutions; for example few countries have a ministry or department solely responsible for sanitation. Usually sanitation is split between water, health and education ministries who take responsibility for small pieces of the overall puzzle, but there is rarely a lead organization coordinating the different roles and taking responsibility for the overall performance of the sector. Even when one organization has a lead role, it may have limited influence on the activities of other organizations. The sector is characterized not only by a complex chain of actors but also a complex chain of operations from the disposal and collection of waste through to its treatment. Different players are involved in different operations of the chains, with little or no coordination between them. Other institutional factors affecting sanitation include:

- Investments are made on an ad hoc basis when funds become available, without reference to an overarching strategy or plan.
- Large capital investments are rarely matched with detailed arrangements—both practical and financial—for future operation and maintenance.
- Improvements are often designed and implemented without reference to local conditions or to the preferences of users.
- Government staff tend to have limited technical expertise and little awareness of the range of non-technical factors that affect the outcome of sanitation investments.

2.51 With appropriate support, institutions can improve their performance. For example, in Senegal, the sanitation sub-sector was seen to be improving slowly, but service delivery was constrained by the high cost of technologies, weak institutional capacity, and the lack of commitment to sanitation. During three years of support, WSP-AF provided support and technical advice to the main national actors, namely the Ministry in charge of sanitation; Sanitation Directorate; and, ONAS (the National Office of the Sanitation Utility). The purpose of the support was to: (i) implement a national action plan in the sanitation sector, (ii) scale up sanitation initiatives in rural areas, (iii) develop mechanism of sustainable financing system in Rural, (iv) enhance capacity to improve sector performance, and (v) build capacities. Achievements of the support include: successful sanitation marketing in Dakar resulting in sanitation access being up by 20% within 3 years and handwashing campaign reaching 1,000 schools; 1,000 women associations; 210 marketplaces and 200 health centres. In other situations, institutional change may be more difficult to achieve. In India, for instance, Public Health Engineering Departments (PHEDs) are often responsible

for urban water supply and sewerage but focus more on the former and address sewerage as if it was an end in itself rather than a component of an overall sanitation system. Change is difficult partly because the deeply entrenched incentive system favours a focus on new works rather than service delivery and partly because existing institutions provide no mechanism for an integrated approach to sanitation service delivery.

Inadequate Supply Chains for Sanitation Services

2.52 It takes a wide range of different disciplines and skills to improve sanitation and hygiene. While the water sector has tended to be 'dominated by engineers who feel comfortable with technical problems and tend to lean towards technical solutions' (Jenkins and Sugden 2006), household sanitation 'requires softer, people-based skills and takes engineers into areas where they feel uncomfortable and unfamiliar'. Promoting behaviour change at household level is an area 'where most countries have few skills... and limited capacity. Most public agencies are unfamiliar with or ill-suited for this role' (Evans 2005). Capacity is not just a problem at local government level but one which cripples the sector at every stage and will take time and resources to train the required human resources. For example, most countries do not have the capacity or skills to implement behaviour change programs or even to plan, design and construct sanitation systems.

2.53 The reality in many places in Africa is that the number of sanitation and hygiene providers is limited, whether agencies of local government, community associations, NGOs or private suppliers. In cities in some developing countries, empirical studies have highlighted the activities of small private suppliers (e.g. Collingnon and Vézina, undated; WSP 2005); these include, for example, bricklayers or masons for latrine construction and people to empty pits manually. There are still some doubts as to slum populations' willingness to pay for these services. But the role of small private providers in meeting the needs of poor populations is now widely recognised as significant, where they are able to offer the right product for the right price.

2.54 In many cultures, there are social norms and cultural taboos affecting sanitation management; in most of South Asia it is only low caste workers who handle menial tasks that are fundamental to the sustainability of latrines like emptying pits. It was observed in many rural communities of Baluchistan (Pakistan) that latrines constructed under the Integrated Area Development programme were not being used because the pits were full (BIAD 1991). People reverted to using bush-covered areas. The reason given by women was that men acted on their priorities and were too busy to go to town to hire low caste waste disposers. Indeed, there is the related issue (or 'invisible curse') of the of the people maintained in certain societies to collect and dispose of waste products including human excreta, and the exploitative conditions and social barriers that keep them excluded from society (WaterAid and IRC 2008).

Rural Sanitation

2.55 The Community Led Total Sanitation (CLTS) approach has reinvigorated the rural sanitation sector. CLTS may be an answer to scaling up coverage, but some have adapted the core principles of CLTS to develop new approaches while others have fundamental concerns with its sustainability. Markets to provide the services required to support safe sanitation are being actively developed as sanitation marketing.

Urban Sanitation

2.56 The largest number of people without access to sanitation is in rural areas. However, the population living in urban areas is growing fast and so is the proportion of people living in informal settlements in these cities and towns. In almost all urban areas there is a very real sanitation crisis and the poor are living in deplorable conditions. Although there are a number of promising approaches to improving rural sanitation and widespread recognition of

the necessity for a systems approach, there has been much less success in developing approaches to improve sanitation in low income urban settlements.

2.57 Challenges facing urban sanitation include (GoI/WSP 2008):

Insufficient infrastructure

2.58 Infrastructure coverage has so far failed to keep pace with the rate of urban growth. Construction of a toilet is generally regarded as the householder's responsibility but, for poor households, investments in sanitation are often constrained by issues relating to:

- Affordability, including the cost of connecting to sewer networks;
- Uncertainty over land tenure (fear of eviction);
- Space constraints; and
- The low priority given to sanitation (people may not appreciate its importance and politicians and officials may prioritise other more 'visible' sectors).
- Land type or lack of legal entitlement to land
- Physical constraints, including high water table and rocky subsoil conditions.
- Lack of capacity to respond to demand
- Inadequate understanding of sanitation options and inappropriate assumptions about which options might be desirable
- Weak town and regional planning.

2.59 The wide range of constraints suggests that lack of progress with sanitation provision is a systemic problem and as such needs to be dealt with in a holistic way. Demand for sanitation is necessary if sanitation facilities are to be used demand sometimes needs to be created and action is often needed to inform it. Even where informed demand is present, capacity to respond to that demand must be present if sanitation services are to improve. Taken together, these considerations point to a need for an increased focus on researching the supply side systems that ensure that sanitation can be promoted, users can be informed and services can be provided in response to their demand.

2.60 One systematic issue with promotion is who should be responsible for promotion and how should promotion be financed. Many, perhaps most, sanitation promotion initiatives have been linked to externally funded projects and as such may not be sustainable. There are a number of locally initiated sanitation promotion initiatives, for example the Midnapore sanitation programme in rural West Bengal in the 1990s and the work of the Orangi Pilot Project and the organisations influenced by it in Pakistan (Rao 2001, Orangi Pilot Project 1995, Satterthwaite et al 2005)). Most of these initiatives have originated with NGOs rather than government and the response of government departments has been mixed. In India, government has taken up the CLTS approach to promotion in several states but perhaps with some variations from the procedures advocated by the originators of the CLTS approach. NGOs have often experienced difficulties in working with government departments. These difficulties stem partly from the often very different philosophies and working practices of NGOs and government departments. (See for instance Hasan 1997). However, they can also relate to inappropriate assumptions, lack of knowledge of sanitation option and related capacity problems.

2.61 It is often assumed that these problems can be dealt with through training. In the early and mid-1990s, WEDC and other British institutions developed training courses with sanitation and public health dimensions. Two examples are the training in aspects of infrastructure upgrading provided to Indian engineers working on the old Slum Improvement Projects (SIPs) and the Management Development for Senior Public Health Officials (MDSUPHO), also intended for Indian professionals. The latter was eventually transferred to the Associated Staff College India (ASCI). While these programmes appeared to be comprehensive, relevant and well taught, they seem to have had limited impacts. It has

become increasingly clear that capacity-building has to go beyond training to take account of structures and systems and the ways in which these facilitate or constrain the individuals that operate within them.

2.62 Some key points relating to this point emerged from the research into strategic sanitation planning and sanitation policies conducted by GHK Research and Training and WEDC in the late 1990s and early 2000s (Tayler, Parkinson and Colin 2003, WEDC 2006). We will return to this shortly. For the moment, it is sufficient to note that the GHK research found that the basic institutional conditions for producing and implementing sanitation plans and programmes are frequently absent. WEDC's work on policy revealed a tendency for sanitation policies to have little effect on institutions other than those that had taken the lead in developing them. These issues are particularly relevant to urban situations, in which sanitation can never be viewed solely in terms of toilets. Even where technologies are theoretically appropriate, physical factors and institutional deficiencies often result in them being operated in a less than optimum way. It has been argued that condominal sewerage built to appropriate standards could solve the urban sanitation problems of developing countries (See for example Mara and Broome 2008). However, the reality is that a combination of poor construction, inappropriate user behaviour and, not least, poor operational practices may undermine these theoretical advantages. (Tayler 2008). All this suggests a need for research into the ways in which institutional factors affect what is and is not possible in relation to sanitation planning, implementation and management. The focus should not be on institutions alone but on their interaction with physical, financial and political factors.

2.64 Another point to be considered is the role of planning in improving sanitation. The public health movements in 19th Century European and North American countries, the forerunner of later town planning approaches, focused strongly on sanitation improvement. By the end of that century, the concern with public health was being supplemented by a concern with improved planning. The 'father' of British planning, Ebenezer Howard, was a visionary whose focus was on the creation of new towns, which would do away with the squalor and deprivation of existing slums. (Fishman 1977). Patrick Geddes, another key figure in the development of town planning, introduced the concept of regional planning although some of his work in India foreshadowed later urban upgrading approaches (Meller 1994). Planning, as it developed in Europe and North America, was predicated on the existence of strong development control systems. Attempts to implement this approach to planning in developing countries have had limited success. Where local government is weak and the majority of development is 'informal', planning systems based on strong development control systems almost by definition are unlikely to be effective. Planning systems are often particularly weak in the small towns in which much urban growth is taking place. Where planning responsibilities are devolved down to the local level, planning departments are often short staffed and have limited influence. Where planning responsibilities remain with a specialised planning department located at the centre, plans and strategies are more likely than not to be ignored.

Limitations to Access and Use of Services

2.65 Even when there are sanitation facilities and services, arrangements for sanitation can be deficient in a number of ways:

- The range of services to cover the urban sanitation chain may not be complete. For example, there may be toilets while facilities for the safe emptying of septic tanks, and the treatment of septage, may be lacking.
- Sanitation facilities may be available but not used because they are inconvenient, unpleasant or unhygienic due to inappropriate design or construction, or inadequate management arrangements. For example, poor management is often a problem with community toilet blocks.

- Sanitation facilities may be available, but some people may have limited access to them. For example, people may not be able to afford to connect to an existing public sewer or sanitation facilities may be in place but are not operated or maintained properly. Poor operation and maintenance of a facility shortens its useful life and could, at worst, result in rapid total failure.
- There may be no provision for the treatment of wastewater or excreta. Local drains and sewers may simply relocate waste to another part of town where it causes local pollution. Households are primarily concerned about the cleanliness of their immediate surroundings and are usually much less worried about the impact of their activities on the wider environment.
- Full latrines: Many cities have high coverage with on-site sanitation but lack of access to emptying and/or space for replacement....

Appropriate technology and financing

2.66 Conventional sewerage may not be cost-effective in low-income urban areas but, as has already been pointed out, low-cost forms of sewerage have been developed for use in such areas. While theoretically attractive, such technologies do not always work well because of poor operation and maintenance and blockage problems caused by uncollected solid waste. Similarly, conventional pit latrines, developed for use in rural areas, may be problematic in urban areas since there may be no adequate provision for the periodic sludge removal that will normally be required. Some suggest that decentralised excreta management systems may be the most feasible solution but the technologies and management for such systems are not fully developed. In some situations, such as for slums with high groundwater or liable to flooding, appropriate technological solutions are yet to be found and more innovation is needed. In almost all cases, there is a need for further research on the ways in which designs and management arrangements interact with local physical conditions to determine whether or not a sanitation technology will work satisfactorily. Even where effective technologies are available, they are not always affordable. Taken together, these points suggest that there is a need for further research on how sanitation systems, encompassing both facilities and the ways in which they are financed and managed, work in difficult urban environments.

Community mobilization

2.67 Understanding relatively complex and diverse urban communities is a prerequisite to sustainable and equitable programme development and implementation. That is a difficult task in fast changing informal settlements where in and out migration can be high, people may rent rather than own property and community coherence is often limited.

Lessons Learnt

Some of the main lessons learnt from activities to improve sanitation for poor households are:

Focus on behaviour change

2.68 Over time, with the growing recognition of the households' willingness and ability to invest in sanitation, there has been a shift from top-down supply-driven projects to an emphasis on bottom-up, demand-led approaches (de Bruijne et al. 2007). This shift has seen a far greater emphasis being placed on 'software' elements of sanitation initiatives (e.g. hygiene education, demand creation, policy and regulation) rather than on 'hardware' or technical components. The challenge for most sanitation programs has thus become how to support household investments and behaviour change, rather than how to build and finance more toilet construction (WSSCC and WHO 2005). The shift in focus has also meant there is a much greater emphasis on the role played by strong policy and the need to establish an enabling environment. Rather than tacking on a poorly conceived hygiene campaign to what is essentially a latrine construction project, those designing sanitation initiatives are now encouraged to plan and install hardware within the framework of an overall 'hygiene

improvement' program (WSSCC and WHO 2005). Experience with hygiene interventions suggests the need to design a small number of clear and relevant messages targeted at specific groups within a community. This requires a thorough understanding of current behaviours and practice. A key part of behaviour change depends on reaching women in the community. Gender mainstreaming is fundamental to promoting behaviour change in relation to sanitation hygiene. But it is difficult to ensure that the voices of both women and men are equally heard in understanding the drivers of behaviour change in relation to improved sanitation and hygiene.

Stimulate demand, secure supply.

2.69 Steps also need to be taken to increase the expression of informed demand and to improve access to sanitation hardware. While there is some debate about the best approach, stimulating demand in any given context will include a mix of marketing, promotion and educational strategies (de Bruijne et al. 2007). As with hygiene promotion, this requires an in-depth understanding of what people do and why they do it, and, more importantly, what they want. Indeed, in terms of user motivation for building a household latrine, there is a strong indication that health concerns are secondary to other concerns such as convenience, comfort, safety (particularly for women) and status. Sensitivity to these broad ranging concerns affecting male and female demand for sanitation services will make it more likely that those services are used in a healthy and sustainable manner. WSSCC and WHO (2005) highlight four key drivers of household demand that need to be addressed:

- **Awareness** of affordable options and their benefits;
- **Priority** for investing in a latrine over other potential investments;
- **Access** to a service provider; and
- **Influence** and ability to take decisions.

The goal is to turn toilets into attractive consumer items on the demand side, whilst on the supply side ensuring that cheap and appropriate options are available for every budget.

Sanitation Research Programmes

2.70 There are numerous research projects working on increasing understanding and providing knowledge to improve sanitation. Some projects are listed in Table 3 and the larger projects are discussed in more detail below.

Going to Scale? The Potential of Community-Led Total Sanitation.

2.71 The aims of the research by IDS are to understand on-the-ground realities of CLTS and issues of spread, scale and quality; participatory action research to engage with practice and improve processes and outcomes; and networking and sharing between organisations and countries to influence policy and practice. The role of IDS is to convene, initiate research and participatory action research with the major roles increasingly and predominantly undertaken by partners in Bangladesh, India and Cambodia, including a network around the theme. The outcomes include insights into grass-roots realities, the evolution of approaches and methods for going to scale, and influence on policy and practice (Kar and Chambers 2008; Deak 2008 etc) and establishing a CLTS website that is aimed to be the global hub for CLTS, connecting the network of practitioners, communities, NGOs, agencies, researchers, governments, donors and others involved or interested in CLTS. The site contains practical information about the approach, information on CLTS in different countries, research papers, relevant news and events and many other useful materials. It intends to serve as an up-to-date virtual resource centre and is a space for sharing and learning on CLTS across organisations, countries and sectors. (www.communityledtotalsanitation.org). The Budget for the research project is about £0.35 million.

RiPPLE

2.72 RiPPLE is a five-year research programme consortium funded by DFID. It aims to advance evidence-based learning on water supply (WSS) focusing specifically on issues of planning, financing, delivery and sustainability and the links between sector improvements and pro-poor economic growth (www.rippleethiopia.org). RiPPLE focuses on the cycle of money into water (how can water and sanitation services be planned, financed and delivered) and water into money (how can improved water and sanitation services contribute to poverty reduction and pro-poor growth)? The three core research themes-governance and planning, financing and growth- are cross cut by work on mapping, communications and capacity building. RiPPLE works in three regions of Ethiopia and intends to develop a new body of high quality policy- and practice-relevant knowledge through the establishment of learning practice alliances (LPAs) at different levels. The LPAs guide research direction according to local priorities, test and evaluate new approaches and share experiences within and between districts and regions. In parallel, RiPPLE is building outward linkages to networks and partnerships within the Nile Region. RiPPLE started in 2005 and is scheduled for mid-term review in early 2009. The budget for RiPPLE is about £3.5 million.

The EcoSanRes Programme

2.73 The Sida-financed EcoSanRes Programme was initiated in 2001 through the Stockholm Environment Institute as a continuation of the pioneer SanRes Programme (1993-2001). The first phase (2001-2006) focused on communications and networking, capacity building, research and development, and implementation through pilot projects in Asia, Africa and Latin America. The second phase of EcoSanRes (2006-2010) builds on the accomplishments of the first phase and, in an effort to address the general lack of expertise in the area of sustainable sanitation, has shifted its emphasis towards capacity development. Other foci of the EcoSanRes Programme are knowledge development, communications, networking and international coordination with other major actors to promote policy development. EcoSanRes is designed to support the MDGs and builds on research along with practical experiences from pilot projects in rural, peri-urban and urban areas. The most notable pilot project is the multi-story new town development in Dongsheng, Inner Mongolia, China. This private/public partnership (PPP) project is built on the EcoSan principles where urine, faeces, greywater and household organics are collected separately and treated and reused locally for which EcoSanRes expertise provides R&D. (www.ecosanres.org). The budget for EcoSanRes is not available.

The Total Sanitation and Sanitation Marketing project (TSSM)

2.74 TSSM is an innovative initiative with the goal to generate sanitation demand at scale and increase the supply of sanitation products and services. The project, funded by the Bill and Melinda Gates Foundation in partnership with WSP, is being implemented in Tanzania, India and Indonesia. TSSM's objectives are to increase access to hygienic sanitation and improved health for poor households and communities in rural villages, small towns and informal urban settlements. Additionally, the TSSM program will carry out a structured learning process to develop practical knowledge and tools for effective replication and scaling up of future programs in other countries to meet the Millennium Development Goals sanitation targets for 2015. (http://www.wsp.org/index.cfm?page=page_disp&pid=10402) the budget for TSSM is about \$4 million.

SPLASH-Net

2.75 SPLASH-Net is the name of the European Union Water Initiative European Research Area Network (EUWI Era-Net). SPLASH is programmed for a period of 48 months from January 2006, to implement a framework through which European partners can work together more effectively (<http://www.splash-era.net>). SPLASH is a consortium of 15 ministries, funding agencies and national research and technological development authorities from 11 European countries, aiming to improve water research for poverty reduction and to contribute to achieving the MDGs. SPLASH is funded by the EC and is

coordinated by DFID. Its geographic focus is the Mekong region of Asia and Africa (including the Mediterranean countries). SPLASH is undertaking a collaborative work programme involving both SPLASH European partner organisations and stakeholders and will:

- Coordinate existing programmes to minimise duplication and identify gaps by initially compiling information on European partner water research funding;
- Design collaborative research programmes which address identified needs by working with developing country partners in identifying their priorities for water-related research;
- Speed up knowledge transfer between researchers and practitioners by establishing tools (web portals, reports, workshops, and review meetings) to enable more efficient sharing of information between researchers, policy makers and practitioners;
- Map good research management to maximise use of resources; and
- Support transfer of research into practice.

2.76 SPLASH prepared a synthesis report reviewing national water and sanitation research programmes in developing countries (SPLASH 2008). In the Review, sanitation is included with water supply as part of 'water for people' theme rather than as a separate theme. Health and hygiene promotion is also included as a separate sub-theme under 'Water for People'. Nine (9) countries participating in SPLASH fund 26 water supply and sanitation research projects, out of which 16 projects have health and hygiene components.

2.77 One of the collaborative research programmes being developed by SPLASH is on Sanitation Service Chains (SPLASH-Net 2008). The proposed research programme will focus on: "technical, governance, institutional, financial and sustaining behaviour change aspects of sanitation service chains and their implementation at scale in low income urban areas and rural communities". The specific objectives of the proposed programme are:

- The generation of new knowledge on sustainable sanitation service chains and the support of their large-scale implementation in rural and peri-urban settings.
- Enhancing capacities of Southern research funds to manage a South-North research program effectively and efficiently and of southern research institutions to conduct innovative demand-led research that contributes to poverty reduction.

2.78 Several SPLASH partners including DFID have expressed an interest in funding the proposed programme and are working out the modalities of joint funding. The estimated budget for the programme is Euro 2 million and partners will be restricted to a maximum funding of Euro 0.5 million.

ESPA Programme

2.79 The DFID ESPA Programme, implemented in partnership with NERC and ESRC explores the potential for a multi-disciplinary research programme that will address how to achieve sustainably managed ecosystems contributing to poverty reduction and wellbeing improvements in developing countries.

2.80 The new Programme is intended to have an initial duration of five years and will be managed by a Programme Management Group, consisting of representatives from NERC, ESRC and DFID, with advice from a Programme Advisory Committee of academic experts. The budget for the programme is expected to be about £?? million.

2.81 It is proposed that the ESPA Programme will address major ecosystem services challenges across five themes – water resources, forests and land use change, coastal and marine, biodiversity and infectious disease and environmental change that constrain poverty reduction measures in four regions – arid and semi-arid lands of Africa, the Amazon-Andes, South Asia and China. Examples of regional challenges include: adapting to monsoon

variability in South Asia; equitable delivery of ecosystems services in China; reducing environmental vulnerability in semi-arid areas of Africa; and, securing bio-stability in the Amazon and Andes. Key drivers of these regional challenges are population and economic growth associated with large-scale land-use changes and climate change.

2.82 The Millennium Ecosystem Assessment identified the urgent need to build bridges in the research community across the traditionally fragmented natural social and economic sciences and ESPA will endeavour to address this need. ESPA will actively promote inter- and multi-disciplinary research that provides vital knowledge about how ecosystems function and deliver services. This research will be designed to support improved policy and plan making and sustainable management of ecosystems services to support poverty reduction. The poor understanding of ecosystems and their under-valuation by society and decision-makers means that valuation and other economic tools to support improved ecosystem service management will be a key aspect of ESPA.

2.83 The impacts of sanitation on the quality of surface waters and groundwater and the disposal of excreta and other wastes may have major influence on ecosystems particularly close to major towns and cities.

Table 3: List of Sanitation Research Projects

Research Topic	Organisation	Location	End date
Governance in services and infrastructure	Practical Action	Bangladesh, Nepal, Orissa (India)	Jan 2009
Large cities, sanitation reform	Practical Action	Dhaka, Kathmandu, Nairobi	Jan 2009
Impact of SEWA	ICDDR,B	Bangladesh	December 2009
Study of safe distance between pit latrine and water point	VERC, WaterAid, ICDDR,B	Bangladesh	December 2009
Sustainability and equity aspects of total sanitation programmes	WaterAid	Bangladesh, Nepal, Nigeria	March 2009
Role of local government in promoting total sanitation	DAM (Plan, WaterAid Bangladesh, WSP)	Bangladesh	November 2009
Sanitation financing	WSP	Ecuador, Senegal, India, Bangladesh, Vietnam	February 2009
Political economy of sanitation	WSP	Brazil, India, Senegal, Indonesia	January 2009
Impact evaluation of CLTS and sanitation marketing and enabling environment at large scale	WSP	India, Indonesia, Tanzania	December 2010
Sustainability of ODF Communities (after 5 years)	WSP	Bangladesh	December 2009
Sustainability of sanitation marketing	WSP	Vietnam	December 2009
Socio-economic impacts of EcoSan	WSP	No information	No information
Sanitation for Challenging Physical Environments	WSP	No information	No information
Scaling-up hand-washing with soap	WSP	Peru, Tanzania, Senegal, Vietnam	No information
Assessment of Community-led Total Behaviour change model	WSP	Ethiopia	No information
Economics of inadequate sanitation	WSP	Cambodia, Indonesia, Philippines, Vietnam,	No information
Comparison and adaptation of social change dynamics for the collection and total abandonment of open defecation	WaterAid	Nigeria, Mali, Ghana, Burkina Faso, Senegal	March 2009
Going to Scale: The potential of CLTS	IDS	Bangladesh, India, Indonesia plus global	March 2009
Sharing Lessons, Improving Practice: Maximising the potential of Community-Led Total Sanitation (Action learning and networking)	IDS	Global	January to December 2009
Sanitation Programming and Planning Frameworks	IWA	Global	No information
Hand washing behaviour change	UNICEF & Unilever	No information	No information
Land tenure in urban areas and its impact on sanitation	WEDC, UK	West Africa	No information
Pit emptying in Urban Areas	WEDC, UK	West Africa	No information
Emergency-Related Sanitation	WEDC, UK		No information
Case studies of CLTS approach	ODI/RIPPLE	Ethiopia	June 2011
Extending the life of pit latrines	Gates Foundation		No information
Going to Scale? The Potential of Community-Led Total Sanitation.	IDS (DFID funded)	Global	June 2009
Investigation into Environmental Sanitation Strategies in peri-urban areas	UNICEF	Zambia	No information
Action research into non-subsidy approaches to rural sanitation	UNICEF	Zambia	No information
Bio-additives and pit design to increase the life of pit latrines.	Oxfam (funded by the B&M Gates Foundation)	No information	No information
Plastic slabs for Relief situations	Oxfam	Pakistan	No information

Source IDS (2009) and other sources

3. FINDINGS FROM THE CONSULTATIONS

Consultation Process

3.1 Consultations were held with key stakeholders to seek their views on the importance of sanitation sector research and appropriate research topics for possible DFID funding. Consultations were undertaken to ensure that the findings of the Scoping Study are based on analysis of a wide range of opinions. The consultation process included preparation and distribution of a Discussion Note describing the Scoping Study and a questionnaire, plus interviews and e-mail exchanges with key staff from stakeholders representing different sectors and interests.

3.2 The consultation process comprised of:

- Consultation on why DFID should fund sanitation research and DFID's comparative advantage in the sanitation sector
- Identification of research activities of other stakeholders including other donor organisations, and international and national research organisations
- Identification of the drivers of change and constraints that will influence sanitation in future
- Identification of priority research topics that address research issues arising from the drivers of change or constraints.

3.3 The list of people consulted is given in Appendix B and the questionnaire is given in Appendix C. The resources and time available to the Scoping Team limited the extent of consultation possible with potential end-users and overseas researchers. The findings of the consultation are presented and discussed in this Chapter, except for the findings of the research activities of stakeholders that are included in Chapter 2.

Points Emerging from the Consultation

3.4 During consultations, stakeholders were asked for their views on factors that are important in the prioritization of possible sanitation research themes. The consultation asked questions on why, what and how should DFID fund future research; as well as asking for views on the drivers of change and constraints, that will change sanitation use/availability for the poor. The questionnaire also allowed room for other opinions relevant for the study to be expressed. A summary of the key points emerging is presented below.

3.5 The drivers of change approach provide a conceptual framework for bringing together various factors that will change sanitation in 10-20 years. The conceptual model for drivers of change recognises that change can be either negative or positive. Analysis of drivers of change and their likely impacts, together with constraints that inhibit change, provides a good starting point for the identification of key researchable issues. Research is clearly concerned with testing ideas and examining ways that those ideas influence and/or are influenced by economic, social and physical changes. Research also has a role in working out the practical application of influential ideas and concepts. The influence of drivers of change on future development of water and sanitation may be modified by constraints that limit the potential effectiveness of the drivers.

3.5 A key question to be answered when considering drivers of change is where change is likely to originate. Much conventional development thinking in recent years has assumed that demand is the key driver of change. Without demand, there is little prospect that people will use improved sanitation facilities, even if they are provided. This is undoubtedly true, but it is arguable that the real drivers of change are the factors that create a demand for improved sanitation. There is some evidence that these factors include physical changes, in

particular urbanisation. Specific supply-side efforts to promote and market sanitation also play an important part. Even where physical growth and densification is creating a demand for sanitation, supply-side systems will be required to guide people's choices and to ensure that any off-site services and facilities required to support household sanitation provision are in place. This suggests that the need is to identify the constraints on existing supply side systems and the factors that might drive change in those systems. In many cases, basic constraints must be removed before drivers can be effective. Constraints include lack of knowledge and skills and inappropriate assumptions about what constitutes good sanitation. It will often be necessary to go beyond these to identify the basic structural and systematic constraints that prevent the development of necessary knowledge, skills and attitudes. The issue for a research programme would be how to identify a researchable topic, recognising that existing structural and systematic constraints will often be so central to existing systems that they will be difficult to remove.

Why should DFID fund Sanitation Research?

3.6 The responses indicated a strong opinion that DFID should fund research on sanitation for various reasons including:

- Sanitation has been a neglected and underfunded subject, and there are still many knowledge gaps
- Sanitation is the most off-track MDG and it is important to research what might be done to address this fact.
- Research in the sector can have big impacts because there is so much room for improvement in the sector. Pound for pound, sanitation research offers the best use of resources.
- Sanitation is important for health.
- Sanitation is important not just for its own specific sanitation target but because sanitation availability and use impact upon other sanitation targets, including MDG 1 (income and employment), MDG 2 (primary schooling), MDG 3 (gender disparity in education), MDG 4 (under 5 mortality), MDG 5 (maternal mortality) and MDG 6 (major diseases).
- The United Kingdom has a long history of involvement in sanitation (including its links to local government).
- DFID follows a practical approach that is orientated to applied rather than purely theoretical research
- There is a need for further research into alternatives to the 'wet' systems based on western models that are still the norm in large cities in developing countries
- By prioritizing sanitation research, DFID increases the credibility of the sector. It can give a lead to the rest of the donor community and thus leverage more much needed support for the sector.
- Sanitation is achieving a higher profile but there is now a need to support policy and strategy development.

Where does DFID bring its comparative advantage to sanitation research?

3.7 Several respondents emphasised that DFID was one of the first donors to fund sanitation research and was willing to engage with cutting-edge research issues such as social marketing, demand assessment and evidence-base for behavioural change.

3.8 Some respondents identified the importance of DFID continuing to focus on the sanitation MDGs to maintain a high profile for sanitation. Many respondents, including representatives of international agencies, referred to DFID's internal capacity and ability to field strong sector professionals through its linkages with UK-based practitioners, academics and NGOs.

3.9 This emphasis on DFID's strengths was balanced by some respondents who noted that its capacity to manage and use research has reduced in recent years, and some respondents suggested that DFID now lacks the institutional capacity to engage in innovative international programmes in a meaningful way. One correspondent noted that because of the shortage of sanitation specialists within DFID, its management of water and sanitation sector projects is often 'content free'.

Drivers of Change and Constraints

3.10 As part of the consultations, respondents were asked to identify the main drivers of change that will change sanitation use/availability/policy for poor households in 10-20 years and also the constraints that may undermine the drivers. Most of those interviewed identified urbanisation as a driver of change. Other drivers identified as important by many respondents included improved understanding of the benefits of sanitation and hygiene participatory approaches, cultural pressure to improve sanitation and increasing opportunities to access affordable sanitation. Several respondents observed that 'killer diseases' could be a major driver but some noted that their occurrence was quite rare and the effects tended to be short-lived. Other factors identified by some respondents included improved governance, increased population, and budgetary support for the sanitation sector. Public private partnerships and an increased focus on the private sector were each only cited by one respondent while globalisation and decentralisation were not cited by any. Perhaps the reason for the last is that responsibility for toilet provision is already decentralised to the household level. When considering these drivers and how they might influenced the focus of research, it is necessary to distinguish between those, for instance urbanisation, that are driving change at the moment, from those such as improved understanding and participatory approaches that might drive change in the way in which secondary stakeholders approach sanitation and those such as cultural pressure that might affect user take-up of sanitation.

3.11 With respect to constraints, more than three out of every four respondents identified political indifference as a constraint. Around half believed that inappropriate and unaffordable technologies constrain action while almost as many identified lack of service providers as a constraint. This could be tied to the view, shared by over one third in each case, that shortage of human and technical capacity and resistance to change are key constraints.

Research Themes

3.12 In the questionnaire, no guidance was given on the topics of possible research themes, and respondents identified a wide range of possible research questions. The topics are grouped together under broad themes, based on the drivers of change and constraints, analysis topics suggested by respondents and issues identified in the literature review, and presented along with possible research questions.

Financing of Sanitation. Large amounts of finance are needed to meet the MDG sanitation target but finding sufficient finance is constrained by many unresolved issues and accessing the resources required remains a major challenge. Householder's limited willingness to pay for sanitation as presently offered is mirrored by government's limited willingness to charge or provide sufficient budgetary support. The commercial risks inherent in sanitation discourage private sector participation. Research questions include:

- *How to address equity?* How to reconcile the competing imperatives of e.g. creating markets and supply chains in sanitation services and ensuring that the poorest households can access and use sanitation?
- *What is the role of subsidies?* When is it effective to use subsidies and when are subsidies counterproductive to achieve improved sanitation?

Water and Governance. Sanitation is as much about governance and sector reform as it is about increasing financial resources. Institutional reform is needed to separate policy making from service delivery and regulation. Research questions include:

- *What are the institutional options for mainstreaming sanitation?* What arrangements work, where do they work and why do they work? How expensive are they? How can success stories be documented in a way that is useful elsewhere?
- *What is required to build capacity to scale up sanitation?* Particular areas to be explored here might include the effect of decentralisation on capacity to respond to sanitation needs and strategies for capacity building in decentralised systems
- *How can national sanitation strategies become more effective?* What components should be included in national sanitation strategies and implementation plans? What are appropriate baselines, standards and information management for national sanitation implementation plans? How should national co-ordination committees, (including civil society) be formulated?

Political Economy of Sanitation. There is an increasing understanding that the ways in which sanitation affects livelihoods of the poor including the health of poor households and broader economic growth are products of the embedded political economy, but there is a lack of detailed analysis and conceptual framework in which to determine the political economy in which sanitation is constrained.

- *Strategies for increasing awareness of the importance of sanitation* – with particular reference to strengthening political support for sanitation programmes
- *The factors that led to sanitation change in Europe and North America.* What were they and what are the lessons for developing countries?
- *What constitutes a good national sanitation policy and plan and what does a good enabling environment look like?*

Sanitation In Challenging Environments. Poor households often live in challenging environments where conventional solutions to sanitation are not feasible or sanitation is liable to sudden interruption or collapse. Research questions include:

- *Replacement of sanitation facilities.* Will replacing sanitation facilities destroyed during disasters with 100% subsidy undermine the benefits gained from sanitation developed by participatory methods?
- *Sanitation in Marginal Lands.* How can sanitation facilities be developed in marginal land (e.g rocky land, low-lying swamps etc) where in the poorest often tend to live and it is difficult to install pit latrines.

Urban sanitation. Urban areas are rapidly increasing and there continues to be major challenges on how to manage sanitation in existing and new urban areas, particularly those in which a majority of residents are tenants or have insecure tenure. High population densities, small living areas, informal tenancy and other factors add complications which need to be better understood. Research questions include:

- *Can community latrines provide adequate sanitation?* What are the criteria for choosing community latrines rather than household or shared latrines
- *How to manage excreta in urban areas?* There are major challenges with sludge collection and disposal of excreta.
- *How is sanitation linked to more general city management issues?* Recognising that sanitation governance issues cannot be addressed in isolation.
- *How to provide sanitation services in peri-urban areas where most households are renting and law and order enforcement may be weak?* Households in peri-urban areas live in insecure conditions that discourage their investing in sanitation where the immediate costs may be high but the benefits are long-term and dependant on many factors outside their control.

- *How can the different elements of urban sanitation systems be brought together to form one sustainable integrated system?*

Sewerage for the poor. Sewerage systems often benefit mainly middle- and higher-income households as they can afford to pay services and have the political weight to be able to access them. Can sewerage be an affordable option serving for poor households in congested urban areas? Research questions include:

- *How to treat or otherwise deal with wastewater?* As sewage water is often used by others for economic gain such as irrigating crops, how can the economic benefits be maintained while at the same time ensuring no health problems arise from using the sewage water? WHO has provided guidelines on quality requirements for wastewater that is used for irrigation and Ensink and IWMI have carried out useful research on wastewater irrigation systems but there is a need for further research on the practical implications of their findings.
- *Sewerage for the poor.* How to make municipal infrastructure work for poor households with few resources to pay for services and negligible political leverage and in situations characterised by inadequate maintenance systems and poor solid waste collection?
- *How to decide when to switch from on-site to off-site sewered sanitation?*
- *How can urban sanitation services be made sustainable?* What are appropriate strategies for improving urban and peri-urban sanitation provision, with particular reference to ongoing operation and maintenance of sewerage, wastewater treatment and sludge collection and disposal services.
- *What options are available to overcome the common problems of households failing to connect to sewers and/or failing to use safe pit emptying methods?*

Community-Led Total Sanitation (CLTS). CLTS has changed approaches to improving sanitation, but questions remain about what enabling environment is required for CLTS to be adopted more widely, and how get top-down government systems to implement CLTS in anything approaching truly participatory ways that are fundamental to the approach. There are also concerns about equity of the approach and ensuring the inclusion of poor households and the sustainability after the initial triggering of changes. Research questions include:

- *What are the delivery costs of CLTS?* How cost-effective is CLTS when compared to other methods of delivering safe sanitation?
- *Does CLTS result in sustainable safe sanitation?* In particular, is the behaviour change resulting from the CLTS approach sustained over time? What do households do when pits are full?
- *Does CLTS succeed in being truly socially inclusive?* Does CLTS meet the specific needs of women, girls and young children as well as the elderly and physically disadvantaged?
- *What are issues relating to mainstreaming CLTS?* Is the Bangladesh approach appropriate in all situations and institutional arrangements for mainstreaming?
- *How can CLTS, with its essentially participatory approach and reliance on flexibility and continuous learning, be mainstreamed in non-conducive contexts, in particular where government structures and systems are top-down and rigid?*
- *What alternative delivery mechanisms exist or are required for sanitation programming where conditions are not favourable to CLTS?*

Mainstreaming gender and social inclusion. The importance of understanding and responding to user demands requires gender specific analysis. Responding to demand also required a focus on the needs of particular groups within communities especially when market research or community led approaches may struggle to include them. Such groups include the aged, the disabled, the extreme poor and other groups that may suffer from discrimination and social exclusion. Research questions include:

- *What are the key differences in male and female needs and demands for improved sanitation at the household level?* This analysis needs to differentiate the implications of improved sanitation for the work and well being of women and men, and for gender specific age groups where there are different attitudes and behaviour. (for example, ensuring that the needs of adolescent girls are adequately addressed).
- *How does extreme poverty constrain health-seeking behaviour including improved sanitation?* What are alternative approaches to ensure safe sanitation for extremely poor households where community-based approaches do not work.

Sanitation and Economic Growth Even though there is some analysis of the linkages between sanitation and economic growth, the impact of inadequate sanitation on economic growth has not been extensively researched. There is literature on the importance of sanitation of the livelihoods of rural people, but the local-level understanding is not incorporated into the broader analysis of how safe sanitation contributes to the process of economic growth and the requirement for safe sanitation to ensure that growth processes are inclusive of the poor. Research questions include:

- *What impact does unsafe sanitation have on incomes of the poorest households?*
- *What are the links in the chain: improved sanitation – better health – better livelihoods – economic growth?*
- *If sanitation has so many benefits why do so many people not have safe sanitation?*

Components of Sanitation. The reluctance of household to improve and maintain sanitation facilities may in part be due to the fact that adequate components are either not available or too expensive. Making a greater range of components available at affordable prices would give households more choice when investing in sanitation facilities. Research questions include:

- *What is the scope for use of new materials to make traditional components?* Developing components that are lighter weight and much easier and cheaper to handle. For instance, plastic latrine slabs
- *What are Options for keeping latrine slabs clean?* Particularly the role of companies that produce cleaning products, in the same way that soap companies have become involved in hand-washing promotion
- *Can the need for pit-emptying be reduced?* Is there scope to reduce the volume of sludge in pits by inserting enzymes?

Sanitation marketing and promotion. Increasing markets in sanitation goods and services is considered to be essential to improving sanitation, but ways of doing this remain elusive. Research questions include:

- *How to develop affordable products and services*
- *What makes the activities of the small-scale provider worthwhile?* What are viable business models for sanitation service providers? For instance, when is it worthwhile for a mason to become engaged in latrine building and what are the factors that might cause him or her to become disengaged?
- *What are the non-health benefits of sanitation and their possible use in advocacy?*

Health Impacts of Sanitation. There is debate in the sanitation sector about the strength and rigour of the evidence of the health impact of safe sanitation. As there have been only a few RCTs used in research on sanitation impacts, evidence-based global health may require use of evidence from RCTs and other scientifically valid studies to evaluate global health interventions and to measure progress in improving global health.

- *Would better evidence on the health impacts of sanitation increase the uptake of safe sanitation?*
- *What are the health impacts of sanitation?* Additional research could help to develop improved understanding of the relationships between improved sanitation and health

- *Relationships between coverage and health.* What is the impact of 100% coverage and what percentage coverage is required for a significant health impact?

Hygiene Promotion. Hygiene education is considered to be an essential part of delivering safe sanitation for better health. Tools to deliver hygiene messages have been developed particularly for rural areas, but less is known about the impact of hygiene on health and what is required for long-term behaviour change to ensure the benefits of safe sanitation are sustainable. Research questions include:

- *What is the relationship between coverage of improved hygiene practices and health?* What is the impact of 100% coverage and what percentage coverage is required for a significant health impact?
- *How to transfer the promotion of successful methodologies and organisational arrangements from rural to urban environments?*

School Sanitation. Providing safe sanitation facilities in schools is considered essential to improving school attendance particularly of girls, and schools are also seen as an opportunity to deliver health and hygiene messages related to sanitation. Research questions include:

- *What is the role of school sanitation programmes in creating and developing demand for safe sanitation?* To what extent do lessons learnt in school 'go home' with children?
- *What are the relative roles of school and home latrines in protecting health?* How does better school sanitation affect the health of the wider community?

4. SCOPE OF A POSSIBLE PROGRAMME AND PROGRAMME MODALITIES

4.1 As the DFID Research Policy recognises, for the research to be of high quality and have impact, there must be “strong research systems and processes, solid and diverse partnerships and strong delivery mechanisms (DFID 2008)”. During the consultation, programme modalities were a key area of discussion with many of those consulted. Based on the findings of the consultations, this section brings together a range of options for managing the sanitation research programme, building southern capacity in the production and use of research and getting research into use.

Guiding Principles used to Develop the Research Programme

4.2 Based on the DFID’s current approach to research activities, the following considerations are likely to feature in the sanitation research programme:

- **Relevant** to policy and practice to make sure research outputs have an impact on short-term (within the next five years), medium (5-10 years) and longer-term (10-25 years) policy demands;
- **Balanced** between creating new knowledge and technology and getting technology – both new and existing- into use.
- **Collaborative** with existing initiatives and programmes of other relevant actors, including bi-lateral, multinational and international donors; governments, the private sector and not-for-profit foundations and related research communities such as health and education.
- **Build** on and strengthen social science insights on demand and specifically be **responsive** to gender differences and the need for social inclusion.
- **Enhance local research capacity** including support to ensure that global knowledge is available at the local level, customised to local circumstances with local involvement and champions. Knowledge exchange should be supported, especially between developing country partners.
- **Uptake activities** (action research and pilots) to put research into policy and practice focusing on outputs and outcomes.
- **Evidence-based** policy suggestions that indicate what works to improve sanitation coverage and conversely what does not.
- **Communications and dissemination** strategies with end-user participation from an early stage, and generation of relevant information that builds on the lessons being learned on poor people’s access to key information on sanitation.
- Seek to enhance the **Regional significance** of actions and research-based lesson learning that are undertaken at a National level

Programme Description

4.3 The **goal** of the programme is to contribute to sustained poverty reduction in countries in Sub-Saharan Africa, South and South-East Asia, by improving access to safe water and basic sanitation for poor households.

4.4 The **purpose** of the programme is to ensure that new and existing knowledge is developed and utilised to improve systems for sanitation and hygiene service delivery. This requires: (a) improved understanding of why safe sanitation is not being adopted at a greater rate by poor households and how to change this; (b) better or improved approaches to promoting and providing sanitation by mobilising public, private and beneficiary resources (c) information and data on the health benefits of safe sanitation and the consequences of not improving sanitation on other MDGs and (d) increased utilisation and adoption of outputs from DFID’s EngKaR programme and other DFID research and analytical work. The programme will include a research-into-use component to build on and optimise use of

earlier DFID funded research and knowledge from the EngKaR and other programmes.

4.5 The key to achieving this purpose will be to develop a demand-led research process that brings together developing country stakeholders, DFID country offices, the central research function and knowledge about technical, social, economic and environmental issues to identify researchable sanitation problems. The problems researched should be resolvable and apply across a group of countries or are so significant within a single country that it is clearly worthwhile to invest in researching new knowledge or further developing existing knowledge in the expectation that it can be re-used will be of general use in the country or region.

4.6 Some existing sanitation programmes have experienced initial success but have then fallen into disuse. The programme needs to identify the reasons for this, and then to formulate and test options for making future sanitation programmes more sustainable. In urban areas in particular, where the need is to think in terms of complete sanitation systems rather than toilets, there is also a need to identify institutional constraints to scaling up sanitation initiatives and possible options for overcoming those constraints.

4.7 The new knowledge and research experience from the programme should include an appropriate communication and uptake strategy that will allow others to access, understand and modify the knowledge for use in other contexts. The strategy should ensure integration of different disciplinary insights and knowledge. Dissemination and communication of research outputs will be a critical activity of the programme.

4.8 An indicative logical framework is shown in Table 3. Detail is provided to the output level.

Table 3 Logical Framework for the Sanitation and Hygiene Research Programme

	OVIs	MOVs	Risk/assumptions
Goal			
Improved access and availability of safe water and basic sanitation for poor households.			<p>Enabling environment suitable for poorest to benefit from policy changes in sanitation sector.</p> <p>Implementation and support frameworks are not established or are not matched to policies.</p> <p>Financial commitment does not match policy objectives.</p>
Purpose			
New and existing knowledge developed and utilised to improve sanitation and hygiene service delivery	<p>Government and donor decision-making on sanitation and hygiene improved.</p> <p>Research capacity in target countries enhanced.</p>	National and Donor policies	
Outputs			
(1) Constraints to progress towards the sanitation MDG targets diagnosed and documented.	1.1 Diagnostic on constraints to progress towards meeting MDG sanitation target in three SHRP regions.	Diagnostic Report	Government institutions, DFID country offices and other secondary stakeholders willing/able to partner process and willing/able to absorb the lessons learnt
(2) Institutional arrangements established for consensus building, planning, implementation and dissemination of research programme	<p>2.1 RPC established and functioning in three regions with local partners</p> <p>2.2 CAG and CASGs established and involving local and regional stakeholders.</p> <p>2.3 Monitoring and Evaluation and Feedback system set up and working</p>	Annual reports	<p>Duration sufficient to allow research topics to be fully investigated.</p> <p>DFID country offices have sufficient knowledge of sanitation, hygiene and related water issues to engage with the research programme.</p>
(3) Regionally specific programme of Research and RIU identified, agreed with stakeholders and implemented.	3.1 Primary and Secondary Stakeholders engaged in defining the priorities for research and strategic direction of sanitation research		Programme responds adequately to the sanitation research demands of policy makers, targeted users and beneficiaries.
(4) Dissemination and advocacy of lessons learned from new and existing research to primary and secondary stakeholders	4.1 Mechanisms established and implemented to disseminate and promote programme findings and outputs to stakeholders including policy makers.		All stakeholders not adequately engaged or differentiated.
(5) Regional institutions' and partners' capacity for water supply and sanitation research enhanced	<p>5.1 Increased range of sanitation and hygiene research activities included in the portfolios of regional institutions and partners</p> <p>5.2 Lessons on dissemination and adoption of sanitation approaches for poverty reduction are incorporated into national programmes</p>		Constraints are amenable to change within the resource and time constraints available to the initiative.

Programme Duration

4.9 A recurring issue that was raised by many people consulted and also in reports evaluating DFID previous research programmes (for example Technopolis and ODI 2005), was the need for long-term support to develop the capacity of research collaborators and to research selected topics fully. To address these requirements, the minimum length of time required for the programme would be 5 years, although up to 10 years would be preferable to allow a greater consolidation of capacity building and time to research more complex issues that constrain sanitation.

Management of the Programme

4.10 In the Research Strategy, DFID propose to support a range of research approaches that includes research managed directly by DFID, joint research and research as part of international initiatives. Of the six mechanisms of funding research identified¹, the most appropriate for the Sanitation Research Programme are:

Research Programme Consortia (RPC). RPC is a consortium of several research organisations, including developing country members that will manage and deliver identified outcomes that address a researchable problem. The essential features of research programme consortia (RPCs) are that they are 'headed by a single organisation; typically comprise between 4 and 6 institutions; at least three of the consortium institutions are in developing countries; at least two of the consortium should be well established; have a strong director with research management expertise. The RPC would be responsible for delivering the outputs of the research programme and could use a number of different models for funding research activities including within-country or developed country Competitive Grant facility (CGF). DFID are developing a third-generation of RPCs, building on the strengths of previous models but introducing changes to support the aims of their research strategy. Many respondents (both from the north and the south) expressed the need for north-south linkages between research institutions to be maintained. The RPC would be managed directly by DFID Research. The strengths and weaknesses of RPCs are discussed in several documents (Campbell et al (2009) and DFID (undated)), but overall RPCs would be a suitable management mechanism for the sanitation research programme because if RPCs are implemented properly, they can result in significant building of southern research capacity which is very much needed in sanitation. Given the widespread problem of inadequate sanitation and the size of the task, consideration should be given to having more than one RPC for the programme so that there is competition between the RPCs during implementation.

Other contracted programmes. Building on the lessons learnt from the Research into Use programme under agriculture, specific research projects in key areas are to be contracted to organisations to trial new and innovative approaches. This may include support to knowledge brokers, intermediaries and media organisations that could be supported to re-package, bring together and promote research outputs.

Joint Programme with International Funders. Support to joint programmes with international partners such as World Bank is provided where there are major opportunities for combining technology, geographical reach and shared learning. In addition, the dissemination of research findings and coordination of research activities within the EU is supported by DFID providing funds to SPLASH-Net Programme. The major constraint to this option is that there is not an internationally recognised southern-based research centre

¹ The other two mechanisms are: International Networks for Growth and Climate Change; and Responsive research programmes, neither of which is appropriate for this programme.

that is strong specifically on sanitation. For the centres involved with sanitation research, the activity is usually secondary to water-related research, which would weaken the impact of outputs from DFID-funded research.

Multi-lateral Programmes and International initiative. Funds are provided to support multi-lateral research programmes. The strengths of supporting multi-lateral programmes are that they provide influence within the multi-lateral partner, and potentially build synergies across sanitation and water disciplines. Potential drawbacks include:

- Providing funds to multi-lateral partners to undertake research diminishes the ability of DFID to provide a challenge function and to be able to research the relationships between the players and the effects of their decision on improving sanitation;
- International partners often have good individuals working on issues but can be weak in cross-disciplinary or sectoral grouping;
- Multi-lateral Programmes may not have the skill set necessary for researching a broad range of sanitation and hygiene issues.
- The scope of the research may be limited by the mandate of the organisation;
- The research programme may distract the organisation from its core agenda.

A further limitation is that there is no multi-lateral organisation that focuses solely on sanitation although WSP and WSSCC both have a significant focus on sanitation.

4.11 The above approaches are not necessarily mutually exclusive and a combined model approach could be supported that, for example, uses a RPCs with significant international involvement along with supporting joint funded research projects.

GEOGRAPHICAL FOCUS

4.12 DFID developed and promoted the Five Ones framework² to deliver more effective global action on water and sanitation (DFID 2008). DFID is proposing to support at least five countries (starting with Ethiopia, Sierra Leone, Tanzania, Mozambique and Bangladesh) in their efforts to deliver on the national Five Ones objectives. In addition, DFID will continue to support urban initiatives, particularly in South Asia.

4.13 There is general agreement amongst those consulted that sanitation research should be firmly based in southern countries, and one option is to support the development of regional research facilities that would work in neighbouring countries with similar researchable issues. If the focus of research activities was more regionally-based, there would be scope for local field-level projects researching specific issues in a country that could contribute more directly to achieving the MDGs locally or regionally and to effectively research gender mainstreaming and social inclusion issues. Regional research facilities will only work where there are already strong, self-reliant research institutes (such as in India and Bangladesh in Asia, and in South Africa, Tanzania and Kenya in Africa).

4.14 Other factors that should influence the location of the programme include:

- *DFID is funding water, sanitation an hygiene activities or programmes in the country.*

² The **Five Ones** framework comprises of Produce **One** Global Annual Report (bringing together essential information of water and sanitation); Hold **one** global high-level annual meeting (to allow ministers to consider the findings of the annual report); Draw up **one** national water and sanitation plan for each country (describing current access to safe water and basic sanitation, the investments needed to meet shortfalls and the action plan to be taken); Form **one** water and sanitation coordination group in each country (with representatives from all stakeholders); and have **one** Lead UN body in each country (by appointing one single lead UN body on water and sanitation services)

This is required to ensure the programme is relevant to DFID country support and DFID country offices become involved in managing the direction of research projects. This would also ensure that the programme was able to influence DFID policy makers.

- *No other large-scale DFID-funded water and sanitation research programme.* This avoids duplication of efforts and possible.
- *Local environment is conducive to research.* At least at the outset, the local environment should be such that research work can be undertaken in the field without security concerns or the possibility of severe disruption to local markets.
- *Inclusion of South Asia and South-East Asia.* The majority of poor people without safe sanitation and hygiene practices live in these two regions.
- *Established and respected local research institutions.* Necessary to ensure that they can provide a strong southern voice in the programme and for capacity building.

4.15 Based on consideration of these factors, possible locations for the programme include:

General Location	Specific Location
Sub-Saharan Africa	Tanzania, Mozambique, Malawi
South Asia	West Bengal with links to Orissa and Bihar
South-East Asia	Cambodia and Vietnam

Level of Funding

4.14 The appropriate level of funding for the sanitation research programme depends on several factors including the complexity of the research themes (that require a greater body of research to generate the knowledge and identify solutions), the involvement of different institutions (the mix of UK/northern-based and southern-based research institutions), the extent of developing research capacity in southern research institutions (for example provision of funds for equipment, facilities, overhead costs etc.), and the location of the main research partners (whether regionally based or UK based).

4.15 In the EngKAR projects allocated in 2003, the average cost of one project was about £350,000, and the funds for the RiPPLE programme implemented through an RPC are £3.75 million over five years. If the programme is to work in three location as suggested in Section 4.13, then an appropriate level of funding would be about £10 million over at least a five year period. DFID indicated that funding of possible research projects under SPLASH will be funded from other sources and should not be included as part of this programme.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Inadequate and unsafe sanitation remains a major constraint on health and livelihoods, particularly of poor households, and improving access and use of safe sanitation are major challenges to meeting the Millennium Development Goals. There are significant knowledge gaps in the sanitation sector, particularly on how to improve sanitation for poor people and to be responsive to the needs of women and children whose demands for safe sanitation are not easily captured. As part of their contribution to the global effort to achieve the MDGs, DFID funding of a sanitation research programme would have significant impacts on improving the lives of poor people and achieving the Millennium Development Goals. DFID is well-placed to fund a sanitation and hygiene research programme by building on its leading role with promoting sanitation and will be able to ensure sensitivity to gender and social inclusion in the global learning agenda on sanitation.

5.2 The Scoping Team therefore recommend that there is scope for DFID to contribute to addressing the significant challenges and knowledge gaps that remain in the sanitation sector, by funding a Sanitation and Hygiene Research Programme.

5.3 The consultation process identified a range of very relevant research themes. However, for the programme to be effective and avoid one of the shortcomings of previous DFID-funded research programmes, the research themes selected by the programme should be based on local demand for new or existing knowledge to fill sanitation.

5.4 The appropriate management structures for the programme is one Research Programme Consortia (RPC) managing research activities in Sub-Saharan Africa (Tanzania, Mozambique and Malawi) South Asia (West Bengal) and South-East Asia (Vietnam or Cambodia).

5.5 DFID should provide £10 million as funding for the programme. In addition and as an indicator of demand, the RPC should seek local contributions (up to 10%) for new research projects and research into use activities.

5.6 A draft Programme Document for the Sanitation and Hygiene Research Programme has been prepared and submitted separately.

**Appendix A
Terms of Reference**

DFID Central Research Department (DFID-CRD)

Terms of reference for Programme Using Research outputs to help achieve the MDGs in Water & Sanitation : **Sanitation Research Programme**

Background

1. DFID's new Research Strategy commits its Central Research Department (CRD) to undertake research that will contribute the achievement of the hardest to reach Millennium Development Goal's (MDG's). MDG 7 (Environmental Sustainability) targets include halving the proportion of people living without water and sanitation. Since the goals were agreed in 2000 there has been little progress toward the sanitation target DFID wishes to develop a 'sanitation' programme that will operate in support of country governments, donor partners, civil society and research and development stakeholders to help achieve the more coverage of sanitation, to improve peoples' health and facilitate better opportunity for economic growth.

2. Diarrhoea, globally kills as many children under 5 as malaria, HIV/AIDS and TB combined. The prevention of diarrhoea centres on sanitation, hygiene and water management, issues which cut across the both a growth and health agenda.

3 The International Development Committee report 'Sanitation and Water' acknowledged this and stressed especially the need for greater involvement of DFID in the field of sanitation. In its response, the Government has welcomed this emphasis and has since committed £ 95 million per year for 2007/8 for the water and sanitation sector in Africa, an amount which is to more than double in 2010/11 to £ 200 million. There seems to be a general agreement that more needs to be done on sanitation, by DFID, and by the international community as a whole, and research is needed to focus and maximise the potential of those investments, especially how to design effective sanitation programmes. Further research is needed in this area.

4 The DFID consultation on water, sanitation and integrated water resources management, on 17th July 2007, brought together experts from different fields and organisations to input towards helping shape DFID's policy within the sector. When the participants were asked to identify DFID's comparative advantages over other international donors, DFID's long commitment to sanitation research was noted. This past commitment was also highlighted by the IDC report which referred to DFID's support for research into the Community-Led Total Sanitation approach. The report encouraged DFID to continue to support the study of this and other approaches, such as social marketing, that can improve the uptake of sanitation.

OBJECTIVE

5 The objectives of this assignment are to identify programme content and implementation modalities and production of project documents of a CRD/DFID programme to improve sustainably the health and livelihoods of poor and vulnerable people by increasing access to sanitation for urban and rural communities, thus improving health and stimulating pro-poor growth. It is envisaged that this will be achieved by disseminating and mainstreaming best practice in policy and appropriate technology whilst improving knowledge and research capacity.

SCOPE

6. This work will be carried out in two parts:

a) Scoping: The confirmation of the merit of the concept, identification of the programme content and a recommended modality, identification of possible partners and production of a draft Project Concept Note (PCN):

b) Programme Design: Following approval of the PCN, the production of all programme documentation, in accordance with the Blue Book, to enable DFID to approve the programme and commission the work.

Design Issues

7. The main issues are:

- The areas that DFID could add value on and maximise the impact of increasing sanitation coverage
- Deciding the initial geographical scope – which countries should be included
- Deciding upon the modality of delivery such as existing multilateral initiative, bilateral project, partnering for large programmes.
- Developing sustainable capacity in the partner-countries which will enable sanitation knowledge for a pro-poor approach to be continued after the completion of the project; this could include establishing formal training capacity, and drawing up sustainable standards and specifications
- Developing effective relationships with development partners, notably the development banks, in order to mainstream research outputs in their planning and design
- The programme will include a gender mainstreaming approach and ensure that poverty and social inclusion impacts are considered in both mapping existing programmes and in developing programme areas and modalities.

Areas for consideration

8. Some possible areas of research topics

a) identifying use and form of national sanitation strategies, the effectiveness and form of national co-ordination committees, (including civil society) and the components of an implementation plan with baselines, standards and information management

b) how to create demand and commitment both from politicians, decision makers and users to sustain behavioural change

c) urban sanitation , the possibilities and choices in the context of rapidly expanding urban growth. How can sanitation be achieved for all?

d) Sanitation provision in emergency situations

METHODOLOGY AND RESOURCES

9. The consultants shall:

- Explore existing sanitation programmes for lessons learnt, and relevant research produced to date, to validate concept; The consultants will assess the extent to which poverty reduction aspects are incorporated into such programmes; as well as whether and how they consider disaggregated impacts, especially gender, age and ethnicity.

- Discuss the proposed programme with DFID staff, W&and health research institutions and other development research funding agencies;
- Investigate possible different programme modality options;.
- Investigate demand, replication with other programmes, relevance, rationale and likely outcome;
- Complete a programme design report that sets out the options for DFID support with suggested funding scale;
- Support for a discussion round to reach agreement on the options presented and preferred/selected;
- Develop the programme documentation for both the approval and implementation processes;
- Support to finalise the funding agreement process;
- Final report describing the activities undertaken in the process and any lessons learned that would be of value to DFID.

10. The consultant team should consist of a person or persons expert in the field of water, sanitation and hygiene research, research use (in both policy and practitioner contexts) and familiar with DFID programming and approval processes.

OUTPUTS

11. The expected outputs are:

Stage 1

A report setting out the programme options and recommendations including delivery mechanisms (to include the SPLASH EUWI ERANET option) and a draft A 4 page concept note, to DFID Blue Book guidelines outlining the relevance and potential of the proposed programme.

Stage 2

Project documents to enable the DFID approval of the programme as per DFID's corporate requirements, including the proposed governance and implementation details.

TIMETABLE

12. The expected time line for completing this work is:

Stage 1 (scoping and draft PCN)	Completed by 30 th January 2009
Stage 2 (Drafting final programme document)	Completed by 15 th March 2009

PROGRAMME DETAILS

The Envisaged Programme

13. DFID has been influential in raising the problems and issues of the 2.5 billion people who do not have access to basic sanitation facilities. These people are afflicted by the problems that lack of sanitation produces and affected by the growth restriction of ill-health.

14. Recently, DFID drafted a new policy paper on sanitation, pointing out that sanitation contributes to all of the Millennium goals. A recent parliamentary IDC review laid great

emphasis on the need for greater involvement by DFID in sanitation and in sanitation research.

15. The programme meets DFID's overall objective for research 'to promote the production and uptake of technologies that will contribute to poverty reduction and the achievement of the MDGs'.³

16 The programme will be managed by an institution contracted by DFID through competitive tender and will work with UK, international and national organisations in target countries (to be defined?). Programme performance will be monitored with milestones clearly set up at inception. The risk associated with this proposal is considered to be low, as the relatively high risk process of generating new knowledge has already been achieved.

17. Further details of the conclusions of existing consultation is at Annex. A.

Principles of the programme

18. Preliminary agreement has been reached on a number of areas that should guide the development of the programme:

- The programme will focus on the large areas of unknown links between hygiene, sanitation and health especially the devastating effects of open defecation. The research programme should reflect the role of the health research community, the necessity for evidence based policy suggestions indication what works in successful sanitation coverage and conversely what does not.
- Identify and implement uptake activities (action research and pilots) to put research into policy and practice focusing on outputs and outcomes.
- The programme will support existing initiatives and programmes with evidence – based innovation, knowledge and policy outputs. (initial discussion has been held with IFS in Stockholm as a potential partner)
- Activities which are driven by demand and clear pathways to impact will be given priority for support.
- Local research capacity development will be an important element including support to ensure that global knowledge is available at the local level, customised to local circumstances and local involvement and champions.
- Knowledge exchange will also be supported, especially between developing country partners.
- The programme will support existing partnership arrangements in the countries where it works to ensure that the programme is harmonised with other's activities.
- Dissemination activities – particularly the synthesis and sharing of success stories will be included.

REPORTING

19. The consultants will report to the lead adviser (TBA) and Robert MacIver (project Officer) and will deliver the outputs to the timetable set out in paragraph 8 above.

ANNEX A

FURTHER INFORMATION

Background

The Need for Research on the Health Impacts of Safe Excreta Disposal

1 Despite a general acceptance that sanitation affords significant health protection (in 2007, readers of the BMJ even voted the introduction of sewerage networks as the single most significant medical advancement of the last 200 years) rigorous scientific evidence to support this is distinctly lacking. The lack of such evidence may explain in part the low level of political commitment afforded to sanitation at both the national and international level.

2 A recent systematic review of the health impacts of improved sanitation on health⁴ found *only* 11 randomised or quasi-randomised controlled trials (RCTs/QRCTs) across both the published and unpublished literature in English, French and/or Chinese. Of these only one study, the RCT, explored the impact of sanitation (on trachoma) in the absence of either water improvements and/or hygiene promotion activities.

3 The systematic review revealed the following:

- 33% reduction in diarrhoea associated with combined watsan interventions across 7 QRCTs
- 10% reduction in trachoma associated with provision of basic pit latrines only in one RCT
- 57% reduction in cholera over a 5 year period associated with watsan improvements in a single QRCT
- 43-35% reduction in shistosomiasis associated with combined watsan interventions in 2 QRCTs
- 66-87% reduction in hookworm associated with combined watan interventions in 2 QRCTs
- 56-77% reduction in unspecified helminth infection associated with combined watsan interventions in 2 QRCTs

4. However all these numbers need be interpreted with caution due to the small number of reviewed studies, the non-random nature of most of these and the inability to separate out the health impacts of the excreta disposal component of the interventions specifically. Thus there is a clear need for future high-quality research (ideally RCTs) to provide hard data on the health impacts of sanitation interventions and thus allow for the cost-effectiveness of such interventions to be calculated. In the words of Clasen et al (2008):

'While the MDG target for sanitation is intended to inspire the political will to advance the implementation of basic sanitation, it is possible that pace of implementation is being retarded by this dearth of rigorous, compelling evidence of the health outcomes that can be achieved thereby'

5 In particular research is needed to explore:

- % latrine coverage needed to afford maximum health benefits across a range of urban and rural environments: investing in home sanitation will not protect a household from infection transmitted via exposure to other people's faeces in the environment

⁴ Conducted by Clasen et al (2008) for Wateraid UK.

- Effect of not only coverage but latrine use patterns on health: to afford health benefits latrines must be used by all household members, including children, however use patterns are rarely investigated in coverage studies.
- Effect of safe disposal of children's stools on health: In conjunction with the above young children often defaecate on the ground, in wrappers or in potties and parents frequently deem children's faeces to be harmless. However, with children under 5 suffering the main burden of diarrhoea their faeces poses the greatest health risks. Thus it is essential that safe stool disposal studies explore both latrine use and infant defaecation practices.

Programme Description

6. The **goal** of the Sanitation programme is to contribute to sustained poverty reduction in countries of Africa and Southeast Asia, where sanitation is important to the livelihoods of the poor.

7. To achieve this, the **purpose** of the programme is to increase access to sanitation for urban and rural communities, thus improving health and stimulating pro-poor growth

8. Most new sanitation in Africa and beyond has been, and continues to be, privately acquired by individual households from small-scale private sector providers in a somewhat fragmented market place. Building and enhancing this market represents one of the most promising strategies to achieving sustained sanitation coverage at scale. Therefore *members of the EHG recommend that DFID take steps to research and develop a sustainable sanitation industry*, whereby demand for household sanitation is increased and an improved range of sanitation technologies and services is offered through viable (i.e. profitable) supply-chains within a favourable policy environment.

9 Utilising the various monitoring programme outputs and knowledge data bases determine what works and what does not to maximise lesson learning. For instance, further efforts are needed to develop more appropriate sanitation products (including not just latrines, but improved superstructures and agents that reduce pit volume and smell for example) and services (especially in urban areas) and to develop viable supply chains (especially rural) and associated business models for delivery.

10 Develop and demonstrate new business models for the production and marketing of sanitation products and services that generate sustained full-scale uptake of improved household sanitation by poor households in developing countries, especially in sub-Saharan Africa. These business models will likely be very different between urban and rural areas, with the former being dominated by the challenge of providing excreta management services (such as pit emptying, safe collection and disposal of sludges) and the latter the challenge of developing viable supply-chains for latrine components or DIY latrine products in highly dispersed populations

.11. While the users of the research outputs will vary, the intended beneficiaries of the poverty reduction impacts of this programme include:

- a) all stakeholders involved with the delivery of water, sanitation and hygiene services;
- b) poor people with problematic or no access to clean water, sanitation and hygiene.

12 Partnerships will be forged with relevant public, private and civil society organisations at local, national and regional levels, so that the promotion and adoption of research outputs takes place through, and builds capacity of, existing structures and institutions.

13 The implementation strategy of the programme will be designed to produce lessons on how best to maximise the impact of sanitation research on poverty, and to identify the constraints to the adoption of new policies, governance techniques and technologies. This knowledge generation will flow from and form part of the monitoring of the adoption of research outputs and their impact on sanitation and hygiene delivery and on peoples' livelihoods. Lessons from this will be disseminated to organisations involved in sanitation and hygiene research and development in DFID's PSA countries.

What will the programme do?

14. DFID will contract an organisation to manage the programme. The contracted party will undertake the following tasks over a five year period:

- Establish a programme advisory board to provide oversight. Membership will include DFID, research and development institutions, and partner organisations from target countries.
- Identify around 30 research outputs from the EngKaR with the best potential for contributing to increase in growth.
- Identify priority regions and target countries in Africa and Mekong where there is greatest potential for the impact of research outputs on growth increase.
- In target regions and countries, undertake country analyses of existing plans and processes of poverty reduction and agricultural change; and identify entry points and potential regional, national and local partners to implement the programme;
- Ensure that a gender mainstreaming strategy is incorporated into the programme.

Contract organisations to: implement the promotion and adoption of outputs; assess the impacts of adoption; and, learn lessons on best ways to do this;

- In partnership with regional and national implementing organisations identify key policy, institutional and technology lessons on maximising the impacts of getting research into widespread use, and disseminate these lessons across Africa and Mekong

15. We expect that two thirds of the budget will be spent on the promotion and adoption of research outputs, and one third on impact assessment, lesson learning and dissemination.

16. We expect that implementation will be through existing organisations in implementation and/or research . These may be long-term programmes.

Identification of target countries

17. The programme focuses on PSA countries in Africa and Mekong. Within these the contracted organisation is expected to identify countries where the programme will direct the majority of its efforts on the promotion and adoption of research outputs. In the sharing of lessons the programme will target all PSA countries and disseminate lessons more widely to other regions. It is expected the selection of target counties will be based on the following:

- The national demand and need for research outputs to contribute to a country's efforts to reduce poverty and contribute to sustained growth.

- The potential of research outputs to reduce vulnerability to environmental risk (including climate change) and contribute to increased coverage of water and sanitation
- The potential to build, or strengthen, partnerships with regional and national organisations who work on getting sanitation.
- The desirability of learning lessons on the promotion and adoption in a range of environments. Target countries will include those from the better performers and more fragile states, and will also be chosen to ensure a wide range sanitation organisations are represented.

Promotion and adoption of research outputs

18. Based on the selection of outputs and target countries the contracting organisation is expected to develop partnerships with UK, international, and national organisations to deliver country programmes on the promotion and adoption of the research outputs. These are expected to include:

- Country level analyses and consultations on national development processes and how the programme can support sustainable infrastructure development and its contribution to poverty reduction and social inclusion.
- Development of national plan and activities for the promotion and adoption of sanitation research outputs. It is likely that the contractor will wish to seek support from the original UK research organisations to assist in the validation and adaptation, and clustering of research outputs to meet specific country's needs and environment.
 - Assessment of baselines on which to evaluate the impacts of the adoption of research outputs. Disaggregated data (sex, ethnicity, age etc) must be used where appropriate.
- Monitoring the adoption and use of different outputs and evaluating the effects of adoption on water and sanitation coverage and the livelihoods of the intended beneficiaries under different conditions.
- Comparison of impacts achieved across countries and regions to draw lessons on the effectiveness of the different approaches to the promotion and adoption of research outputs.

Lesson Learning

19. A major output of the programme is on building the capacity of national organisations to get sanitation to make significant impacts on poverty reduction. This will be undertaken by the contracted organisation working with existing national organisations: to strengthen their ability to get sanitation and adding EngKaR outputs to their repertoire of knowledge, tools, and technologies; to assess the impact of different approaches to get sanitation; and, based on this experience identifying policy, institutional and methodological lessons that were successful. To share these lessons more broadly the contracted organisation will be expected to design and implement a communication and knowledge sharing component that includes:

- Analysis and documentation of lessons on how to get sanitation.

- Identifying target groups (practitioners, research and extension organisations, national policy makers, regional institutions and development partners), located across different regions and countries. This will in due course feed lessons into the proposed DFID regional water and sanitation research programmes in Africa and elsewhere.
- Identification of different pathways for the sharing of lessons.
- Sub-contracting of regional and national organisations to deliver knowledge sharing programmes.

Appendix B

List of People Consulted

DFID Staff

Robert MacIver	Deputy Programme Manager, DFID
George McLaughlin	Research Manager, DFID
Guy Howard	Lead Advisor on this Scoping study, DFID
Peter O'Neill	Deputy Head, DFID
Mary Thompson	Social Development Advisor, DFID
Alan Tollervy	Research Manager, DFID
Jo Mullingan	Health Adviser, DFID
Lesley Hammil	NRR RIU Project, DFID
Peregrine Swann	Senior Water Adviser, DFID
Sanjay Wijesekera	W&S Team Leader, DFID
Ian Curtis	Head of Profession Environment, DFID
Jane Jamieson	Private Sector Infrastructure Policy Manager Global Funds & DFI Department, DFID
Brian Baxendale	Senior Infrastructure Adviser, African Regional Department, DFID
Simon Kenny	Growth & Vulnerability Team Leader, Ethiopia, DFID
Tim Sumner	Environment Adviser, African Regional Department, DFID
Stephen Young	Senior Programme Manager/Senior Infrastructure & Urban Development Adviser, DFID India
Ashufta Alam	Senior Infrastructure and Urban Development Adviser, DFID India
Mark Harvey	Senior Infrastructure Adviser, DFID Afghanistan
Clare Shakya	Senior Regional Water & Environment Adviser, South Asia Division, DFID
Jane Crowder	Infrastructure Adviser, DFID Overseas Territories Department DFID
Andrew Maclean	Infrastructure and Growth Adviser, DFID Mozambique
Rodney Dyer	Pro-poor growth Team Leader, DFID Rwanda
Beth Scott	Sanitation and Health Advisor

External Institutions

Barbara Evans	Independent Sanitation Expert
Keith Whetherhead	Cranfield University
Richard Carter	Cranfield University
Richard Francis	Cranfield University
Tom Franks	Dept of Development & Economic Studies, Bradford University
Peter de Vries	DGIS, The Hague
Edward Kairu	Exec Dir ANEW (African CSO on W&S)
Martin Walshe	Global Water Partnership, Stockholm
Robert Chambers	IDS, Sussex University
Anuradha Joshi	IDS, Sussex University
Petra Bongartz	IDS, Sussex University
Barbara Evans	Independent consultant
Darren Saywell	International Water Association, The Hague
Sandy Cairncross	LSHTM, London
Steve Sugden	LSHTM, London
Alan Nicol	ODI/RiPPLE
Tim Forster/Andy Bastable	OXFAM
Kerstin Danert	SKAT, Switzerland

Anne Blenkinsopp
Frank Greaves
Mari Williams
Clarissa Brocklehurst
Jane Bevan
Oliver Cumming
Abel Mejia
Andrew Cotton
Jamie Bartram
Pete Kolsky
Isabell Blackett
Andreas Knapp
Mike Saeger
Guy Hutton
Eddy Perez
Peter Morgan
Tim Hayward
Peter Harvey

SPLASH net
Tear Fund
Tear Fund
UNICEF, New York
UNICEF W Africa
Water Aid
Water Anchor, World Bank, Washington
WEDC, Loughborough University
WHO, Geneva
World Bank, Washington
WSP-EAP
WSP, Ethiopia
WSP, Vietnam
WSP, EAP
WSP, Washington
Zimbabwe
WSUP
UNICEF, Zambia

Appendix C Questionnaire

The questionnaire is divided into three sections: (A) General (B) Sanitation Research

SECTION A: GENERAL							
Institution/Organisation			Contact-details <i>{It is useful but not essential for you to provide full contact details}</i>				
			Name of Contact				
Please check the box for your selection from the options given or type in your answer							
Mark your working area of interest : (mark one or up to four of the following categories)							
Policy support	<input type="checkbox"/>	Rural Sanitation	<input type="checkbox"/>	Legislation	<input type="checkbox"/>	Water quality	<input type="checkbox"/>
Research	<input type="checkbox"/>	Urban Sanitation	<input type="checkbox"/>	Governance	<input type="checkbox"/>	Rural Water Supply	<input type="checkbox"/>
Agriculture	<input type="checkbox"/>	Solid Waste	<input type="checkbox"/>	Land management/use	<input type="checkbox"/>	Urban Water Supply	<input type="checkbox"/>
Irrigation	<input type="checkbox"/>	Hygiene	<input type="checkbox"/>	Financing	<input type="checkbox"/>	Water Storage	<input type="checkbox"/>
Land drainage	<input type="checkbox"/>	Urban Drainage	<input type="checkbox"/>	Privatisation	<input type="checkbox"/>	River basins/watersheds	<input type="checkbox"/>
Service delivery	<input type="checkbox"/>	Health	<input type="checkbox"/>			Groundwater	<input type="checkbox"/>
Relief and Rehabilitation	<input type="checkbox"/>	Water management	<input type="checkbox"/>			Wetlands	<input type="checkbox"/>
Poverty alleviation	<input type="checkbox"/>	Industrial Waste Disposal	<input type="checkbox"/>			Coastal	<input type="checkbox"/>
SECTION B: SANITATION RESEARCH							
Q1: Why should DFID fund Sanitation Research?							

Q2: Where does DFID bring its comparative advantage to Sanitation sector?

Q3: Are you involved in Sanitation Research? Yes No

If yes, please describe your activities with sanitation research:

Q4: What are the main drivers that will change sanitation use/availability/policy for poor households in 10-20 years? (please mark no more than 4)

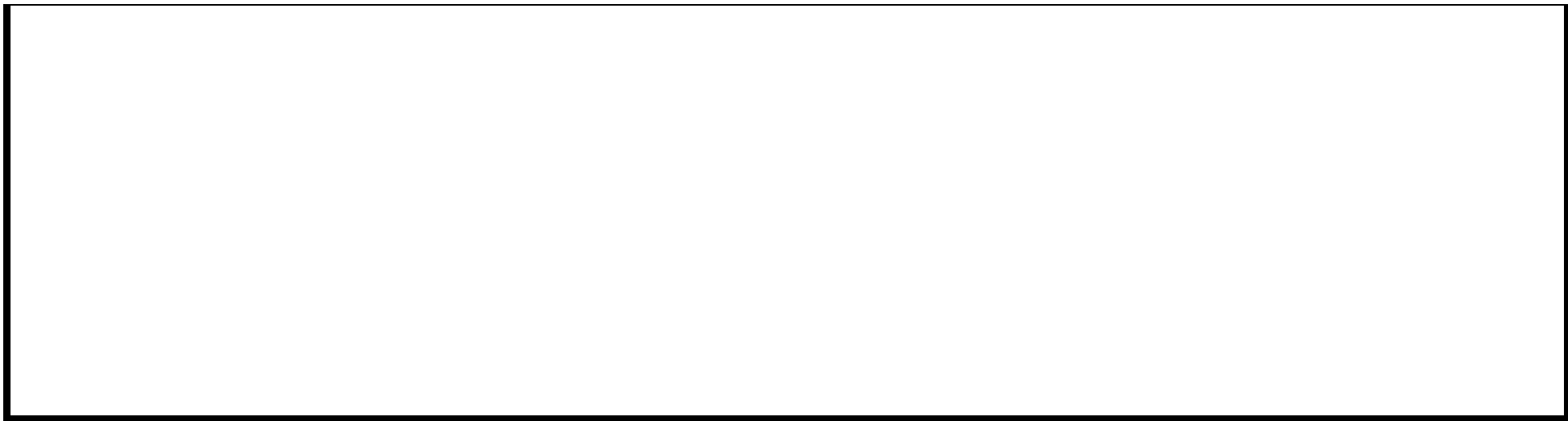
- | | | |
|---|---|-------------------------------|
| <ul style="list-style-type: none"> • Climate change <input type="checkbox"/> • Improved Governance <input type="checkbox"/> • Increasing Urbanisation <input type="checkbox"/> • Public-Private Partnerships <input type="checkbox"/> • Increased focus on private sector <input type="checkbox"/> • Technology changes <input type="checkbox"/> • Poverty Reduction Strategies <input type="checkbox"/> • Improved understanding of the benefits of sanitation and hygiene <input type="checkbox"/> • More opportunities for poor households to access sanitation <input type="checkbox"/> • Increasing industrialisation <input type="checkbox"/> • Increasing population <input type="checkbox"/> • Improved livelihoods <input type="checkbox"/> • Cultural pressures to improve status <input type="checkbox"/> | <ul style="list-style-type: none"> • Killer diseases (e.g. cholera, hepatitis etc) <input type="checkbox"/> • Security <input type="checkbox"/> • Globalisation <input type="checkbox"/> • Decentralisation <input type="checkbox"/> • Access to affordable sanitation <input type="checkbox"/> • Increased Hygiene awareness <input type="checkbox"/> • Reduced Vulnerabilities through better Sanitation and Hygiene <input type="checkbox"/> • Budgetary support for the sanitation sector <input type="checkbox"/> • Improved environmental management <input type="checkbox"/> • Increasing environmental degradation <input type="checkbox"/> • More professional staff working in sanitation <input type="checkbox"/> • Creation of new institutions for sanitation provision <input type="checkbox"/> | <p>Others (please state):</p> |
|---|---|-------------------------------|

Q5: What are the constraints on improving access and use of sanitation? (please mark no more than 3)

<ul style="list-style-type: none"> • Availability of information <input type="checkbox"/> • Inappropriate or unaffordable technologies <input type="checkbox"/> • Lack of finance <input type="checkbox"/> • Lack of Service Providers <input type="checkbox"/> • Declining water quality <input type="checkbox"/> • Shortage of human and technical capacity <input type="checkbox"/> 	<ul style="list-style-type: none"> • Resistance to change <input type="checkbox"/> • Corruption <input type="checkbox"/> • Vested interests <input type="checkbox"/> • Influence of culture <input type="checkbox"/> • Increasing population <input type="checkbox"/> • Political indifference <input type="checkbox"/> 	Others (please state):
--	---	------------------------

Q6: What should be the main priority areas for a possible DFID-funded sanitation research programme and why? *These should be linked to the drivers of change and potential constraints; as well as the sanitation MDGs.*

Any Other Comments?



*****Many thanks for taking the time to complete this proforma*****

*****Please note that analysis from the information provided in this proforma will be available in the public domain; although no attribution to individuals or organisations will be given*****

*****Although this proforma was prepared with DFID funding, the British Government bears no responsibility for, nor is in any way committed to, the views or opinions expressed herein*****

*****Please return the completed proforma to the Scoping Team:**

by e-mail to: **iantod@mac.com**

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