A Review of Decision-Making Support Tools in the Water, Sanitation, and Hygiene Sector

by
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Executive Summary

In developing countries, water, sanitation, and hygiene (WASH) practitioners need a way to choose among the numerous available options for securing safe water and sanitation. Effectively addressing community needs requires that technologies or approaches be economically, ecologically, and socially appropriate and sustainable. **Decision-making support tools** help address this need, guiding practitioners to the most appropriate water and sanitation solutions.

The authors of this analysis conducted an assessment of 120 existing support resources, including books, manuals, and websites. Additionally, we performed an in-depth evaluation of the 18 support resources that most closely resembled decision-making tools. This analysis indicated that existing support resources fail to adequately serve WASH practitioners. Most commonly missing among the resources evaluated were: an effective user interface; consideration of social implications; regional specificity; information on costs and financing; hygiene approaches; project replicability; and evaluation and monitoring.

Emerging from this analysis is a clearer picture of the necessary characteristics of an effective decision-making support tool. The ideal tool would include all elements necessary to implement a water, sanitation, and hygiene project; serve multiple languages; be developed in both web and print form; and include success stories. The tool would be complimented by a comprehensive and ongoing dissemination and support system, including regional workshops; on-call technical support teams; and long-term support for on-the-ground experts, including financing, community, and technical support. A decision-making support tool that includes these elements, particularly the critical support system, would best be able to ensure the selection and success of appropriate solutions. It is clear that developing this ideal decision-making support tool will be a significant challenge and require the concerted effort of numerous stakeholders.

It is our hope that this report will lead to the development of a decision-making support tool in the WASH sector that will serve practitioners seeking the best options to meet the water, sanitation, and hygiene needs of their communities. We also seek to build a foundation to develop the ongoing support system that will be required to ensure that technologies and approaches in the WASH sector are successfully implemented and maintained on the ground.

I. Introduction

Water, sanitation, and hygiene (WASH) challenges continue to plague the developing world. Decades of international attention have focused on these issues, yet high rates of sickness and mortality from preventable water-related diseases persist, particularly among young children. Over one billion people lack access to an improved water supply,[1] and over 2.5 billion live without safe sanitation.[2]

Efforts to address this water supply and sanitation shortfall have shown that *no single technological solution, economic tool, or institutional structure* can be applied to all populations. From the 1960s to the late 1980s, massive centralized investments in water infrastructure succeeded, at best, in keeping pace with population growth in most underserved regions. In the 1990s, a switch in financial and economic strategies—from large international grants and aid to smaller-scale strategies and involving the private sector—led to some success. Currently, however, the number of people without adequate water services remains as large as it was a decade ago.

A major opportunity exists today. International awareness of and attention to water and health issues are at an all-time high. As the limitations of old approaches become apparent, new technologies, finance mechanisms, and institutions are flourishing. Stronger governance is improving efforts to set targets and achieve measurable objectives. However, the WASH sector still lacks a consistent, central source of information and analysis on technological and financial solutions.

In 2000, the United Nations released the Millennium Development Goals (MDGs), encouraging increased efforts to halve the proportion of people without access to adequate and safe water and sanitation by 2015. As practitioners, community planners, government agencies, and elected officials struggle to meet the MDGs, they need ways to effectively choose among water and sanitation options. Some communities will best benefit from a government-funded, centralized urban water purification and waste-treatment facility. Others may be better off with micro-loan-funded point-of-use treatment systems.

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[1] An improved drinking water source is defined as "piped water, public tap, borehole or pump, protected well, protected spring or rainwater. Improved water sources do not include vendor-provided waters, bottled water, tanker trucks or unprotected wells and springs" (The World Bank Group. "Millennium Development Goals." http://ddp-ext.worldbank.org/ext/GMIS/gdmis.do?siteId=2&contentId=Content_t30&menuId=LNAV01HOME1. Accessed March 11, 2008).

[2] An improved sanitation source is defined as a facility "that hygienically separate human excreta from human, animal and insect contact. Facilities such as sewers or septic tanks, poor-flush latrines and simple pit or ventilated improved pit latrines are assumed to be adequate, provided that they are not public, according to the World Health Organization (WHO) and United Nations Children's Funds (UNICEF) Global Water Supply and Sanitation Assessment 2000 Report. To be effective, facilities must be correctly constructed and properly maintained"(The World Bank Group. *31. Proportion of the urban and rural population with access to improved sanitation.* "Millennium Development Goals." http://ddp-ext.worldbank.org/ext/GMIS/gdmis.do?siteId=2&contentId=Content_t31&menuId=LNAV01HOME1. Accessed March 11, 2008).

Practitioners need an effective decision-making support tool to assist them in identifying, evaluating, and choosing a technology or approach that best suits the conditions and needs of their community. To help develop this tool, the authors assessed existing support resources in the WASH sector and identified the critical gaps in the content, design, and implementation of existing support resources.

Having identified the gaps, we developed a framework for what is needed in a WASH decision-making support tool. This will help guide those organizations and individuals invested in building the capacity of WASH practitioners and will ultimately help communities to make sustainable improvements to their water and sanitation systems. While developing the ideal decision-making support tool and the accompanying ongoing support system is a significant hurdle, once achieved, it will greatly improve the effectiveness and success of efforts in the WASH sector.

A. The Role of Support Resources in the WASH Sector

A variety of support resources have been created to help those who need to select, implement, and maintain different WASH technologies and approaches. These support resources range from design specifications on different technologies to guidance documents on implementing a particular hygiene approach. The role of these support resources is to provide necessary assistance to WASH practitioners who are finding ways to meet the water, sanitation, and hygiene needs of the communities they serve.

Our experience working in developing countries has shown that underserved communities; engineering, planning, funding, and implementing agencies; nongovernmental organizations (NGOs); and the private sector are not sufficiently familiar with the range of available solutions in the WASH sector and their applicability. To help practitioners make informed, effective choices, a comprehensive decision-making support tool is needed that allows them to weigh the feasibility and effectiveness of different approaches.

Definitions

Support Resources: The information available to decisionmakers that helps them understand, implement, or choose among various technologies and approaches in the WASH sector. Support resources can include process guides/documents, decision-making support tools, evaluation tools, technical briefs, technical references, and policy briefs.

Tools: The technologies, financing strategies, and approaches that are being used in the WASH sector. *Support resources* provide further information and evaluation on implementing and using *tools* in the WASH sector. The *tools* themselves range from EcoSan toilets and microcredit to in-home chlorine disinfection and safe water storage.

Decision-making support tool: A product that combines information on a user's given situation with information on available technologies and approaches, and then helps a practitioner select the best technology or approach. It fits within the broader category of "support resources." A decision-making support tool compares and contrasts different

technologies and approaches, including their construction, operation and management, costs, financing, scalability, and institutional requirements. It also incorporates the special needs of different geographic locations, the need for community involvement, and case studies. Key to an effective decision-making support tool is an accessible user interface, which includes multiple language capabilities. An ideal decision-making support tool assists practitioners in selecting among various technologies and approaches as they implement water, sanitation, and hygiene projects.

B. Decision-Making Support Tool Users

Those invested with the responsibility and opportunity to improve water, sanitation, and hygiene services in a community are the target users of the decision-making support tool. This group includes staff of development agencies, rural development practitioners, NGOs, rural and peri-urban planners, government agency staff, engineers, and health professionals. It also includes the local community, water users, and individuals. An effective decision-making support tool will be useful to those working on the ground to create the most effective path to reduce waterborne diseases and to improve community sanitation and health.

II. Review of Existing Support Resources in the WASH Sector

A variety of methods were used to identify the support resources examined in this report. We conducted a systematic online search – including WASH organization sites and library catalogues – and interviewed key WASH sector stakeholders. To avoid limiting the search to evaluation tools (the closest to the decision-making support tool envisioned), all resources that could be used to inform the decision-making process were included. This review identified 120 resources, including web portals, books, computer programs, and documents and reports available online or in print.

The annotated bibliography (Appendix A) provides details on the 120 support resources, including references and descriptions. It represents the wider body of available resources. This bibliography may omit significant resources, including those that are locally specific or not available online.

A. WASH Support Resource Types

A wide variety of support resources are targeted at decision-makers and practitioners. Those identified here fall into one of five types: *evaluation tools, process guides and documents, technical briefs, technical references,* and *policy papers.*

Evaluation Tools

Evaluation tools are documents, websites, or computer programs that help users choose among multiple options for a particular problem. Evaluation tools are the closest support resource type to the decision-making support tool identified as necessary in the WASH sector. In the WASH field, evaluation tools tend to focus on sources for drinking water, technologies for drinking water treatment, household sanitation technologies, and wastewater treatment. A common type of evaluation tool is a decision tree, which practitioners follow to a solution depending on the characteristics of their situation. Evaluation tools also come in the forms of tables and computer programs. Tables allow the user to compare several of the attributes of different technologies, approaches, and methods side-by-side (see Brikké and Bredero 2003: Appendix B, No. 2, p. 64). Computer programs allow the user to input information on the nature of a problem: the program then produces one or several recommended solutions (see WAWTTAR, Appendix B, No. 14, p. 88).

Process Guides and Documents

Process guides and documents describe a suggested set of steps (i.e., the "process") decisionmakers should take to assess and improve water and sanitation conditions in a community. Usually based on a framework, guiding theme, or particular philosophy (such as demand-driven development), process documents guide the user through a set of possible actions. The suggested steps usually contain a set of questions for the user, general advice and suggestions, and important points to consider. Within this category of tools, practitioners have a varying amount of freedom to make choices about program and technology options. Some resources, such as "Towards Better Programming: A Sanitation Handbook" (UNICEF 1997: Appendix B, No. 12, p. 84), offer a guiding

framework rather than prescriptive steps. Some resources provide significant guidance, leading the practitioner through predetermined project steps, such as "Towards Better Programming: A Water Handbook" (UNICEF 1999: Appendix B, No. 13, p. 86) and "Safe Water Guide for the Australian Aid Program 2005" (AusAid 2005: Appendix B, No. 1, p. 62).

Technical Briefs

Technical briefs provide succinct descriptions of a technology, method, or process. Usually targeted at practitioners who lack experience with the technology, technical briefs are intended to provide enough information to make a quick decision about the potential applicability of the technology for the practitioner's situation. The most useful technical briefs include references to more detailed information on the technology, method, or process described. Technical briefs are popular among a wide range of organizations in the WASH field, including the Water and Sanitation Program (WSP), the World Bank, Water and Environmental Health at London and Loughborough (WELL), and many local NGOs. An example of a set of technical briefs is "Small-Scale Water Supply: A Review of Technologies" (Skinner 2003: Appendix B, No. 9, p. 78).

Technical References

Technical references provide practitioners with guidance on how to carry out specific tasks. Technical references come in the form of construction manuals, operation and maintenance (O&M) manuals, water quality testing procedures, and descriptions of financing methods (see Ainsworth 2004: Appendix A, No. 3, p. 23).

Policy Papers

Policy papers present situational analyses and make recommendations on needed policies or approaches in the field. In the WASH sector, institutions such as the World Bank, WSP, WELL, and policy research institutes publish numerous policy papers (see Lantange et al. 2007: Appendix B, No. 7, p. 74). Policy papers often include information that can be found in technical briefs and their policy recommendations are often abbreviated versions of process guides.

B. Evaluating WASH Support Resources

After reviewing each of the 120 support resources listed in Appendix A, we identified a smaller subset of the resources that most closely resembled a comprehensive decision-making support tool for the WASH sector. According to our definitions of resource types, there are only three or four support resources that could be classified as evaluation tools. For this reason, we expanded our detailed review to include other resources that have decision-making support tool characteristics. There are 18 support resources that most closely resemble a complete decision-making support tool. Summarized in Table 1, they include two evaluation tools, five process guides and documents, three compendiums of technical briefs, and two policy papers. The remaining six resources represent hybrids of the different resource types.

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Evaluations of these 18 support resources can be found in Appendix B.

Table 1. 18 Support Resources Closest to a WASH Decision-Making Support Tool

Australian Agency for International Development 2005. "Safe water guide for the Australian Aid program 2005."
Brikké, F., and M. Bredero 2003. "Linking Technology Choice with Operation and Maintenance in the Context of Community Water Supply and Sanitation." (WHO)
Cotruvo, J., Gunther F. Craun, and N. Hearne (eds) 1999. "Providing Safe Drinking Water in Small Systems: Technology, Operations, and Economics." (NSF, WHO, and PAHO)
Department of Water Affairs and Forestry, South Africa 2004. "Introductory Guide to Appropriate Solutions for Water and Sanitation."
Deverill et al 2002. Designing Water Supply and Sanitation Projects to Meet Demand in Rural and Peri-Urban Communities
Huuhtanen, S., and A. Laukkanen 2006. "A Guide to Working in Sanitation and Hygiene for Those Working in Developing Countries."
Lantange, Quick, and Mintz 2007. "Household Water Treatment and Safe Storage Options in Developing Countries: A Review of Current Implementation Practices."
ROLAC, UNEP 2003. "Recommendations on Basic Sanitation and Municipal Waste Water for Latin America & the Caribbean."
Skinner, B. 2003. Small-Scale Water Supply: A Review of Technologies. (WELL)
Smet, J. and C. van Wijk (eds) 2002. Small Community Water Supplies. (International Water and Sanitation Centre)
UNEP 2000. "International Source Book on Environmentally Sound Technologies for Wastewater and Stormwater Management."
UNICEF 1997. "Towards Better Programming: A Sanitation Handbook."
UNICEF 1999. "Towards Better Programming: A Water Handbook."
Water and Wastewater Treatment Technologies Appropriate for Reuse Model. Developed and Programmed by B. A. Finney, and R. A. Gearheart, University of Humboldt.
WELL "WELL Technical Briefs"
WELL 1998. "Guidance Document on Water Supply and Sanitation Programmes"
World Bank 2006. "Manual on Low Cost Sanitation Technologies for Ger Areas, Mongolia"
WSP and WUP 2003. "Water and Sanitation for All: A Practitioners' Companion."

Our evaluation of each of these 18 support resources includes a brief description, a discussion of its strengths and weaknesses, and a checklist of the "elements" included in each resource. These elements include 20 components common to support resources in the WASH field and fall into one of four groups: Sector, Locale, Topics, and User Interface (see below for a description of each element). These 20 elements make up most of the key characteristics of an ideal decision-making support tool. In addition to these, a support system to promote the use of the tool and the sustainability of implementation efforts is necessary, as will be described in later sections.

The *Sector* category subdivides support resources by their area of focus: *water supply*, *drinking water treatment*, *sanitation*, *wastewater treatment,* and *hygiene*.

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The *Locale* category indicates a support resource's targeted location. This category includes *regional specificity* (where a support resource contains information specific to a geographic area); and the three general types of targeted communities—*urban*, *peri-urban*, and *rural*.

The *Topics* category is subdivided into ten substantive issue areas.

- *Technological comparison* – Inclusion of descriptions, figures, tables, lists, or other mechanisms that compare the benefits and disadvantages of technologies in a side-by-side manner.
- *Construction* – Information on how to build or implement water and sanitation infrastructure and technologies.
- *Operation and maintenance (O&M)* – Information on the specific O&M requirements for a technology, or a general discussion of O&M within a framework or methodology.
- *Community involvement* – Information on the role of the community or community members in water and sanitation projects, specifically their role in planning, implementation, evaluation, or operation and maintenance; and information on a specific technology/method/approach that relies on community involvement.
- *Institutional aspects* – Information on the role that government bodies, community groups, banks, businesses, and others play in the planning, implementation, promotion, construction, evaluation, or maintenance of a water- and sanitation-related method or technology.
- *Cost of technologies* – Information on water and sanitation infrastructure construction and O&M costs, the price consumers and providers pay for water and sanitation services using specific technologies or systems, and any other incurred costs.
- *Financing* – Discussion of approaches to financing specific water and sanitation technologies or general projects.
- *Evaluation and monitoring* – Information on the evaluation and/or monitoring of water and sanitation improvement projects in general, or with respect to projects that use specific technologies or systems.
- *Scalability and replicability* – Information on or discussion of how well particular technologies or approaches are suited to being replicated in other regions, or how easy it is to scale up a particular approach to larger geographic areas.
- *Case studies* – Descriptions of actual water and sanitation projects and their use of systems, technologies, and/or approaches in communities.

The *User Interface* refers to how well the support resource involves the user through having the user specify the conditions of the community through inputs, and providing outputs that are relevant based on community conditions.

C. Summary of WASH Support Resources Review

Evaluating the 18 selected support resources against the 20 elements revealed a number of trends.

Sector

Among the 18 support resources reviewed, some covered more than one of the WASH sectors. In all, water supply, drinking water treatment, and sanitation were each covered by nearly a dozen different resources. Fewer resources dealt with wastewater treatment. This is a telling exception, in that too often in the WASH sector, wastewater treatment is ignored in favor of drinking water. Only 6 of the 18 resources dealt with hygiene in more than a cursory manner (see Table 2). Hygiene is generally underrepresented in the overall literature, despite the recognition that it is integral to the success of water and sanitation interventions (see "Gaps in WASH Support Resources" below). Among the six that dealt with hygiene, none treated hygiene education or improving hygiene practices as tools.

Table 2. Occurrence of Elements

Element	Occurrence
Sector	
Water supply	12
Drinking water treatment	11
Sanitation	12
Wastewater treatment	9
Hygiene	6
Locale	
Regional specificity	10
Urban	8
Peri-urban	18
Rural	17
Topics	
Comparison of pros and cons of technologies	8
Construction	10
O&M	12
Community involvement	13
Institutional aspects	12
Cost of technologies	10
Financing—access to capital	7
Evaluation and monitoring	3
Scalability and replicability	4
Case studies	9
User interface	*2*

Locale

In the *Locale* category, 10 of the 18 resources were either regionally specific or had elements of regional specificity (see Table 2). Urban contexts (10 resources) were slightly underrepresented in comparison to peri-urban (18) and rural (17) contexts. The distinction between urban and peri-urban, however, is subtle, with substantial overlap among the various definitions. The smaller number of resources that focus on urban areas can be attributed to the fact that drinking water and sanitation access rates are higher in urban areas, thus the need in rural and peri-urban areas is far greater.

Topics

In the *Topics* category, information on financing, evaluation and monitoring, and scalability and replicability were underrepresented in comparison to the other categories (Table 2). Evaluation and monitoring were mentioned in only three resources, and scalability and replicability were only mentioned in four of the resources. Of these resources, only two actually compared and contrasted different technologies using the lenses of scalability and evaluation.

User Interface

Only 2 of the 18 tools addressed user interface. The lack of attention to this consideration suggests that many resources are targeted at experts in the field, and not at users who are relatively new to these technologies. This also points to the difficulty of creating a user interface where people are able to enter in their community conditions and receive outputs on suitable technologies and approaches.

Of the 18 support resources we reviewed, only 4 could be considered useful as potential decision-making support tools.[3] These resources had an effective user interface, and carried users through an evaluation of their community conditions, and provided comparative information on different technologies and approaches.

This meta-analysis demonstrates that practitioners lack comprehensive support resources that are valuable in multiple contexts or regions. In the next section, we expand on the gaps in support resources that hinder the development of comprehensive and successful water, sanitation, and hygiene projects.

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[3] In the larger pool of support resources, several additional evaluation tools were not available in time to include in this initial review.

III. Gaps in WASH Support Resources

While we discovered several effective guides, our review revealed some key gaps in existing WASH support resources. Most of these resources were created to guide practitioners through the implementation of a specific solution. But given the various economic, social, and ecological conditions practitioners must weigh, they first need assistance *selecting* the most appropriate solution. Because of the number of gaps in available tools, practitioners are unable to adequately evaluate appropriate solutions.

A. Economics/Cost

Understanding the cost to implement *and* maintain different options is critical when making the initial technology choice as these costs also affect the long-term sustainability of technologies. If the community cannot afford, or does not plan for, a technology's long term operation and maintenance costs, the WASH infrastructure is more likely to fall into a state of disrepair.

Economic analyses of different technologies were consistently out-of-date or absent from the support resources reviewed. Only 9 of the 18 support resources incorporate cost information. Only six provide enough information to make informed decisions. Four of those are useful as decision-making tools.

- The World Bank (2006) support resource on Ger Areas, Mongolia, describes various latrine options, their advantages, disadvantages, building materials, and costs (Appendix B, No. 17, p. 94). The report not only provides useful information on each step in the construction process, but also a comparison of the construction costs for various latrines and community toilet bank systems.
- Lantange et al. (2007) uses specific examples from the field and includes cost figures from these experiences (Appendix B, No. 7, p. 74). Throughout the chapter, technology costs are described in various contexts, such as the unit cost for a bottle of sodium hypochlorite solution and the cost of a ceramic filter in real project situations.
- Brikké and Bredero's (2003) technology briefs provide the most useful information for evaluating a technology's appropriateness in a community, including construction and O&M costs from actual projects (Appendix B, No. 2, p. 64). A limitation of Brikké and Bredero's support resource, however, is that their cost data are frequently 10 or more years old.
- UNICEF's "Towards Better Programming: A Water Handbook" (1999) includes a chapter on cost that pulls together an assortment of numbers and provides guidance on the economics of water supply. The chapter highlights and provides details on systems management, capacity building, community management, and women's participation. Also, the handbook delves into variables affecting cost, including technical and logistical considerations, local production of materials and spare parts, and contracting. A practitioner could use this overview to perform his or her own cost analysis based on knowledge of local labor and materials costs (Appendix B, No. 13, p. 86).

Addressing cost and economics effectively would require up-to-date information on the costs of materials, construction, and ongoing maintenance of various technologies and approaches, as well as provide details on these costs in different regions.

B. Financing

WASH sector practitioners need an unbiased assessment of all the different approaches for securing capital for water sector projects. They need to be able to evaluate whether their community can and should apply for microfinance, pursue community bank lending, develop a local bond market, or pursue other options.

We did not find a support resource that compared the applicability of various financing approaches based on the technology selected and the community's institutional environment, local economy, or personal wealth.

One support resource provided information on the financing of water and sanitation projects.
- The Global Water Partnership maintains a website[4] that links to 100 resources focused on public-private relationships in water and sanitation projects (Appendix A, No. 38, p. 33). While many of these resources focus on an aspect of financing, they do not offer an alternative perspective to private sector involvement in the water and sanitation sector. The website also lacks many of the most up-to-date policy papers on financing by organizations such as the Water and Sanitation Program and WaterAid. Many of the other support resources on the website cover a willingness-to-pay approach or compare capital and operating costs to other household costs; none provide a range of options for accessing capital or evaluate different financing methods.

Despite the lack of true financing decision-making support tools, numerous general guidance documents in the field of finance attempt to provide independent support. However, documents we encountered did not include all potential options.
- The World Bank has created and funded several documents guiding practitioners through the pros and cons of accessing private capital for water and wastewater projects. Other options to address capital needs, such as microfinance or bond financing, are not mentioned or equally considered.
- Similarly, other multilateral aid agencies have created guidance documents or case study documents to support a particular financing approach. For example, the U.S. Agency for International Development, which has long supported the creation of local bond markets, has published several documents promoting this approach.[5]

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[4] http://www.partnershipsforwater.net/psp/tc/
[5] For example, see
http://www.usaid.gov/our_work/economic_growth_and_trade/development_credit/designing_loan_guarantees.pdf
http://www.usaid.gov/our_work/economic_growth_and_trade/development_credit/water_finance.htm

C. Social Implications of Technology and Financial Choices (Equity Considerations)

The impact of technology and financing methods on other social priorities requires consideration. Technology and financing choices can increase equity by providing all community residents with access to clean water and safe sanitation. Conversely, technology and financing schemes can inadvertently exacerbate inequities. As a result, a comprehensive decision-making support tool would permit users to analyze social factors including local control over resources, end-user ability to pay, social cohesion, resource conflict, and impacts on different age groups and genders.

For example, point-of-use (POU) water systems have been shown to be very effective at reducing waterborne disease rates. However, household-level POU water treatment may require significant capital and/or ongoing investment (i.e., purchase of filters or boiling). Depending on the funding scheme, these systems may only be available to those who can afford them.

In another example, partnering with a private provider may be an attractive method to meet capital needs in the short term. This partnership, however, may result in the loss of existing knowledge and skills among the local population and local agency. If a private sector partner pulls out of a water system, the local government or community may not have the in-house skills or capabilities to run the water system. Private sector involvement may also result in the loss of revenues from the water system. While a domestic water provider will most likely reinvest revenues in the local community, an international private operator may use revenues outside the country or they may accrue to the parent company.[6]

We did not find any resources that systematically consider the potential social implications of specific technologies and funding schemes. There are, however, several process guides that cover these issues to some extent. Two were reviewed here:

- "Safe water guide for the Australian Aid program 2005" (AusAid 2005: Appendix B, No. 1, p. 62) discusses the social considerations of community involvement in the planning, monitoring, and evaluation process.
- "Towards Better Programming: A Sanitation Handbook" (UNICEF 1997: Appendix B, No. 13, p. 84) deals specifically with the social implications of sanitation and wastewater projects, including the chapters *Working as a Catalyst for Better Programming Design*, *Identifying Communities*, *Community Participation*, *Technology Options*, *Financing*, *Institutional Arrangements*, and *Building Political Will*. Each chapter concludes with a section titled, "What Do We Know, and What Do We Need to Know? Information Checklist," which poses many questions focused on social considerations.

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[6] For a more comprehensive discussion of these issues, see Gleick, Peter et al. 2002. *The New Economy of Water*. Pacific Institute: Oakland, California.

D. Regional Specificity

An effective decision-making support tool should account for regional variations. Evaluating soil, temperature, institutional landscape, social structure, cultural practices, and other regional characteristics can help determine successful WASH solutions and avoid the selection of inappropriate technologies. For example, a water-based wastewater collection and treatment system may be inappropriate in an area with severe water scarcity. Similarly, dry methods of waste disposal may not work in places where water washing after defecation is the cultural practice.

- If regularly updated and fact-checked, UNEP's (2000) "International Source Book on Environmentally Sound Technologies for Wastewater and Stormwater Management" (Appendix B, No. 11, p. 82) would be a good example of the type of information and level of detail needed on regionally specific conditions, practices, and case studies. The Source Book provides overviews of a diverse range of wastewater technologies. It includes separate sections for major world regions: Africa, Asia and the Pacific, Europe, Latin America and the Caribbean, and North America. Section 3 of this online resource contains regional overviews of the wastewater and stormwater situation, including information on collection, treatment, reuse, and disposal. The section also covers the policy and institutional framework, public education, sources of information, and provides case studies. If the regional chapters were updated and included a few more comparison tables in the technology-centered chapters, this volume would be a useful evaluation tool. Currently, however, none of the Source Book's sections contain the depth necessary to be stand-alone support resources.
- A second support resource that has strong potential in the area of regional specificity is the "Water and Wastewater Treatment Technologies Appropriate for Reuse Model" (WAWTTAR) computer program (Finney and Gearheart 1998: Appendix B, No. 14, p. 88). In contrast to UNEP's Source Book, WAWTTAR allows the user to input data on local environmental and community conditions. This example is a great model of a decision-making tool that allows flexibility in defining local characteristics.

E. User Interface

Related to regional specificity is the notion of an appropriate user interface. An appropriate user interface would allow practitioners to input their needs, details about local conditions, water quality and availability data, and wastewater treatment needs, and then be presented with options on how to address their challenges. This can be done through an interactive online or computer program, but can also be done more simply through a series of electronic or paper worksheets that help users describe their context and direct them to the appropriate technologies.

For example, a decision-making tool that contains a simple user interface would allow a practitioner in Bangladesh to identify ways to address local arsenic conditions by inputting the concentration of arsenic in the source water, other potential water sources, and then being directed to the applicable technology options.

Although they greatly facilitate the decision-making process, effective user interfaces are generally missing from current support resources. Technical briefs, one of the most popular resource types, require practitioners to self-evaluate their situation and then to sift through technology fact sheets to find the one that best suits their needs. Unfortunately, these fact sheets are often irrelevant to the situation of interest.

- The WAWTTAR computer program (referred to above) allows practitioners to input information on the issue they are addressing. Many resources would be improved if their user interface allowed users to input situational information and receive information, such as a side-by-side comparison, that assists in the decision-making process.

F. Information Access

It is vital that an effective decision-making support tool be available in both electronic hard copy formats – the latter for users without computers or Internet access. For practitioners who do have adequate access to the Internet, a number of useful support resources are available, although several will need to be used together in order to give practitioners the full range of options and assessment methods. While even remote rural sites are gaining some form of Internet access, those who have gained access may still find it unreliable or inadequate for downloading large files. As a result, hard copy documents will continue to be an important option in many areas for some years to come. Because many hard copy support resources are often not available in local libraries, wide-scale dissemination to local community centers and libraries must be a priority.

Another aspect of information access is language. The majority of support resources are available only in English. Many support resources that were created in English are not translated into many other languages. In our broad search, a few non-English support resources were found. The limited diversity of available languages limits the use of these support resources in some regions. We would also suggest a more complete, multilingual search to identify support resources that may have been missed by the scope of our review.

G. Comprehensive WASH Directory

Technology choices in the field are rarely made after navigating an online support resource or a book on technology options. Collaborating with those who have implemented or developed the technology allows the practitioner to feel confident that their questions and concerns have been addressed before implementing a new system. A comprehensive directory would include WASH professionals, organizations, and individuals, by country and by region. Such a directory would make it easier for practitioners to find someone who speaks his or her language and is familiar with their particular local area. This directory would need to be updated regularly. Contact information for those with experience related to a particular technology was absent in the support resources reviewed.

H. Scalability and Replicability

Some WASH solutions are amenable to scaling up or replication, while others require specific pre-existing conditions. Information on the necessary conditions for scaling up or replicating particular approaches is an important aspect of a decision-making support tool. Strategies that can be scaled up quickly or are easily replicated in other communities may be particularly attractive to donors, aid agencies, and multilateral organizations. Information on the pitfalls of scaling up or replication, and strategies to guard against these potential challenges, are equally important.

For example, a successful technology strategy that used ecosanitation methods in India may be readily scaled up within the country because of a supportive institutional environment, cultural norms that do not conflict with the technology, and other conducive factors. But this same strategy may be difficult to replicate in Africa because of an unsupportive policy environment, differences in cultural norms, and/or a lack of skilled masons or required materials. None of the reviewed support resources provides the necessary information on scalability and replicability to allow practitioners to compare the appropriateness of different technologies and approaches.

I. Evaluation and Monitoring

A decision-making support tool should provide information on the technology's long-term effectiveness. Evaluation and monitoring of the success and long-term sustainability of different technologies, approaches, and projects provides important information for practitioners who seek to implement similar projects in their communities. What has been the experience of communities using this technology in the short-, medium-, and long-term? What challenges were faced, and how were they overcome? Evaluation and monitoring studies are often conducted by academics but rarely incorporated into action-oriented decision-making support tools. Long-term evaluation and monitoring (at least five years after project completion) is rare, as funding partners often only evaluate the success of projects immediately after completion or after one or two years.

- "Tools for Sustainable Operation and Maintenance of Urban Infrastructure" (Sohail and Cotton 2002: Appendix A, No. 88, p. 49) is an example of a comprehensive process guide to evaluation and monitoring. The document presents a framework for the operation and maintenance of projects with suggested roles for community and institutional stakeholders. The purpose of the framework is to improve the sustainability of urban services in poor communities by using appropriate management strategies and support tools.

J. Hygiene Approaches

Hygiene is key to reducing water-related illnesses and to the long-term success of water projects. Numerous studies have demonstrated the critical role that hygiene plays in reducing waterborne disease mortality and morbidity. The WHO estimates that hygiene interventions are more effective than interventions in water supply or sanitation, reducing diarrhea morbidity by 45 percent. Yet hygiene approaches are particularly sensitive to

variations in cultural norms and educational approaches. None of the resources evaluated provide a detailed comparison of different approaches to hygiene education and promotion.

Most support resources in this sector were guidance documents developed by multilateral aid agencies. These documents provide practitioners with a step-by-step guide to implementing an individual hygiene approach.

- The numerous organizations involved in the Water for Schools Program (now called WASH Partnership) have developed several guidance documents on how to implement hygiene education in schools. Other support resources provide fact sheets, posters, and training documents that can be used to teach hygiene to other audiences.

While it is not clear whether there are enough distinct hygiene approaches to be evaluated on their regional appropriateness, a decision-making tool that provides information on different approaches would be helpful.

IV. Next Steps: Successfully Designing and Disseminating a Decision-Making Support Tool

Our analysis uncovered a host of existing support resources that provide at least some form of guidance for practitioners, development agency staff, and governments undertaking a water, sanitation, or hygiene project. Most of these support resources, however, do not provide practitioners with a way to evaluate and choose among different technologies and approaches. Emerging from this analysis is a clearer picture of the type of resource needed to address gaps in existing resources.

A. Design of a Decision-Making Support Tool

The ideal decision-making support tool would guide a WASH practitioner through the process of selecting the appropriate technology to address his or her water and sanitation challenge. It would do this by allowing a practitioner to evaluate technologies according to a variety of criteria, including, but not limited to, cost, financing, equity implications, and regional specificity. In order to be effective, this tool must be user-friendly, regularly updated, and available in multiple languages.

Incorporating All Necessary Elements

An effective decision-making support tool can help WASH practitioners reduce water-based mortality and morbidity by addressing the interconnected factors of water supply, drinking water treatment, sanitation, wastewater treatment, and hygiene. A tool should consider the different needs of urban, peri-urban, and rural areas. An effective guide will compare the benefits and challenges of each technology, provide information on the materials and other resources needed to implement each technology, detail ongoing operation and maintenance needs, provide options for involving the community, address institutional elements of success, compare the costs of different technologies, and suggest financing schemes.

Additional information is needed so that users can understand the effectiveness of the tool, the pitfalls and opportunities for scaling up or replicating an approach, and obtain a sense of the use of this technology in multiple settings via case studies.

User Interface: Problem to Solution

A decision-making tool in the WASH sector should solicit responses to questions from the user and then provide the appropriate technologies and approaches to meet the user's needs. An effective user interface can greatly increase the number of people who could use and make decisions about WASH technologies and approaches. Practitioners would not have to sift through hundreds of technical fact sheets and books. Instead, they could define their problem in terms of water quality, quantity, and contaminants and specify the parameters of their community from a demographic, environmental, institutional, and social perspective, allowing the tool to narrow down technology options.

Regular Updates

In order for a decision-making support tool to be trusted in the field, it needs to be accurate and updated over time. The interface should be designed to easily receive updates on new technologies, costs, and contacts. Commonly, support resources are funded in the initial development phase, but lack funding for ongoing, regular revisions.

Inclusion of Success Stories

A collection of success stories and illustrative failures would be an invaluable supplement to the decision-making support tool. It would highlight the technologies, financial approaches, and institutions that have worked in various communities to address water supply and sanitation problems. A similar report on California water was developed by the Pacific Institute and proved to be very valuable in demonstrating the range of projects that can be successfully implemented for domestic water use, ecological restoration, sanitation, and more.[7]

While some success stories or case studies are available, they are often written to demonstrate an agency's success or are academic in nature. WASH practitioners need an independent analysis and presentation of success stories that is consistent in format and targets multiple communities and sectors in order to promote the adoption of proven approaches.

B. Dissemination of a Decision-Making Support Tool

Our analysis and conversations with current practitioners revealed that the creation of an effective decision-making support tool solved only half of the problem. Practitioners cannot use a decision-making support tool that they do not know about or to which they lack easy access. Effective dissemination is key to the success of a decision-making tool.

An ideal decision-making support tool needs to be created in partnership with users so that it is designed to meet their needs, and is already primed for their immediate use. In addition, a decision-making support tool should be supplemented with in-country education and workshops to inform potential users about where to find the tool and how to use it.

Translation into Multiple Languages

Since practitioners can understand and are most comfortable incorporating new information that is presented in their native language, efforts need to be made to ensure many elements of the decision-making support tool are translated into multiple languages. A focus group of potential practitioners in various communities can help identify the priority languages for translation. Certain elements in the decision-making support tool meant for wider application – for example, hygiene education materials – should be translated into as many languages and dialects as possible, and include opportunities for non-literate community members to also access this information.

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[7] "Sustainable Use of Water: California Success Stories." A Report of the Pacific Institute, Oakland, California, 1999.

Online and Hard Copy

Some practitioners will have easy access to Internet resources and can use an online decision-making support tool for assessment and evaluation. Others may not have access to adequate Internet service or will not feel confident navigating an online support resource. For these users, a hard copy version of the decision-making support tool is necessary.

For both the hard copy and web-based decision-making support tool, dissemination through existing public and technical libraries and through new, easily accessible repositories will be critical. To facilitate the circulation of these support tools, the decision-making support tool needs to be widely disseminated and integrated into schools, community centers, and other public locations that are common in multiple regions.

Regional Workshops

Regional workshops to explain the applicability of the tool and to demonstrate how to use it are essential to the uptake and use of the decision-making support tool among practitioners. These meetings, to be held in Africa, Asia, and Latin America, would bring together a diverse range of agencies, local governments, NGOs, and practitioners to learn about the applicability of the decision-making support tool. Regional workshops would ensure that the decision-making support tool is put to use in many different areas, allow time to troubleshoot problems encountered during use, and answer questions from users.

Technical Support Teams

To ensure water and sanitation systems are implemented and maintained over time, practitioners must have access to local experts who can answer questions during construction and help them troubleshoot problems during operation. Making technical support teams available in each region can dramatically improve the implementation and uptake of new technologies. Technical support teams need to be funded in combination with the decision-making support tool and regional workshops in order to create a comprehensive package that provides practitioners with the support and resources needed to implement new technologies.

V. Conclusions

This initial review of support resources in the WASH sector identified 120 resources to assist practitioners in undertaking a water sector project. Many of these support resources were guidance documents or technical fact sheets. A more detailed review of 18 of these support resources found that the current body of resources lacks key elements of an effective decision-making support tool. Missing pieces include an effective user interface, economic/cost information, information on financing approaches, information on hygiene approaches, a directory of WASH professionals, considerations of the social implications of technologies, regionally specific issues and technologies, information on scalability and replicability, and information on past evaluations of the technology or approach.

A comprehensive decision-making support tool in the water sector would combine an effective user interface; incorporate all elements important in a water, sanitation, and hygiene project; be translated into multiple languages; be regularly updated; and include an objective section on success stories in the field. While the content, form, and usability of the tool itself is important, a comprehensive and ongoing dissemination and support strategy that includes access through libraries and the Internet, regional workshops, and on-call technical support teams is equally critical.

Addressing the gaps in existing resources could lead to the development of a comprehensive WASH decision-making support tool. When paired with a support system, such a tool could help practitioners successfully and efficiently implement the appropriate technologies and strategies to meet the water, sanitation, and hygiene needs of underserved areas around the world.

Appendix A - Bibliography of WASH Support Resources

#1
Author: Asian Development Bank (ADB)
Year: 2007
Title: Smarter Sanitation - New Business, Unusual Tool
Publisher: Asian Development Bank
Number of Pages: CD format
Notes: "'Smarter Sanitation' is ADB's new electronic toolkit to help national and local governments put their sanitation and wastewater sectors on the MDG success path. More than 30 specialists from developing countries in Asia and the Pacific contributed case studies.
"Smarter Sanitation" includes a CD and companion booklet that guides users through the main barriers confronting them:
Attitudes and misconceptions about what is and is not possible
Getting policies to work
Changing community behavior and awareness levels
Choosing the most suitable technology
The toolkit is loaded with links to the best websites, resources, case studies, and virtually everything about sanitation and wastewater management that planners and managers need to know. It also includes SANEX™, a high-powered software for assessing and planning sanitation systems in developing countries.
This innovative toolkit is ADB's way of doing business unusual itself, and getting its DMC partners to also think in innovative ways."
URL: http://www.adb.org/Water/Topics/Smarter-Sanitation/default.asp
Reference Type: Electronic source with booklet

#2
Author: ADB
Year: 1999
Title: Handbook for the Economic Analysis of Water Supply Projects
Publisher: Asian Development Bank
Number of Pages: 346
Notes: "This Handbook is an attempt to translate the provisions of the water supply guidelines into a practical and self-explanatory work with numerous illustrations and numerical calculations for the use of all involved in planning, designing, appraising and evaluating WSPs. This Handbook is written for non-economists (planners, engineers, financial analysts, sociologists) involved in the planning, preparation, implementation, and management of WSPs, including: staff of government agencies and water utilities; consultants and staff of non-governmental organizations (NGOs); and staff of national and international financing institutions. Since the Handbook focuses on the application of principles and methods of economic analysis to WSPs, it is also a practical guide that can be used by economists in the economic analysis of WSPs.

The Handbook can also be used:

(i) as a reference guide for government officials, project analysts and economists of developing member countries (DMC) in the design, economic analysis and evaluation of WSPs;
(ii) as a guide for consultants and other professional staff engaged in the feasibility study of WSPs, applying the provisions of the Bank's "Guidelines for the Economic Analysis of Water Supply Projects;"
(iii) as a training guide for the "Economic Analysis of Water Supply Projects."
Link to PDF:
http://www.partnershipsforwater.net/psp/tc/TC_Tools/007T_EconAnalysis%20Projects.pdf
Reference Type: Report

#3
Editor: Ainsworth, Richard
Year: 2004
Title: Safe Piped Water
Publishers: World Health Organization (WHO) and International Water Association (IWA)
Number of Pages: 168
Notes: "This review looks at the factors affecting the presence and growth of microorganisms in piped networks, and the practices of water supply organizations that can directly or indirectly influence their presence and growth. The information provided is based on experience with conventional underground systems. The information and conclusions presented here are intended for policymakers and those responsible for formulating water safety plans for the supply of drinking-water, as described in the third edition of the WHO Guidelines for Drinking-water Quality (WHO, 2004). They are also relevant to engineers and scientists responsible for water supply planning, operations and monitoring."
Link to PDF: http://www.who.int/water_sanitation_health/dwq/en/safepipedwater.pdf
Reference Type: Report

#4
Author: Antonio Almeida de Souza, Marco
Year: 1997
Title: Metodología De Análisis De Decisiones Para Seleccionar Alternativas De Tratamiento Y Uso De Aguas Residuales
Publisher: Centro Panamericano de Ingeniería Sanitaria y Ciencias del Ambiente (CEPIS)
Notes: "Para responder a esa interrogante, el presente trabajo propone y divulga una metodología para la selección de sistemas integrados de tratamiento, recuperación y uso de aguas residuales. Esta metodología se basa en el uso de métodos de análisis de decisión con objetivos y criterios múltiples que permiten un tratamiento holístico de la selección tecnológica (Schumacher, 1973; Willoughby, 1990). Estos métodos sustituyen a los métodos económicos y de optimización criticados por monetarizar y materializar los factores involucrados. La metodología propuesta puede usarse en cualquier otra área ambiental y de saneamiento."

URL: http://www.cepis.org.pe/eswww/proyecto/repidisc/publica/hdt/hdt068.html
Reference Type: Electronic Source

#5
Author: Atkinson, D., and P. Ravenscroft
Year: 2002
Title: Alternative Service Delivery Options for Municipalities in the Rural Areas: Kamiesberg Local Municipal Case Study
Publisher: South African Water Research Commission (WRC)
Report Number: KV 137/02
Reference Type: Report

#6
Author: Australian Agency for International Development (AusAid)
Year: 2005
Title: Safe Water Guide for the Australian Aid Program 2005
Publisher: AusAid
Number of Pages: 192
Notes: Full description available in Appendix B
Link to PDF: http://www.ausaid.gov.au/publications/pdf/safe_water_guide.pdf
Reference Type: Report

#7
Author: AusAid
Year: 2005
Title: Managing Arsenic in Water Supplies - Interim AusAid Guidelines and Operating Procedures
Publisher: AusAid
Number of Pages: 30
Notes: These guidelines, although limited to small-scale activities in remote locations, contain relevant information on NGO projects, small-activity scheme projects, community-access fund projects, and small-scale water supply infrastructure. The guidelines are intended to serve as a practical field guide that recognizes AusAID's commitment to duty of care. As a result, the guidelines require AusAID-funded projects that provide drinking water to provide safe drinking water; testing for arsenic and surrogate contaminants by appropriately trained personnel; and the development of management strategies relevant authorities to reduce health risks when existing supplies are contaminated. The guidelines advise the avoidance of water known to contain arsenic, before AusAID will fund new water sources, when WHO guidelines are exceeded, unless specifically negotiated, and agreed with national authorities. They do not include health or arsenic treatment advice (although they provide additional web references).
Link to PDF: http://www.ausaid.gov.au/publications/pdf/arsenicguide_feb04.pdf
Reference Type: Government Document

#8
Author: Austen, L. M.

Year: 2006
Title: Guidelines for the Design, Operation and Maintenance of Urine-Diversion Sanitation Systems
Publisher: South African Water Research Commission
Report Number: TT 275/06
Reference Type: Report

#9
Author: Austin, J., L. Burgers, S. Cairncross, A. Cotton, V. Curtis, B. Evans, G. Galvis, P. Kolsky, E. Perez, F. Rosenweig, and D. Saywell
Year: 2005
Title: Sanitation and Hygiene Promotion - Programming Guidance
Publishers: WHO, Water Engineering Development Centre (WEDC)
Number of Pages: 97
Link to PDF: http://www.who.int/water_sanitation_health/hygiene/sanhygpromo.pdf
Reference Type: Report

#10
Author: Austin, L. M., L. C. Duncker, Marsebe, M. C. Phasha, T. and E. Cloete
Year: 2005
Title: Ecological Sanitation - Literature Review
Publisher: South African Water Research Commission
Report Number: TT 246/05
Reference Type: Report

#11
Author: Bernhardt Dunstan & Associate (BDA)
Year: 1998
Title: Handbook to Guide Communities in the Choice of Sanitation Systems
Publisher: South African Water Research Commission and Bernhardt Dunstan & Associate (BDA)
Report Number: TT 104/98
Reference Type: Report

#12
Editor: Bolt, Eveline
Year: 1994
Title: Together for Water and Sanitation: Tools to Apply a Gender Approach. The Asian Experience
Publisher: International Water and Sanitation Centre (IRC)
Volume: Occasional Paper No. 24
Number of Pages: 113
Notes: "This document is the manual made by middle-level project management staff from rural water supply and sanitation projects in Asia. It combines the joint experiences of 15 participants of the workshop from 9 countries in Asia, the IRC International Water and Sanitation Centre and the NGO Water Supply and Sanitation Decade Service. But

besides much experience and skills, it also reflects the commitment these women and men have to their work for better water supplies, sanitation and water resources in their countries and the joy they had in working together."
Link to PDF: http://www.irc.nl/content/download/2563/26447/file/op24e.pdf
Reference Type: Edited Book

#13
Author: Bolu, Onabolu, and Ndlovu Maliti
Year: 2006
Title: The WRC Community Based Health and Hygiene Model and Implementation Kit
Publisher: South African Water Research Commission
Report Number: TT 264/06
Reference Type: Report

#14
Author: Boot, Marieke T.
Year: 1991
Title: Just Stir Gently: The Way to Mix Hygiene Education with Water Supply and Sanitation
Publisher: International Water and Sanitation Centre (IRC)
Number of Pages: 171
Report Number: Technical Paper no. 29
Notes: "Provides options and methods for integrating hygiene education with water supply and sanitation projects. Illustrations and examples are used to reinforce the text and to give some ideas from 'real life' situations. Target audience: those responsible for the development and implementation of hygiene education components in water supply and sanitation projects."
URL: http://www.irc.nl/page/1889
Reference Type: Report

#15
Author: Brikké, François, and Maarten Bredero
Year: 2003
Title: Linking Technology Choice with Operation and Maintenance in the Context of Community Water Supply and Sanitation
Publisher: WHO and the IRC Water and Sanitation Centre
Number of Pages: 142
Notes: "This document focuses exclusively on community water supply and sanitation in developing countries, in particular, the services that can be managed by communities in rural or low income urban areas). It is designed to help planners and project staff select water-supply and sanitation technologies that can be maintained over the long term in rural and low income urban areas. As has been repeatedly demonstrated worldwide, the selection of a particular technology can have far-reaching consequences for the sustainability of the services. For many years, technical criteria and initial investments were emphasized when choosing such technologies. Although these aspects are important, the roles of financial, institutional, social and environmental factors are also

germane for ensuring the sustainability of services. In this manual, it is proposed that an O&M component be added to the selection process. With new actors, such as formal or informal private entrepreneurs, becoming increasingly involved, O&M is no longer simply a technical issue. It is now seen as encompassing social, gender, economic, cultural, institutional, political, managerial and environmental aspects, and is viewed as a key factor for sustainability."
Link to PDF:
http://www.who.int/water_sanitation_health/hygiene/om/wsh9241562153.pdf
Reference Type: Report

#16
Author: Cain, J., P. Ravenscroft, and I. Palmer
Year: 2000
Title: Managing Rural Water Supply in South Africa
Publisher: International Water and Sanitation Centre (IRC)
Report Number: TT 126/00
Reference Type: Report

#17
Author: Carmichael, S.S., D. Forsyth, and D. A. Hughes
Year: 2001
Title: Decision Support System for the Development of Rural Water Supply Schemes
Publisher: International Water and Sanitation Centre (IRC)
Report Number: 837/1/01
Reference Type: Report

#18
Author: Cinara, Colombia, Alberto Galvis C
Year: 2003
Title: Technology Selection for Water Treatment and Pollution Control
Publisher: International Water and Sanitation Centre (IRC)
URL: http://www.irc.nl/page/8313
Reference Type: Electronic Source

#19
Author: Coates, Sue, and Kevin Sansom
Year: 2001
Title: Customer Relations Management: Part B: Draft Customer Services Guidelines, Urban Water and Sewerage Authorities, Tanzania
Publisher: Water and Environmental Health at London and Loughborough (WELL)
Number of Pages: 59
Link to PDF: http://www.lboro.ac.uk/well/resources/well-studies/full-reports-pdf/task0514B.pdf
Reference Type: Report

#20
Editor: Cotruvo, J., Gunther F. Craun, and Nancy Hearne
Year: 1999
Title: Providing Safe Drinking Water in Small Systems – Technology, Operations, and Economics
Publisher: NSF International (NSF), Pan American Health Organization (PAHO), and WHO
Number of Pages: 650
Reference Type: Edited Book

#21
Author: The Council for Scientific and Industrial Research (CSIR)
Year: 1993
Title: Guidelines on the Cost-Effectiveness of Rural Water Supply and Sanitation Projects
Publisher: CSIR and South African Water Research Commission (WRC)
Report Number: 231/1/93
Reference Type: Report

#22
Author: Cullis, J.
Year: 2005
Title: Water Poverty Mapping: Development and Introduction Using a Case Study at the Local Municipal Scale for the Eastern Cape
Publisher: South African Water Research Commission (WRC)
Report Number: TT 250/05
Reference Type: Report

#23
Author: Deverill, Paul, Simon Bibby, Alison Wedgwood, and Ian Smout
Year: 2002
Title: Designing Water Supply and Sanitation Projects to Meet Demand in Rural and Peri-Urban Communities
Publisher: WEDC
Notes: "These guidelines are the result of two years collaborative research undertaken by WEDC with partners in Africa and South Asia. They demonstrate how water supply and sanitation projects in rural and peri-urban areas can be designed to meet user demand. The aim is to improve the use and sustainability of the services provided. The guidelines consist of three books: Book 1: Concept, Principles and Practice Book 2: Additional Notes for Policy Makers and Planners Book 3: Ensuring the Participation of the Poor."
Reference Type: Book

#24
Author: Duncker, L. C.
Year: 2000

Title: The Kap Tool for Hygiene. A Manual On: Knowledge, Attitude and Practices Study for Hygiene Awareness in the Rural Areas of South Africa
Publisher: South African Water Research Commission (WRC)
Report Number: TT 144/00
Reference Type: Report

#25
Author: Department of Water Affairs and Forestry (DWAF), South Africa
Year: 2004
Title: Introductory Guide to Appropriate Solutions for Water and Sanitation
Publisher: DWAF
Notes: "This guideline is for use by municipalities and their service providers as an introduction to the range of appropriate solutions available for water supply and sanitation, and where and how these are suited to different situations."
Link to PDF: http://www.rwsn.ch/documentation/skatdocumentation.2005-11-17.2350860691/file
Reference Type: Government Document

#26
Author: Erpf, Karl
Year: 2004
Title: Technology Selection - and Buyer's Guide for Public Domain Handpumps for Drinking Water
Publisher: Swiss Resource Centre and Consultancies for Development (SKAT)
Notes:[8] "This document contains information on the Public Domain Handpump vailable on the market and is intended to give assistance to all those, who are evaluating or intending to procure handpumps. Included is condensed information on the different handpump types as there are : extracts of the specifications, existing options, and information on supporting diocuments. Included in this document are the following handpump types : - Suction Pumps for Shallow Wells (N°6 handpump, India), - Direct Action Pumps for Shallow and Medium Wells (Malda Pump, Malawi; Maya-Yaku Pump, Bolivia; Tara Pump India) - Rotary Pumps for Shallow, Medium and Deep wells (Rope Pump, Madagascar and Nicaragua) - Lever operated Pumps for Medium and Deeop Wells (Jibon Pump, Bangladesh; Walimi Pump, Tanzania; India Mark II, III Pump; U3M Pump, Uganda; Afridev Hanpump, Bush Pump Zimbabwe) - Lever Operated Pump for Extra Deep Wells (India Mark II Extra Deep Well; Afridev Deep Well Pump with Bottom Support)."
Reference Type: Book

#27
Author: Swiss Federal Institute of Aquatic Science and Technology (EAWAG)
Year: 2005
Title: Implementing the Bellagio Principles in Urban Environmental Sanitation - Provisional Guideline for Decisionmakers

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[8] This is a direct quote from the publisher's website: http://www.skat.ch/publications/prarticle.2005-09-29.5069774463/skatpublication.2005-11-22.5737439894. Spelling mistakes are theirs.

Publisher: EAWAG
Notes: "This Guideline for Decisionmakers has been developed to provide first guidance on how to implement the Bellagio Principles by applying the HCES approach (the Environmental Sanitation Working Group of the WSSCC conceived the Household-Centred Environmental Sanitation approach) Assistance is given to those willing to include and test this new approach in their urban environmental sanitation service programmes."
Link to PDF: http://www.wsscc.org/pdf/publication/hces.pdf
Reference Type: Report

#28
Author: Fernando, Vijita
Year: 1996
Title: Water Supply: Energy and Environment Technology Source Book
Publisher: Practical Action
Notes: "The goals of this book are to promote understanding of water supply technologies and water supply management to enable women to make informed choices. The book also contains information on how to assess the suitability of different water supply options and how to find financial and technical assistance. This book is suitable for use by technical and non-technical project managers, project staff, extension officers, trainers and consultants concerned with women in development and women's organisations."
Reference Type: Book

#29
Author: Ferron, Suzanne, Joy Morgan, and Marion O'Reilly
Year: 2006
Title: Hygiene Promotion: A Practical Manual for Relief and Development 2nd Edition
Publisher: Practical Action
Number of Pages: 256
Notes: "Indispensable for fieldworkers on projects or programmes aiming to reduce the incidence of water-and sanitation-related diseases, it will also be useful for other relief and development workers, particularly those working in the fields of community development, health, and engineering. The authors describe a wide range of approaches to hygiene promotion that can be used in different settings. Central to these approaches is a commitment to working in collaboration with people and encouraging them to take more control over the factors that influence their lives. The authors stress the need for a form of hygiene promotion that fosters capacity-building rather than the provision of information alone."
Reference Type: Book

#30
Editor: Fewtrell, Lorna, and Jamie Bartram
Year: 2001
Title: Assessing Microbial Safety of Drinking Water: Improving Approaches and Methods

Publisher: WHO and IWA
Number of Pages: 413
Notes: "The potential to increase consistency in approaches to assessment and management of water-related microbial hazards was discussed by an international group of experts between 1999 and 2001. The group included professionals in the fields of drinking-water, irrigation, wastewater use and recreational water with expertise in public health, epidemiology, risk assessment/management, economics, communication, and the development of standards and regulations. These discussions led to the development of a harmonised framework, which was intended to inform the process of development of guidelines and standards. Subsequently, a series of reviews was progressively developed and refined, which addressed the principal issues of concern linking water and health to the establishment and implementation of effective, affordable and efficient guidelines and standards. This book is based on these reviews, together with the discussions of the harmonised framework and the issues surrounding it."
URL: http://www.who.int/water_sanitation_health/dwq/whoiwa/en/index.html
Reference Type: Edited Book

#31
Author: Fewtrell, Lorna, and John M. Colford Jr.
Year: 2004
Title: Water, Sanitation and Hygiene: Interventions and Diarrhoea a Systematic Review and Meta-Analysis
Series Title: Health, Nutrition and Population Discussion Paper
Publisher: The World Bank
Number of Pages: 88
Notes: "Many individual studies have reported results of interventions intended to reduce illness through improvements in drinking water, sanitation facilities and hygiene practices. This paper provides a formal systematic review and meta-analysis examining the evidence of the effectiveness of these interventions."
Link to PDF:
http://siteresources.worldbank.org/HEALTHNUTRITIONANDPOPULATION/Resources/281627-1095698140167/Fewtrell&ColfordJuly2004.pdf
Reference Type: Report

#32
Programmer: Finney, Brad A., and Robert A. Gearheart
Year: 1998
Title: Water and Wastewater Treatment Technologies Appropriate for Reuse Model (WAWTTAR)
Publisher: Humboldt University
Notes: "The WAWTTAR software package was designed as a tool for individuals with a technical background to use to screen and investigate possible water and wastewater treatment options. The package addresses the problems of (1) overlooking applicable treatment processes and (2) system failures due to the installation of inappropriate treatment technologies. In addition, WAWTTAR serves as a tool for engineers to increase their exposure to various treatment processes and balance the benefits of each in

terms of effectiveness, affordability, and sustainability. The software package assesses geological, atmospheric, and demographic factors and variables to generate a set of comparable, feasible technical solutions."
URL: http://firehole.humboldt.edu/wawttar/wawttar.html
Reference Type: Computer Program

#33
Author: Franceys, R., J. Pickford, and R. Reed
Year: 1992
Title: A Guide to the Development of on-Site Sanitation
Publisher: WHO
Number of Pages: 229
Notes: "This publication has therefore been prepared in response to these developments, as an update of Wagner & Lanoix's work, on which it draws heavily. The change of title is intended to focus attention on sanitation facilities on the householder's property, which are appropriate for some urban areas, as well as rural areas and small communities. The book has three parts. Part I deals with the background to sanitation - health, sociological, financial and institutional issues, and the technologies available for excrete disposal. Part II provides in depth technical information about the design, construction, operation and maintenance of the major types of on-site sanitation facility, while Part III describes the planning and development processes involved in projects and programmes. Annexes on reuse of excrete and sullage disposal are also included; although connected with on-site sanitation, these are primarily off-site activities.

The book has been compiled with the needs of many different readers in mind. The authors hope that it will prove useful for engineers, medical officers and sanitarians in the field, and also for administrators, health personnel, planners, architects, and many others who are concerned with improving sanitation in rural areas and underprivileged urban communities in developing countries."
Link to PDF: http://www.who.int/water_sanitation_health/hygiene/envsan/onsitesan.pdf
Reference Type: Report

#34
Author: Frohlich, U.
Year: 2001
Title: Management Guide: Series of Manuals on Drinking Water Supply
Publisher: Swiss Resource Centre and Development Consultancies for Development
URL: http://www.skat.ch/publications/prarticle.2005-09-29.5069774463/prarticle.2006-11-02.8410562785
Reference Type: Book

#35
Author: Genthe, B., and J. Seager
Year: 1996
Title: The Effect of Water Supply, Handling and Usage on Water Quality in Relation to Health Indices in Developing Communities

Publisher: South African Water Research Commission (WRC)
Report Number: 562/1/96
Reference Type: Report

#36
Author: Genthe, B., and M. Franck
Year: 1999
Title: A Tool for Assessing Microbial Water Quality in Small Community Water Supplies: An H2S Strip Test
Publisher: South African Water Research Commission (WRC)
Report Number: 961/1/99
Reference Type: Report

#37
Author: Global Water Partnership (GWP)
Title: GWP Toolbox for Integrated Water Resources Management
Publisher: GWP
Notes: "The ToolBox is a compendium of good practices related to the principles of Integrated Water Resources Management presented under a structured reference framework. The ToolBox allows water related professionals, to discuss, analyse the various elements of the IWRM process and facilitates the prioritization of actions aimed at improving the water governance and management. The IWRM ToolBox comprises an organized collection of case studies submitted by external contributors which have been peer reviewed. Through this website the ToolBox aims to faciliate that professionals and specialists engage with a broader community for the solution of (water related) problems."
URL: http://www.gwptoolbox.org/
Reference Type: Electronic Source

#38
Author: GWP
Year: Various
Title: Public-Private Partnerships for Water Supply and Sanitation
Publisher: GWP
Notes: A website that contains links to dozens of policy papers and decision making guides organized under the following categories: Preparation, Planning, Procurement, Operation and Monitoring, and Renewal.
URL: http://www.partnershipsforwater.net/web/w/www_8_en.aspx
Reference Type: Electronic Source

#39
Author: Harris, John
Year: 2005
Title: Challenges to the Commercial Viability of Point-of-Use (POU) Water Treatment Systems in Low-Income Settings
Publisher: School of Geography and the Environment, Oxford University

Number of Pages: 78
Notes: "Drawing upon semi-structured interviews with industry experts, this paper argues that initial POU commercialization projects have failed to boost significantly adoption rates. Reasons for this failure are explored. Nevertheless, the pursuit of commercial viability presents a promising strategy by which to promote POU products' adoption and sustained use."
Link to PDF: https://www.who.int/household_water/research/commercial_viability.pdf
Reference Type: Master of Science Thesis

#40
Author: Hazelton, D. G.
Year: 2000
Title: The Development of Effective Community Water Supply Systems Using Deep and Shallow Well Handpumps
Publisher: South African Water Research Commission (WRC)
Report Number: TT 132/00
Reference Type: Report

#41
Author: HealthCanada
Year: 2006
Title: The Multi-Barrier Approach to Safe Drinking Water
Publisher: Health Canada
Last Modified Date: September 2006
Notes: "The multi-barrier approach takes all of these threats into account and makes sure there are "barriers" in place to either eliminate them or minimize their impact. It includes selecting the best available source (e.g., lake, river, aquifer) and protecting it from contamination, using effective water treatment, and preventing water quality deterioration in the distribution system.

The approach recognizes that while each individual barrier may be not be able to completely remove or prevent contamination, and therefore protect public health, together the barriers work to provide greater assurance that the water will be safe to drink over the long term.

Intake to tap (December 2001)
This document was developed by a working group of the Federal-Provincial-Territorial Committee on Drinking Water. It considers the factors that affect drinking water quality from the intake to the tap, while recognizing that source water protection is an integral part of the process. It identifies key elements in a comprehensive drinking water program and sets out best management practices for drinking water purveyors. The guidance is designed specifically for the water industry (public and private), including managers and practitioners responsible for ensuring safe drinking water, whether the supply is public or private, large or small, urban or rural.

From Source to Tap: The Multi-barrier approach to Safe Drinking Water (May 2002)

This short position paper was developed jointly by the Federal-Provincial-Territorial Committee on Drinking Water and the Canadian Council of Ministers of the Environment Water Quality Task Group. It builds upon the information in the Intake to Tap document (see above) to include strategies for source water protection. This paper was prepared for a general audience (such as governments, citizens, and interested stakeholders) to communicate the concept of a multi-barrier approach to drinking water protection.

 From Source to Tap: Guidance on the Multi-barrier Approach to Safe Drinking Water (June 2004)
This technical guidance document is a companion document to the May 2002 position paper, and was also produced jointly by the Federal-Provincial-Territorial Committee on Drinking Water and the Canadian Council of Ministers of the Environment Water Quality Task Group. The document provides in-depth guidance to drinking water system owners and operators on how to apply the concept of the multi-barrier approach to Canadian drinking water supplies.

Guidance For Providing Safe Drinking Water in Areas of Federal Jurisdiction - Version 1 (August 2005)
This guidance document was developed by the Interdepartmental Working Group on Drinking Water (IWGDW), which consists of 13 federal departments who have responsibilities for producing and/or providing clean, safe and reliable drinking water in areas of federal jurisdiction. Guidance is directed to federal civil servants and other responsible authorities whose jobs relate, either directly or indirectly, to ensuring the safety of drinking water on federal lands, in federal facilities and/or in First Nations communities. The document incorporates an "intake to tap" approach, and is complementary to the Guidelines for Canadian Drinking Water Quality, referencing the Guidelines as the minimum standard for safe drinking water."
URL: http://www.hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/multi-barrier/index_e.html
Reference Type: Report

#42
Author: House, Sarah, and Bob Reed
Year: 2004
Title: Emergency Water Sources: Guidelines for Selection and Treatment (3rd Edition)
Publisher: Practical Action
Notes: "These guidelines have been designed to help those involved in the assessment of emergency water sources to collect relevant information in a systematic way, to use this information to select a source or sources and to determining the appropriate level of treatment required to make the water suitable for drinking. The book is relevant to a wide range of emergency situations, including both natural and conflict-induced disasters."
Reference Type: Book

#43
Author: Howard, Guy
Year: 2002

Title: Healthy Villages: A Guide for Communities and Community Health Workers
Publisher: WHO
Notes: "This guide is intended to provide community leaders with information to assist them in implementing and sustaining a health villages project. It covers topics such as water and sanitation drainage, waste management, housing quality, domestic and community hygiene, and provision of health services, providing extensive source materials for adaptation to local needs and conditions."
URL: http://www.who.int/water_sanitation_health/hygiene/settings/healthvillages/en/
Reference Type: Book

#44
Author: Howard, J.R., N. Quinn, K. Eales, S. Douglas, N. Quinn, and R. Voller
Year: 2000
Title: The Development of an on-Site Sanitation Planning and Reporting Aid (Sspra) for the Selection of Appropriate Sanitation Technologies for Developing Communities
Publisher: South African Water Research Commission (WRC)
Report Number: 586/1/00
Reference Type: Report

#45
Author: Hutton, Guy
Year: 2000
Title: Considerations in Evaluating the Cost-Effectiveness of Environmental Health Interventions
Publisher: WHO
Number of Pages: 97
Link to PDF: http://www.who.int/quantifying_ehimpacts/publications/en/wsh00-10.pdf
Reference Type: Report

#46
Author: Huuhtanen, Sari, and Ari Laukkanen
Year: 2006
Title: A Guide to Sanitation and Hygiene for Those Working in Developing Countries
Publisher: Global Dry Toilet Club of Finland, Tamper Polytechnic University of Applied Sciences
Number of Pages: 56
Notes: "The aim of the project has been to increase the knowledge of Finnish workers in developing countries in sanitation and hygiene matters and to give them abilities to answer local people's questions on sanitation and hygiene. It is desirable that workers, along with their own tasks, could make observations on the state of sanitation and think of proposals for improvements, together with the local people, to possible sanitation problems in the area. The aim is to get organizations and companies to get sanitation issues as a part of their functions."
Link to PDF: http://www.drytoilet.org/pdf/Sanitation_Guide.pdf
Reference Type: Report

#47
Author: The International Benchmarking Network (IBNET) for Water and Sanitation Utilities
Year: 2005
Title: The International Benchmarking Network for Water and Sanitation Utilities - Toolkit
Publisher: IBNET, World Bank, Water and Sanitation Program (WSP), and the United Kingdom Department for International Development (DFID)
Notes: "The IBNET Benchmarking Toolkit contains all the information and worksheets you need to start your own benchmarking scheme. It also provides more complete information on data and indicator definitions for readers only interested in using the Performance Results already available on this site. The Benchmarking Toolkit is available in English (for Excel and Word documents), and in Spanish and French (for Word documents). A Russian version is currently being prepared."
URL: http://www.ib-net.org/en/ibnet-toolkit/ibnet-toolkit/download-ibnet-toolkit.php?L=2&S=3&ss=4
Reference Type: Electronic Source

#48
Author: Idelovitch, Emanuel, and Klas Ringskog
Year: 1997
Title: Wastewater Treatment Options in Latin America: Old and New Options
Publisher: World Bank
Notes: Technological Options; Financing and Implementation Options
Link to PDF: http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/1997/08/01/000009265_3971229180845/Rendered/PDF/multi_page.pdf
Reference Type: Report

#49
Author: Johnson, Randy
Year: 2006
Title: Drinking Water Contaminant Table
Publisher: N/A
Notes: Includes information on organic and non-Organic Contaminants in H20; contaminant removal by different POU methods; and an extensive table that lists the appropriateness of different technologies for addressing common water contaminants.
URL: http://www.cyber-nook.com/water/WaterTreatment.htm
Reference Type: Electronic Source

#50
Editor: Kerr, Charles
Year: 1989
Title: Community Water Development
Publisher: Intermediate Technology Development Group (ITDG)

Notes: "This collection of articles from the Waterlines and Appropriate Technology journals covers the areas: sources of water, abstraction, pumping and distribution, and training and maintenance. It is an excellent training guide."
Reference Type: Edited Book

#51
Editor: Kerr, Charles
Year: 1995
Title: Community Health and Sanitation
Publisher: ITDG
Notes: "A community-sensitive approach to the developing world's water supply; for students, trainers and engineers alike. Deals with disease and problems of water in the house and at the source, waste disposal, and education and training."
Reference Type: Edited Book

#52
Author: Lagardien, A., and D. Cousins
Year: 2005
Title: Strategic Approaches in the Provision of Sanitation Services to Informal and Unserviced Areas
Publisher: South African Water Research Commission (WRC)
Report Number: 1438/1/05
Reference Type: Report

#53
Author: Lantagne, Daniele S., Robert Quick, and Eric D. Mintz
Year: 2005
Title: Household Water Treatment and Safe Storage Options in Developing Countries: A Review of Current Implementation Practices
Publisher: Woodrow Wilson International Center for Scholars
Notes: "This paper summarizes five of the most common HWTS options—chlorination, filtration (biosand and ceramic), solar disinfection, combined filtration/chlorination, and combined flocculation/chlorination—and describes implementation strategies for each option."
Link to PDF: http://www.wilsoncenter.org/topics/pubs/WaterStoriesHousehold.pdf
Reference Type: Report

#54
Author: LeChevallier, Mark W., and Kwok-Keung Au
Year: 2004
Title: Water Treatment and Pathogen Control - Process Efficiency in Achieving Safe Drinking Water
Publisher: WHO and IWA
Number of Pages: 136
Notes: "This document is a critical review of some of the literature on removal and inactivation of pathogenic microbes in water. The aim is to provide water quality

specialists and design engineers with guidance on selecting appropriate treatment processes, to ensure the production of high quality drinking-water. Specifically, the document provides information on choosing appropriate treatment in relation to raw water quality, estimating pathogen concentrations in drinking-water, assessing the ability of treatment processes to achieve health-based water safety targets and identifying control measures in process operation."
Link to PDF: http://www.who.int/water_sanitation_health/dwq/en/watreatpath.pdf
Reference Type: Report

#55
Author: Leermakers, Mieke
Year: 2000
Title: 25 Steps to Safe Water and Sanitation: Experience and Learning in International Cooperation, No. 1
Publisher: Helvetas – Swiss Development Agency
Notes: "This Helvetas publication describes the successful "community-oriented stepwise approach", developed in Nepal in an integrated project which includes the construction of drinking water and sanitation facilities as well as the introduction of better hygienic practices. The stepwise approach makes community management a priority and combines it with the promotion of gender awareness through actual practice within this process."
Reference Type: Book

#56
Author: Lens, P., G. Zeeman, and G. Lettinga
Year: 2001
Title: Decentralised Sanitation and Reuse: Concepts, Systems and Implementation
Publisher: IWA
Notes: "Adopting a multi-disciplinary approach, "Decentralised Sanitation and Reuse" places public sanitation in a global context and provides a definitive discussion of current state-of-the-art sanitation technologies. It shows how these technologies can be implemented to integrate domestic waste and wastewater treatment in order to maximize resource recycling in domestic practice.

Decentralised Sanitation and Reuse presents technical solutions for on-site collection and transport of concentrated waste streams, and focuses on the compromise between reliability and minimal water wastage. A whole range of available sustainable technologies, both low and high-tech, to treat concentrated (black water) and diluted (grey water) streams are addressed in detail from the fundamental scientific and engineering points of view.

Sociological, economic and, particularly, environmental and public health aspects are essential issues within this book. The necessity of new infrastructure implementation and the resulting challenges for a good number of economic branches are illustrated with examples from architecture and town planning.

Decentralised Sanitation and Reuse will be an invaluable resource for a wide academic and professional readership active in the fields of environmental protection and public sanitation."
Reference Type: Book

#57
Programmer: Loestcher, T
Year: 1999
Title: Sanex
Publisher: Advanced Wastewater Management Centre, The University of Queensland, Australia
Notes: This computer program is described as "decision support software for assessing the suitability of sanitation technologies for developing communities."
URL for the manual:
http://www.training.gpa.unep.org/documents/sanex_20_user_manual_english.pdf
Reference Type: Computer Program

#58
Author: Louis, Garrick E., and Luna M. Magpili
Year: 2002
Title: A Needs-Based Methodological Framework for Planning Sanitation Service Provision in Less Industrialized Countries
Conference: 2nd Annual Asia Pacific Landfill Symposium, Sept 24-28, 2002, Seoul, Korea
Number of Pages: 8
Notes: "The challenge facing us at the dawn of the millennium begins with scale. Given that waste is generated at all stages of human activity, residential and industrial waste production continues to increase in both absolute and per capita terms worldwide. The problem in developing countries is more acute due to the general inability to meet current demand and the pressing need to increase capacity to meet present and future needs under heavy economic and resource constraints. This paper adopts a three-pronged approach to planning: needs assessment, needs analysis, and needs management; as strategic responses to Haimes' three questions for risk management (Haimes, 1998a), "What can be done and what options are available?" "What are their associated trade-offs in terms of costs, benefits, and risks?" "What are the impacts of current management decisions on future options?" The research presents contextual planning framework for addressing the deficiencies of sanitation services in developing countries, tested via a case study in the town of Bacoor, Philippines."
Link to PDF:
http://www.sys.virginia.edu/dfd/CIMSS%20Site/PDF%20or%20Electronic%20Publicati ons/APLAS%20paper-final.pdf
Reference Type: Conference Proceedings

#59
Author: Louis, Garrick E., and Tisan Ahmad
Year: 2004

Title: Technology Assessment for Sustainable Sanitation Services in Low-Income Communities
Notes: "The goal of this paper is to present an objective method for selecting appropriate sanitation service options for low income communities. This goal will be achieved through the objectives of; (i) developing an exhaustive list of MSS technologies, (ii) classifying this list into MSS options, and (iii) ranking these options so they may be mapped into a profile of host communities. In the past twenty years, many developmental agencies focused intense attention on the water and sanitation sector in an attempt to bridge the gaps in service in low income communities. Although considerable progress has been made, there is still no systematic method for helping a select an appropriate MSS option to implement. This paper adds to Louis' method to help communities make informed decisions about which of the many MSS options to implement (Louis, 2002). There are two complementary components to this approach: the assessment of the MSS options and the assessment of the community. The assessment of the MSS options will be presented in this paper and the assessment of community which receives these service options, will be discussed briefly. Finally, the method as a whole is then examined and illustrated using a case study."
Link to PDF: http://www.sys.virginia.edu/techreps/2004/SIE-040008.pdf
Reference Type: Article

#60
Author: Lovell, Chris
Year: 2001
Title: Productive Water Points in Dryland Areas: Guidelines on Integrated Planning for Rural Water Supply
Publisher: Practical Action
Notes: "This book shows how research in Southern Africa has shed light on why conventional wells and boreholes fail, on the potential of the groundwater resource to support production through improved siting and selection of more appropriate well designs, and on the positive impacts and some problems that can emerge at productive water points. The findings are presented in a practical manner to encourage planners and practitioners in rural water supply to consider developing productive water points in drought-prone areas."
Reference Type: Book

#61
Author: Mara, Duncan
Year: 1996
Title: Low-Cost Urban Sanitation
Publisher: John Wiley and Sons
Number of Pages: 223
Notes: "This book covers the public health, technical, socioeconomic, sociocultural and institutional aspects of sanitation in towns and cities of developing countries. The text features excreta-related diseases and the use of sanitation to reduce their transmission. The sanitation technologies covered in detail are VIP latrines, pour-flush toilets, septic tanks, settled sewerage and simplified sewerage, with additional chapters on sullage

disposal, pit emptying, and sewage treatment and reuse. .... The text also explains how to choose the most appropriate sanitation option for a given low-income community."
Reference Type: Book

#62
Author: Mara, Duncan
Year: 2004
Title: Domestic Wastewater Treatment in Developing Countries
Publisher: James & James/Earthscan
Notes: "This book details methods of domestic wastewater treatment that are especially suitable in developing countries. The emphasis is on low-cost, low-energy, low-maintenance, high-performance systems that contribute to environmental sustainability by producing effluents that can be safely and profitably used in agriculture for crop irrigation and/or in aquaculture for fish and aquatic vegetable pond fertilization. Modern design methodologies, with worked design examples, are described for waste stabilization ponds (WSP), wastewater storage and treatment reservoirs, constructed wetlands, upflow anaerobic sludge blanket reactors, biofilters, aerated lagoons, and oxidation ditches."
Reference Type: Book

#63
Author: Marah, L., R. J. Martin, R. Alence, and D. Boberg
Year: 2003
Title: Identifying Examples of Successful Cost Recovery Approaches in Low Income, Urban and Peri-Urban Areas
Publisher: South African Water Research Commission (WRC)
Report Number: 1131/1/03
Reference Type: Report

#64
Author: Mays, Larry W.
Year: 2002
Title: Urban Water Supply Handbook
Publisher: McGraw Hill
Number of Pages: 704
Notes: "This state-of-the-art resource draws upon the accumulated wisdom of a carefully chosen team of internationally recognized experts selected for their extensive experience in the essential aspects of water supply systems. This industry "who's who" covers everything from the historical perspectives of urban water supply to planning, safety and security – an especially timely and crucial issue, management, performance indicators, operation, pricing, maintenance, and public-private partnerships. The author includes informative case studies for valuable "real world" perspective."
Reference Type: Book

#65
Author: Moat, C., C. van den Voorden, and W. Wilson

Year: 2003
Title: Making Water Work for Villages
Publisher: South African Water Research Commission (WRC)
Report Number: TT 216/03
Reference Type: Report

#66
Author: Ministry for the Environment, New Zealand
Year: 2003
Title: Sustainable Wastewater Management: A Handbook for Smaller Communities
Publisher: Ministry for the Environment, New Zealand
Notes: "Provides a framework to assist small communities identify and evaluate alternatives for improving sewage treatment and disposal. The aim of the handbook is to help communities understand and navigate the issues, plans, legislation, and technical advice provided by consultants."
Link to PDF: http://www.mfe.govt.nz/publications/waste/wastewater-mgmt-jun03/introduction.pdf
Reference Type: Report

#67
Author: Narayan, Deepa
Year: 1993
Title: Participatory Evaluation Tools for Managing Change in Water and Sanitation
Publisher: World Bank
Number of Pages: 140
Notes: Provides policymakers, managers, and planning and evaluation staff with ideas about participatory processes and indicators that can be used to involve community members and others in program evaluation.
Link to PDF: http://povlibrary.worldbank.org/files/14789_Participatory_Evaluation.pdf
Reference Type: Report

#68
Author: Onabolu, B., and M. Ndlovu
Year: 2006
Title: A Methical Approach to Health and Sanitation Integration
Publisher: South African Water Research Commission (WRC)
Report Number: 1380/1/06
Reference Type: Report

#69
Author: Planning and Development Collaborative International (PADCO)
Year: 2001
Title: Urban Water Supply and Sanitation Programming Guide
Publisher: PADCO and the United States Agency for International Development (USAID)
Number of Pages: 133

Notes: "The Guide first outlines key strategic issues associated with program planning. After covering these basics, the scheduling and organization of planning and implementation are introduced and briefly discussed. The final section contains multiple references to useful sources of information on each topic. Decisionmakers and technical managers can use the reference section to locate and obtain a wealth of detailed information on program planning and implementation."
Link to PDF: http://www.makingcitieswork.org/files/docs/Tools/splash.pdf
Reference Type: Report

#70
Author: Palmer, I., and R. Eberhart
Year: 1995
Title: Evaluation of Water Supply to Developing Urban Communities
Publisher: South African Water Research Commission (WRC)
Report Number: KV 73/95
Reference Type: Report

#71
Author: Parr, Jeremy, and Rod Shaw
Year: 1999
Title: Choosing an Appropriate Technology
Publisher: WEDC, Loughborough University
Number of Pages: 4
Notes: This electronic source provides descriptions of common water treatment processes; procedures to select an appropriate technology; and utilizes SHTEFIE criteria.
URL: http://www.lboro.ac.uk/well/resources/technical-briefs/49-choosing-an-appropriate-technology.pdf
Reference Type: Electronic Source

#72
Author: Palmer Development Group (PDG)
Year: 2004
Title: Guidelines for Economic Regulation of Water Services in South Africa
Publisher: PDG and South African Water Research Commission (WRC)
Report Number: TT 229/04
Reference Type: Report

#73
Author: Pearson, G., and G. Idema
Year: 1998
Title: An Assessment of Common Problems Associated with Drinking Water Disinfection in the Developing Areas
Publisher: South African Water Research Commission (WRC)
Report Number: 649/1/98
Reference Type: Report

#74
Author: Pearson, I. A., J. Bhagwan, W. Kariuki, and W. Banda
Year: 2001
Title: Guidelines on Appropriate Technologies for Water Supply and Sanitation in Developing Communities
Publisher: South African Water Research Commission (WRC)
Report Number: 520/1/01
Reference Type: Report

#75
Author: Pérez Carrión, José M.
Year: 2000
Title: Technologia Apropriada En Tratamiento De Agua
Publisher: CEPIS
Notes: "In order to solve the problem of waste supply, the following technological solutions are used in Latin America; Those imported from developed countries, conventional, of appropriate technology and very elemental methods.

The objectives of a water supply system are: improve health, economy and development without modifying the environment. An adequate technological solution will be that which attains these objectives, with the major use of material and local resources, of easy construction and operation.

PAHO/CEPIS has contributed to the use of adequate technological solutions in water treatment, through the execution of a program of diagnosis, construction and evaluation of pilot plants, and mass dissemination, arriving at the following conclusion: That it is possible to design, build, operate and maintain water treatment plants, of high technical efficiency, at a lower cost than 50% of other technological solutions."
URL: http://www.cepis.ops-oms.org/eswww/proyecto/repidisc/publica/hdt/hdt004.html
Reference Type: Electronic Source

#76
Author: Pickford, John
Year: 1991
Title: The Worth of Water: Technical Briefs on Health, Water and Sanitation
Publisher: Practical Action
Number of Pages: 144
Notes: This book "brings together a series of short, highly illustrated introductions to many of the main technologies and processes in the field of village and community level water and sanitation, ranging from household water storage to public standposts."
Reference Type: Book

#77
Author: Pickford, John, Peter Barker, Adrian Load, and Tom Dijkstra
Year: 1995
Title: Affordable Water Supply and Sanitation

Conference: 20th WEDC Conference, August 1994, Colombo, Sri Lanka
Publisher: WEDC
Number of Pages: 354
Notes: "The editors consider the different aspects of, and the issues surrounding, affordable water supply and sanitation. They consider both 'software' aspects - people, communities, health, management and institutions - as well as technological considerations such as waste management."
URL: http://wedc.lboro.ac.uk/publications/details.php?book=0%20906055%2042%203
Reference Type: Conference Proceedings

#78
Author: Pickford, J.
Year: 1995
Title: Low-Cost Sanitation: A Survey of Practical Experience
Publisher: Intermediate Technology Publications
Reference Type: Book

#79
Author: Rogers, Peter, and Alan W. Hall
Year: 2003
Title: Effective Water Governance
Publisher: GWP
Number of Pages: 48
Notes: "This paper has been developed by the GWP as part of the Dialogue on Effective Water Governance. It is aimed at water professionals who increasingly need to be familiar with issues of governance as they strive to work outside the water sector. Governance is much debated but is probably not familiar to the water community; the paper thus sets out in Section 1 the present thinking on governance. It draws on current thinking by Kooiman (1993), Keohane and Ostrom (1995), Pierre (2000) and others but does not profess to be an exhaustive analysis and does not address the wider areas of 'good governance' such as democracy, electoral systems and sovereignty. In Section 2 the particular aspects of water governance are addressed and this covers both the management of water as a natural resource and the use of water for social or productive purposes. Section 3 gives some ideas on how to achieve effective water governance taking account of governance both within and outside the water sector. It does not pretend to be complete; indeed, one purpose of this paper is to stimulate more practical ideas and solutions. Finally, Section 4 gathers some observations on water governance that need to be taken into account when reforming systems and provides some examples of actions presently underway."
Link to PDF: http://www.gwpforum.org/gwp/library/TEC%207.pdf
Reference Type: Report

#80
Author: Ross-Jordan, J.
Year: 2006

Title: The Development of a Successful Unaccounted-for Water Management
Programme in the Rural Water Supply Context
Publisher: South African Water Research Commission (WRC)
Report Number: TT 256/06
Reference Type: Report

#81
Author: Schoeman, G., and Magongoa
Year: 2004
Title: Community Identified Performance Indicators for Measuring Water Services
Publisher: South African Water Research Commission (WRC)
Report Number: TT 228/04
Reference Type: Report

#82
Author: Schouten, Ton, and Patrick Moriarty
Year: 2003
Title: Community Water, Community Management: From System to Service in Rural
Areas
Publisher: Practical Action
Notes: "This book considers the opportunities and constraints of community management
in providing a service to the millions of people who need it: What factors affect
community cohesion? Why do systems fail? Under what conditions is community
management the most suitable model? How can support to community managed systems
best be provided? What are the key actions needed to scale up community management
successfully? Published in collaboration with IRC International Water and Sanitation
Centre."
Reference Type: Book

#83
Author: Schultz, Christopher, and Daniel A. Okun
Year: 1992
Title: Surface Water Treatment for Communities in Developing Countries
Publisher: Practical Action
Number of Pages: 312
Notes: "This book discusses the basic considerations that need addressing when
designing or building water treatment plants. Also presents a series of appropriate
treatment requirements and processes for plants for use by communities in developing
countries."
Reference Type: Book

#84
Author: Shaw, Rod
Year: 1999
Title: Running Water: More Technical Briefs for Health, Water and Sanitation
Publisher: Practical Action

Notes: "This second collection of 32 short, highly-illustrated introductions to appropriate water and sanitation technologies and processes complements The Worth of Water. It covers a further range of subjects from water source selection and hand pump maintenance to sanitary surveying, hygiene understanding and community management."
Reference Type: Book

#85
Author: Skinner, Brian
Year: 2003
Title: Small-Scale Water Supply: A Review of Technologies
Publisher: WELL
Notes: "Small-scale Water Supply provides non-specialists with an overview of the technologies available for water supply in low-income communities in rural areas of developing countries. Focusing chiefly on point supplies such as wells, boreholes, springs and rainwater catchment systems, the book also introduces the reader to powered pumps, water treatment and piped distribution systems. Chapters cover design capacity, sources of water, raising water, storage and water treatment. The book contains useful illustrations of each of the technologies and outline guidance on making appropriate choices between technologies. The subject of water supply is vast and this handy book shows the reader where to begin in designing water supply systems. Extensive appendices point the reader to sources of further information for each technology, both in printed form and from Internet web pages. Published in collaboration with WELL (Water and Environmental Health at London and Loughborough)."
Reference Type: Book

#86
Editor: Smet, Jo, and Christine van Wijk
Year: 2002
Title: Small Community Water Supplies: Technology, People and Partnership
Publisher: IRC
Number of Pages: 585
Notes: "In 1981 IRC first published Small Community Water Supplies and the book has been a regular bestseller. A large part of its appeal has been that it is one of the few textbooks to link water supply science and technology with the specific needs of small communities in developing countries.

This completely revised edition with contributions from 29 authors from different countries provides a general introduction to a wide range of technologies. Among the topics covered are: planning and management of small water supplies, community water supplies in Central and Eastern European countries, water quality and quantity, integrated water resources management, artificial recharge, rainwater harvesting, spring water tapping, groundwater withdrawal, water lifting, surface water intake, water treatment, aeration, coagulation and flocculation, sedimentation, multi-stage filtration, desalination technology, disinfection, household level water treatment, technologies for arsenic and iron removal from ground water, and emergency and disaster water supply.

Target audience: Engineers and other staff involved in water supply programmes and projects, and students."
URL: http://www.irc.nl/page/1917
Reference Type: Edited Book

#87
Author: Sobsey, Mark
Year: 2002
Title: Managing Water in the Home: Accelerated Health Gains from Improved Water Supply
Publisher: WHO
Number of Pages: 83
Notes: "This report describes and critically reviews the various methods and systems for household water collection, treatment and storage. It also presents and critically reviews data on the ability of these household water treatment and storage methods to provide water that has improved microbiological quality and lower risk of waterborne diarrheal and other infectious disease. The target audience for this report is intended to be scientists, engineers, policy makers, managers and other public health, environmental health and water resources professionals who are knowledgeable about the fundamentals of drinking water and related health sciences and water engineering technology."
Link to PDF: http://www.who.int/water_sanitation_health/dwq/WSH02.07.pdf
Reference Type: Report

#88
Author: Sohail, M., and A.P. Cotton
Year: 2002
Title: Tools for Sustainable Operation and Maintenance of Urban Infrastructure - Tool 7a and Tool 10
Publisher: Water, Engineering and Development
Number of Pages: 38
Notes: "This document presents the findings from Project R-7397, 'Operation, maintenance and sustainability of services for the urban poor'. The document also indicates a framework for potential community and institutional roles for effective O&M. The purpose of the project is to improve the sustainability of urban services in poor communities by using an appropriate management framework and supporting tools for external agencies, urban government and non-government organisations (NGOs).
The WHO monograph Tools for assessing the O&M status of water supply and sanitation in developing countries comprises nine tools which can be used to measure and evaluate the effectiveness of operations and maintenance (O&M) of water supply and sanitation services."
Link to PDF: http://wedc.lboro.ac.uk/publications/pdfs/tfsomui/tfsomui-insides.pdf
Reference Type: Report

#89
Author: Still, D., P. Mwangi, and P. Housten
Year: 2003

Title: Cost and Tariff Model for Rural Water Supply Schemes
Publisher: South African Water Research Commission (WRC)
Report Number: 886/1/03
Reference Type: Report

#90
Author: Still, D., and F. Balfour
Year: 2006
Title: The Use of Key Performance Indicators in the Benchmarking of Rural Water Supply Schemes: An Aid to Development of Meaningful Local Government Capacity
Publisher: South African Water Research Commission (WRC)
Report Number: TT 255/06
Reference Type: Report

#91
Author: Swartz, C. D., and T. Ralo
Year: 2004
Title: Guidelines for Planning and Design of Small Water Treatment Plants for Rural Communities, with Specific Emphasis on Sustainability and Community Involvement and Participation
Publisher: South African Water Research Commission (WRC)
Report Number: 1185/1/04
Reference Type: Report

#92
Author: Taljaard, L., A. Venter, and D. Gorton
Year: 2005
Title: An Evaluation of Different Commercial Microbial or Microbially-Derived Products for the Treatment of Organic Waste in Pit Latrines
Publisher: South African Water Research Commission (WRC)
Report Number: 1377/1/05
Reference Type: Report

#93
Author: United Nations Environment Program (UNEP)
Year: 2000
Title: International Source Book on Environmentally Sound Technologies for Wastewater and Stormwater Management
Publisher: UNEP
Notes: "This 'International Source Book on Environmentally Sound Technologies for Wastewater and Stormwater Management' is a sequel to IETC's successful publication 'International Source Book on Environmentally Sound Technologies for Municipal Solid Waste Management'. The urgent need for information on how to deal with wastewater is clearly shown by the fact that nearly 3 billion people are without adequate sanitation and its impact on health, medical bills, consequent loss of economic productivity and environmental degradation...This Source Book complements UNEP's Practical Policy

Guidance for the implementation of the Global Programme of Action (GPA) for the protection of the marine environment from land based activities. Much of the pollution from land based activities come with wastewater and stormwater. Though approached from different angles the two publications are consistent in their message."
URL: http://www.unep.or.jp/ietc/publications/techpublications/techpub-15/main_index.asp
Reference Type: Electronic Source

#94
Author: UNEP
Year: 2000
Title: Technical Workbook on Environmental Management Tools for Decision Analysis
Publisher: UNEP International Environmental Technology Centre
Notes: "This workbook is designed to facilitate a wider dissemination of EM tools, such as Environmental Technology Assessment (EnTA), Environmental Risk Assessment (EnRA), Rapid Urban Environmental Assessment (RUEA), Environmental Profiling (EP) and Environmental Management Systems (EMS)."
URL: http://www.unep.or.jp/ietc/Publications/techpublications/TechPub-14/index.asp
Reference Type: Electronic Source

#95
Author: United Nations Habitat Program, Regional Office of Latin America and the Caribbean (UNHABIT ROLAC) and UNEP
Year: 2003
Title: Recommendations on Basic Sanitation and Municipal Waste Water for Latin America & the Caribbean
Publisher: United Nations Habitat Program, Regional Office of Latin America and the Caribbean (UNHABIT ROLAC) and UNEP
Number of Pages: 134
Notes: "The objective of this document is to help key stakeholders and decisionmakers to identify, evaluate and select appropriate, environmentally sound, technically feasible, and economically viable systems for basic sanitation services and municipal wastewater management in Latin America and the Caribbean. Our primary focus is on promoting alternative sustainable solutions for sanitation and wastewater treatment, such as ecological sanitation (ecosan), on the one hand; and resource efficient water-based systems, such as ecological engineering, low-cost sewer systems (e.g. small-bore condominium systems) and stabilization ponds."
Link to PDF:
http://www.stakeholderforum.org/fileadmin/files/RECOMMENDATIONS_FOR_DECISION-MAKING_IN_LA_C.pdf
Reference Type: Report

#96
Author: UNEP
Year: 2004
Title: Guidelines on Municipal Wastewater Management

Publisher: UNEP / WHO / UN HABITAT / Water Supply and Sanitation Collaborative Council (WSSCC)
Number of Pages: 112
Notes: "The guidelines address and stress the need to link water supply and the provision of household sanitation, wastewater collection, treatment and re-use, cost-recovery, and re-allocation to the natural environment. Local participation is advocated and stepwise approach to technology and financing, starting at modest levels, expanding if and when more resources become available. The guidelines are summarized in 10 keys for action covering: political commitment; action at national and local level; going beyond taps and toilets; integrated management; long-term perspectives with step-by-step approaches; time-bound targets and indicators; appropriate technology; demand-driven approaches; stakeholder involvement; transparency; and financial stability and sustainability. UNEP and its partners are pleased to present this third version of the guidelines, which went through several rounds of review and consultation. UNEP very much welcomes comments to ensure that the guidelines address the needs of the users."
Link to PDF:
http://esa.un.org/iys/docs/san_lib_docs/guidelines_on_municipal_wastewater_english.pdf
Reference Type: Report

#97
Author: United Nations Children's Fund (UNICEF)
Year: 1997
Title: Towards Better Programming: A Sanitation Handbook
Publisher: UNICEF and USAID
Report Number: Water, Environment and Sanitation Technical Guidelines Series - No. 3; EHP Applied Study No. 5
Number of Pages: 155
Notes: "UNICEF has prepared this handbook to serve as a resource for staff and their partners to use in planning realistic and better quality sanitation programmes. The art of programming, and related policy development, should be seen as a continuous learning process, one which evolves better programmes over time based on careful analysis of living experience and innovation. Programming is not merely a paper exercise but an approach to help a sector evolve with the participation of all those concerned—from local communities, concerned professionals in public, nongovernmental, and private sectors, to national policy makers.

The sanitation programming process presented in this handbook employs participatory methods, objective oriented planning techniques, and key principles that reflect positive and negative lessons learned about sanitation. All are premised on participation and inclusion. The methods you will find here focus on programme-level rather than project-level planning, endeavors in which the programme is a broad framework for several projects with similar longterm goals. Programme-level planning provides a framework for integrating sanitation activities with such activities as health, nutrition, and education, which is difficult to do within the scope of individual projects.

It is assumed that readers will have had practical experience with development-related issues, but are seeking better knowledge, methods, and techniques to plan and implement sanitation programmes and projects. The handbook should be particularly useful to:
- UNICEF programme and project officers responsible for UNICEF support for sanitation improvement.
- Planners and implementers of government agencies and NGOs that implement national and local sanitation programmes receiving UNICEF support.
- Supervisors and senior officials in agencies and organisations employing the above categories of officers."
Link to PDF: http://www.unicef.org/wes/files/San_e.pdf
Reference Type: Report

#98
Author: UNICEF
Year: 1999
Title: Towards Better Programming: A Manual on Communication for Water Supply and Environmental Sanitation Programmes
Publisher: UNICEF
Report Number: Water, Environment and Sanitation Technical Guidelines No. 7
Number of Pages: 83
Notes: "Water supply and environmental sanitation professionals worldwide have evolved a body of imaginative inventiveness, variety and practicality that is the envy of many other programme interventions. This Manual will attempt to build upon that wealth of experience for you. It will use a modified Triple A framework (Assessment – Analysis – Action) within a context of communication models and theories that have been successfully applied in a variety of cultural settings and interventions."
Link to PDF: http://www.unicef.org/wes/files/com_e.pdf
Reference Type: Report

#99
Author: UNICEF
Year: 1999
Title: Towards Better Programming: A Manual on Hygiene Promotion
Publisher: UNICEF and the London School of Hygiene and Tropical Medicine
Report Number: Water, Environment and Sanitation Technical Guidelines Series No. 6
Number of Pages: 85
Notes: "This manual presents methodologies to assist development workers in the promotion of behavioural change for safer hygiene practices, and to help make hygiene promotion programmes more effective. The objective of the manual is to provide a tool that will contribute towards a reduction in diarrhoeal diseases - one of the top three killer diseases in developing countries - and thus a reduction in child mortality.

The manual describes a methodology for bottom-up programming for hygiene promotion: first finding out what people know about hygiene through formative research in people's knowledge and practices, and then combining this with state-of-the-art expert knowledge and appropriate communication strategies to develop effective and sustainable

programming models. The manual is accessible and jargon-free: its audience includes all professionals interested in the area of hygiene promotion."
Link to PDF: http://www.unicef.org/wes/files/hman.pdf
Reference Type: Report

#100
Author: UNICEF
Year: 1999
Title: Towards Better Programming: A Water Handbook
Publisher: UNICEF
Report Number: Water, Environment and Sanitation Technical Guidelines Series No. 2
Number of Pages: 116
Notes: "The Water Handbook is part of a series of modules which were written with the objective of assisting UNICEF programme and project officers in the operationalization of the new WES strategies as presented in: UNICEF Strategies in Water and Environmental Sanitation. Although UNICEF POs working with water-related programmes at the country and sub-country level are the primary target of this handbook, it is also useful for Representatives and other UNICEF staff members, in addition to government and NGO partners. Ideally, UNICEF Strategies in Water and Environmental Sanitation1 should be read prior to using this handbook. Before proceeding to a specific section of interest in this handbook, Section 1 Water and Sustainable Development should be read first. For the reader interested in gaining a general broad understanding of the issues pertinent to UNICEF-assisted water programmes, the entire handbook should be read. For other readers, any individual section can be read as each section is self-contained and can stand on its own.

At the end of each section a set of a summary points has been provided to assist the reader in reviewing the section or of getting an idea of the contents of the section. Text boxes have been used extensively throughout the handbook. The boxes contain excerpts from case studies or other documents related to the section material and are intended to further illustrate or broaden the material presented in the body of the handbook. Primary references for additional reading are presented in the bibliography at the end of the handbook. Full details of all references in the text can be found in the bibliography."
Link to PDF: http://www.unicef.org/wes/files/Wat_e.pdf
Reference Type: Report

#101
Author: Various
Years: Various
Title: WHO Water Resources and Sources Tools
Publisher: WHO
Notes: "Stimulating the development and testing of new technologies, tools and guidelines for disease control, risk reduction, health-care management, and service delivery."...is one of the six core functions listed in the General Programme of Work 2002-2005 of WHO.

Hygiene and PHAST
- PHAST step-by-step guide: a participatory approach for the control of diarrhoeal diseases
- Participatory hygiene and Sanitation Transformation: a new approach to working with communities

Sanitation-related tools
- Guide to the development of on-site sanitation
- Sanitation promotion
- Preventing trachoma: a guide for environmental sanitation and improved hygiene

Health impact assessment of water resources
- Health impact assessment harmonization, mainstreaming and capacity building
- Intersectoral decision-making skills in support of health impact assessment of development projects
- Health opportunities in development

Good practice in drinking-water quality
- Toxic cyanobacteria in water: their public health consequences

Operation and maintenance of drinking-water supply and sanitation
- Operation and maintenance of rural water supply and sanitation systems: a training package
- Tools for assessing the O & M status of water supply and sanitation in developing countries
- Upgrading water treatment plants
- Leakage management and control: a best practice training manual

Water resources quality
- Water quality assessments
- Water quality monitoring
- Water pollution control
- Toxic cyanobacteria in water: a guide to the public health consequences
- Monitoring bathing waters

Healthy settings
- Healthy villages: A guide for communities and community health

Emergencies
- Environmental health in emergencies and disasters: a practical guide"
URL: http://www.who.int/water_sanitation_health/tools/en/index.html
Reference Type: Electronic Source

#102
Author: Venter-Hildebrand, M.

Year: 2005
Title: Application and Testing of the WSSCC Indicator Toolkit for Water and Sanitation
Achievements – Report Number KV 162/05
Publisher: South African Water Research Commission (WRC)
Reference Type: Report

#103
Author: World Bank
Year: 2004
Title: Rural Water Supply and Sanitation Toolkit for Multi-Sector Projects
Publisher: World Bank
Number of pages: 76
Notes: Assessing the policy and country context; Designing a strategy for RWSS based
on context
URL: http://www.worldbank.org/html/fpd/water/rwsstoolkit/sector_country.htm
Link to PDF:
http://www.worldbank.org/html/fpd/water/rwsstoolkit/material/rwss_pub.pdf
Reference Type: Electronic Source

#104
Author: World Bank
Year: 1997
Title: Toolkits for Private Sector Participation in Water and Sanitation
Publisher: World Bank
Notes: Designing and implementing a private sector arrangement in the water sector
URL: http://www.worldbank.org/html/fpd/water/wstoolkits/
Reference Type: Electronic Source

#105
Author: World Bank
Year: 2000
Title: Toolkit on Hygiene, Sanitation, and Water in Schools
Publisher: World Bank
Notes: The electron source describes how to initiate and maintain school hygiene and
sanitation programs. It also provides tools, samples, and manuals to implement and
monitor the programs.
URL: http://www.schoolsanitation.org/
Reference Type: Electronic Source

#106
Author: World Bank
Year: 2003
Title: Water Resources and Environment Technical Note
Publisher: World Bank
Notes: Developing water quality standards; Description of conventional treatment
techniques; Costs of conventional techniques

URL:
http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTWRM/0,,contentMDK:20
442867~isCURL:Y~menuPK:1305255~pagePK:148956~piPK:216618~theSitePK:33724
0,00.html
Reference Type: Electronic Source

#107
Author: World Bank
Year: 2006
Title: Manual on Low Cost Sanitation Technologies for Ger Areas, Mongolia
Publisher: City of Ulaanbaatar and the World Bank
Notes: "Manual on Low Cost Sanitation Technologies for Ger Areas, Mongolia describes
the various latrine options, its advantages, disadvantages, building materials, bill of
materials, costs, salient features and so on, for participatory bottom up planning and
implementation of the sanitation improved services. It starts with no hardware investment
to gradually improved latrine types like a 'sanitation ladder'."
Link to PDF:
http://siteresources.worldbank.org/INTMONGOLIA/Resources/H&S_Manual_Sanitation
.Jan06.pdf
Reference Type: Report

#108
Author: WELL
Year: 1998
Title: DFID Guidance Manual on Water Supply and Sanitation Programmes
Publisher: WELL and DFID
Number of Pages: 356
Notes: This report describes the technical aspects, and institutional and financial
perspectives of different programs.
URL: http://wedc.lboro.ac.uk/publications/details.php?book=0%20906055%2058%20X
Reference Type: Report

#109
Author: WELL
Series Editor: Shaw, Rod
Year: Various
Title: Well Technical Briefs
Publisher: WELL
URL: http://www.lboro.ac.uk/well/resources/technical-briefs/technical-briefs.htm
Reference Type: Electronic Source

#110
Author: WHO
Year: Various
Title: WHO Water and Sanitation Portal - Tools
Publisher: WHO

Notes: Six papers that are relevant to specific stages of a water safety plan or drinking water flow can be accessed by directly clicking on the relevant stage. The tools listed are unabridged documents that have relevance to more than one element of the water safety plan and/or drinking water flow. Sections of these documents are also available within stages of the water safety plan and drinking water flow.
URL: http://www.who.int/wsportal/tools/en/
Reference Type: Electronic Source

#111
Author: WHO
Year: 2005
Title: Water Safety Plans
Publisher:WHO
Notes: This guide provides practical guidance on developing and implementing WSPs as outlined in the Guidelines for Drinking-water Quality. It is organised in step by step form to guide users through the process and includes a selection of contrasting case studies.
Link to PDF: http://www.who.int/water_sanitation_health/dwq/4safetyplans.pdf
Access Date: January 2007
Reference Type: Electronic Source

#112
Author: WHO
Year: Updated 2008
Title: WSPortal: Health through Water - Treatment Tools
Publisher: WHO
Notes: A collection of web-based practical guidance on Water Safety Plans
URL: http://www.who.int/wsportal/en/
Reference Type: Online Database of case studies and tools

#113
Author: WHO
Year: 2000
Title: Tools for Assessing the O&M Status of Water Supply and Sanitation in Developing Countries
Publisher: WHO and WSSCC
Number of Pages: 50
Notes: This report contains nine tools that are targeted at policy makers and professionals. The tools can be used to measure and evaluate the effectiveness of operations and maintenance of water supply and sanitation services.
Link to PDF: http://www.who.int/water_sanitation_health/hygiene/om/ToolsAssess.pdf
Reference Type: Report

#114
Author: WHO
Year: 2003
Title: Assessing Microbial Safety of Drinking Water

Publisher: WHO
Number of Pages: 292
Notes: "A review that considers application of appropriate indicators within a 'Water Safety Plan' approach with separate sections dealing with source water quality, treatment efficiency, monitoring in storage and distribution; and dealing with surveillance and incident investigation."
Link to PDF: http://www.who.int/water_sanitation_health/dwq/9241546301full.pdf
Reference Type: Report

#115
Author: WHO
Year: 2004
Title: Chemical Safety of Drinking-Water: Assessing Priorities for Risk Management
Publisher: WHO
Date: July 2004
Number of Pages: 104
Notes: "The objective of this publication is to help users at national or local level to establish which chemicals in a particular setting should be given priority in developing strategies for risk management and monitoring of chemicals in drinking-water. The document will be useful to public health authorities, those responsible for setting standards and for surveillance of drinking-water quality, and to water supply agencies responsible for water quality management. In particular, this publication will be applicable in settings where information on actual drinking-water quality is limited, which is the case in many developing countries and in rural areas of some developed countries. Once priority chemicals have been identified, subsequent risk management strategies may include setting standards, monitoring and control."
Link to PDF: http://www.who.int/water_sanitation_health/dwq/cmp130704.pdf
Reference Type: Report

#116
Author: WSP and Water Utility Partnership (WUP) - Africa
Year: 2003
Title: Water and Sanitation for All: A Practitioners Companion
Publisher: WUP, WSP, and Special Interest Group in Urban Settlement-MIT
Notes: The electronic source provides the pros and cons and levels of service for various technical options; customer relations; methods on developing cross-sectoral collaborations; and information on financing water and sanitation projects.
URL: http://web.mit.edu/urbanupgrading/waterandsanitation/
Reference Type: Electronic Source

#117
Author: Ministry of Health, New Zealand
Year: 2002
Title: Public Health Risk Management Plan Guide: Surface and Groundwater Sources - Version 2, Ref S1.1
Publisher: Ministry of Health, New Zealand

Number of Pages: 28

Notes: "This Guide considers four methods for managing risks to raw water quality:

  • regulation of activities by law (Resource Management Act 1991 – RMA)

  • increasing people's awareness of the effects their activities have on the drinking-water supply

  • increasing awareness of natural activities and processes, so that the risks to raw water quality they create can be managed

  • co-operation and communication with landowners whose activities can affect raw water quality; being aware of planned activities that might affect water quality."

URL:

http://www.moh.govt.nz/moh.nsf/0/5AF58E090CF4098BCC25699600754798/$File/source-surfaceandgroundwatersources-v2.doc

Reference Type: Government Document

#118

Author: Ministry of Health, New Zealand

Year: 2005

Title: A Framework on How to Prepare and Develop Public Health Risk Management Plans for Drinking Water Supplies

Publisher: Ministry of Health, New Zealand

Number of Pages: 16

Notes: "To help you create and operate a public health risk management plan (Plan) for your drinking water supply a set of model Public Health Risk Management Plan Guides (Guides) has been prepared by the Ministry of Health. Table 1 sets out the information contained in the Guides that will help you prepare a Plan. This overview document also suggests how to prepare and operate a plan. It helps you understand the information contained in the model Guides and how this information can be used. Table 1 tells you what information is contained in the Guides."

Link to PDF:

http://www.moh.govt.nz/moh.nsf/0/CCA65C18B2E29251CC256A7900082B9C/$File/aframeworkfordevelopingaphrmp.pdf

Reference Type: Government Document

#119

Author: Tayler, Kevin

Year: 2000

Title: "Tools for Sanitation Choice" in Strategic Planning for Municipal Sanitation

Publisher: GHK Research and Training, WEDC, and Water and Sanitation Program for South Asia

Notes: This resource assesses sanitation technologies based on local context, the costs of different options, and the willingness-to-pay approach.

Link to PDF: http://www.bvsde.paho.org/bvsacg/i/fulltext/guide/guide.pdf

Reference Type: Electronic Source

#120
Author: Unknown
Year: 1999
Title: Alaska Sanitation Planning Guide for Small Communities
Publisher: Alaska Department of Community and Economic Development Rural Utility Business Advisor Program
Notes: "This book is intended to be used cooperatively by community members and engineers. Many parts of the process can and should be done by members of the community. Other parts of developing a plan require specialized skills like engineering. By knowing what the community wants, engineers and planners can help you build projects that will work for your community."
Link to PDF: http://www.dced.state.ak.us/dca/ruba/pub/ASPGFSC.pdf
Reference Type: Book

Appendix B - Detailed reviews of 18 selected WASH Support Resources

Full citations can be found in Appendix A.

1. Australian Agency for International Development 2005.

"Safe water guide for the Australian Aid program 2005."
Link to PDF : http://www.ausaid.gov.au/publications/pdf/safe_water_guide.pdf

<u>Description</u>
The purpose of the report is to provide guidance to Australian Aid staff, and to be a resource for other development agencies and NGOs planning, implementing, monitoring, and evaluating drinking water projects. Part 1, 'Framework for managing water quality,' is mainly applicable to AusAid staff, but provides sound guidance for the general steps one should take when carrying out a drinking water intervention project. Part 2, 'Guidelines for managing water quality,' contains guidelines for water quality monitoring procedures, including sampling and analysis, and the development of a water quality monitoring plan. A table of treatment technologies follows the descriptions of the different water quality problems. These treatment guidelines are very basic and lack detail. In addition, it contained an error that was repeated in each of the tables. The table states that solar water distillation requires four weeks to disinfect water, but on a sunny day, four hours is plenty of time. The guidelines in the chapter on "Developing a Water Quality Monitoring Plan 'contain 12 'elements' that frequently comprise water quality monitoring plans. While they do not explicitly cover technology choice, they do detail processes to be carried out prior to technology selection. Part 3, "Supporting guidance," contains a section on "managing arsenic in water supplies," which provides a thorough list of the available techniques and technologies available for removing arsenic from drinking water sources. The "gender guidelines" section presents lists of questions that guide development interventions, with particular emphasis on issues that are unique or most relevant to water. There is little mention of technology selection.

The Australian Aid document is not a technology decision-making guide, but it does provide guidance on relevant supplementary activities that should occur prior to, or alongside, technology selection. The arsenic technology description is, by itself, a useful toolkit, but should be combined with additional guidance on correcting water quality problems.

<u>Elements</u>

Sector
☑ **Water supply**
☑ **Drinking water treatment**
- **Sanitation**
- **Wastewater treatment**
- **Hygiene**

Locale
- **Regional specificity**
- **Urban**
- ☑ **Peri-urban**
- ☑ **Rural**

Topics
- **Comparison of pros and cons of technologies**
- **Construction**
- ☑ **Operation and maintenance** - O&M is discussed in general terms as it pertains to strategic planning and community involvement, but technology-specific requirements are not described.
- ☑ **Community involvement** - One of the strengths of this guide is its detailed discussion of community involvement in the planning, monitoring, and evaluation process.
- ☑ **Institutional aspects**
- **Cost of technologies**
- **Financing—access to capital** - Intended for Australian Aid staff who are carrying out Australian Aid programs, the guide does not include information on financing.
- ☑ **Evaluation and monitoring**
- **Scalability and replicability**
- **Case studies**

Other
- **User interface**

2. Brikké, François, and Maarten Bredero; World Health Organization 2003.

"Linking Technology Choice with Operation and Maintenance in the Context of Community Water Supply and Sanitation."
Link to PDF:
http://www.who.int/water_sanitation_health/hygiene/om/wsh9241562153.pdf

Description
"This document focuses exclusively on community water supply and sanitation in developing countries, in particular, the services that can be managed by communities in rural or low income urban areas. It is designed to help planners and project staff select water-supply and sanitation technologies that can be maintained over the long term in rural and low income urban areas. As has been repeatedly demonstrated worldwide, the selection of a particular technology can have far-reaching consequences for the sustainability of the services. For many years, technical criteria and initial investments were emphasized when choosing such technologies. Although these aspects are important, the roles of financial, institutional, social and environmental factors are also germane for ensuring the sustainability of services. In this manual, it is proposed that an O&M component be added to the selection process."

WHO has prepared this water supply and sanitation manual as both a guide and as a decision-making tool. The introductory chapters establish a framework and guidelines for implementing community water and sanitation projects. The technology briefs are structured to provide the most useful information for deciding whether or not each technology will appropriately fit a community. Each aspect of construction and O&M is described with suggested roles for various actors, the relative skill level required to complete the tasks, and the costs from actual projects (although these are frequently from sources that are ten or more years old). The section on drinking water disinfection includes a chart that compares the different methods and technologies. While the technologies described in the water supply, storage, and sanitation sections are less comparable, a similar chart, or decision tree for each would make this document a comprehensive, user-friendly decision-making tool.

Elements

Sector
- ☑ **Water supply**
- ☑ **Drinking water treatment**
- ☑ **Sanitation**
- ☑ **Wastewater treatment**
- - **Hygiene**

Locale
- - **Regional specificity**
- - **Urban**
- ☑ **Peri-urban**
- ☑ **Rural**

Topics

- ☑ **Comparison of pros and cons of technologies**
- ☑ **Construction**
- ☑ **Operation and maintenance**
- ☑ **Community involvement**
- ☑ **Institutional aspects**
- ☑ **Costs of technologies**
     Financing—access to capital
- ☑ **Evaluation and monitoring**
- **- Scalability and replicability**
- **- Case studies**

Other

- **- User interface**

3. Cotruvo, J., Gunther F. Craun, and Nancy Hearne (eds); NSF International, WHO, and Pan American Health Organization 1999.

"Providing Safe Drinking Water in Small Systems: Technology, Operations, and Economics."

Description
This book encompasses the May 1998 proceedings of the First International Symposium on the Technology, Operations and Economics of Providing Safe Drinking Water in Small Systems. Papers are organized into the following chapters: defining the problem of drinking water; sustainability of small systems; disinfection technologies; filtration technologies; pre-engineered water treatment systems including point of use; monitoring for water quality; emerging technologies in energy; and delivery of water, systems solutions, and regulatory structures.

This document is not a very effective decision-making guide because the included papers are all in different formats. While a few of the papers are useful in providing comparisons of different technologies and approaches, many are very theoretical or scientific with limited practical application. The most relevant papers include "Selecting Residential or Personal Water Treatment Systems," "Rural Disinfection Technologies in Latin America," and "Small Water Supplies in Urban Areas of Developing Countries." The other papers provide details on one particular technology, provide a scientific or theoretical basis for different water treatment options, or provide an overview of the principles in regulatory management or community involvement.

Elements

Sector
☑ **Water supply**
☑ **Drinking water treatment**
- **Sanitation**
- **Wastewater treatment**
- **Hygiene**

Locale
- **Regional specificity**
- **Urban**
☑ **Peri-urban**
☑ **Rural**

Topics
- **Comparison of pros and cons of technologies** - While several chapters in the document offer some comparisons of the applicability of different technologies, it is not systematic for each sector.
- **Construction** - Almost no information on how to construct various systems was provided.

- **Operation and maintenance**
- **Community involvement**
- **Institutional aspects**

☑ **Costs of technologies** - The report has some cost comparisons of different water treatment technologies, but they are not thorough or systematic.

- **Financing—access to capital**
- **Evaluation and monitoring**
- **Scalability and replicability**

☑ **Case studies** - Several papers present case study examples from throughout the world.

Other

- **User interface** - The nature of the document, a set of distinct set of papers, makes it not very user friendly.

4. Department of Water Affairs and Forestry, South Africa 2004.

"Introductory Guide to Appropriate Solutions for Water and Sanitation."
URL: http://www.rwsn.ch/documentation/skatdocumentation.2005-11-17.2350860691/file

Description
"This guideline is for use by municipalities and their service providers as an introduction to the range of appropriate solutions available for water supply and sanitation, and where and how these are suited to different situations.

Sections 1 – 3 contain stand-alone information on a range of appropriate technical solutions with respect to: water supply technologies, sources of power for pumps, and sanitation technologies. Each technology is covered in broad terms, and information under each technology includes: what the technology is and how it works; requirements; institutional support; capital needs; operation and maintenance; advantages and disadvantages of the technology; experience as regards practical implementation.
Section 4 focuses on solutions for the control of water supply and payment options, and is dealt with differently from sections 1-3. It is divided into two sub-sections: Communal standpipes, and Individual household connections. Information under the sub-sections is explored in terms of technologies for the control of water supply and loss, and the various payment options available. Section 5 provides additional information in the form of a description of the various pumps available, and water treatment options at household and municipal level. Section 6 provides additional references to books, journals and articles for in-depth further reading for each solution."

The guide is a good basic reference that can familiarize a practitioner with a particular technology. The references at the end of each technology description are mostly relevant to South Africa and fail to incorporate lessons learned from major organizations, such as WHO, WEDC, WSCC, and WSP. Despite its focus on South Africa, the guide can be a useful reference for practitioners in other African countries and on other continents.

Elements

Sector
☑ **Water supply**
☑ **Drinking water treatment**
☑ **Sanitation**
- **Wastewater treatment**
- **Hygiene**

Locale
☑ **Regional specificity** - The guide was written for practitioners working in South Africa.
☑ **Urban**
☑ **Peri-urban**
☑ **Rural**

Topics
- **Comparison of pros and cons of technologies**
- ☑ **Construction**
- ☑ **Operation and maintenance**
- **Community involvement**
- **Institutional aspects**
- **Cost of technologies**
- ☑ **Financing—access to capital** - This guide describes payment and billing strategies for water supply.
- **Evaluation and monitoring**
- **Scalability and replicability**
- **Case studies**

Other
    User interface

5. Deverill et al 2002.

"Designing Water Supply and Sanitation Projects to Meet Demand in Rural and Peri-Urban Communities."

Description
The three books in the series present a philosophy of water and sanitation development based on community demand. Each section presents the theory of the approach as well as guidelines for carrying out a project using the approach. The authors explore aspects of a demand approach for each of the following project phases: selection, planning, appraisal, implementation, and operation. The book was written for practitioners working on water supply and sanitation projects in rural and peri-urban areas. Those interested in learning about a demand-based approach to water and sanitation management will gain a lot from the series. The focus on demand, however, comes at the expense of a more well-rounded treatment of the project process and the inclusion of other perspectives.

Elements

Sector
☑ **Water supply**
☑ **Drinking water treatment**
☑ **Sanitation**
- **Wastewater treatment**
☑ **Hygiene**

Locale
☑ **Regional specificity** - The guide was written to be universally applicable to rural and peri-urban areas. Nearly all of the examples are drawn from South Africa, Tanzania, Nepal, and India, where collaborating institutions are based.
- **Urban**
☑ **Peri-urban**
☑ **Rural**

Topics
- **Comparison of pros and cons of technologies**
- **Construction**
- **Operation and maintenance**
☑ **Community involvement** - There is significant information on community participation, including demand creation for sanitation, project planning, implementation, and operation. Book 3 is exclusively about including the poor in projects.
☑ **Institutional aspects**
- **Cost of technologies**
☑ **Financing—access to capital** - Financial planning is discussed in detail, with the most attention paid to calculating amortization and ensuring adequate funds for O&M costs.
- **Evaluation and monitoring**

☑ **Scalability and replicability** - The guide contains a general section on the scalability and replicability of water and sanitation projects, though it draws its suggestions from other sectors.

☑ **Case studies** - There are boxes in most chapters that give brief descriptions of specific, pertinent projects.

Other
- **User interface**

6. Huuhtanen, Sari, and Ari Laukkanen; The Global Dry Toilet Club of Finland, Tamper Polytechnic University of Applied Sciences 2006.

"A Guide to Working in Sanitation and Hygiene for Those Working in Developing Countries."
Link to PDF: http://www.drytoilet.org/pdf/Sanitation_Guide.pdf

Description
"The aim of the project has been to increase the knowledge of Finnish workers in developing countries in sanitation and hygiene matters and to give them abilities to answer local people's questions on sanitation and hygiene."

The guide begins with an overview of the need for simple, alternative sanitation solutions. A number of simple latrines and ecological sanitation options are described, including their construction, maintenance, user friendliness, and use of community involvement. The guide emphasizes the importance of hygiene and sanitation promotion, as well as describes a basic set of sanitation technology options that are tried and tested.

Elements

Sector
- **Water supply**
- ☑ **Sanitation**
- **Wastewater treatment**
- ☑ **Hygiene**
- **Water quality**

Locale
- ☑ **Regional specificity** - Examples are drawn from specific projects mostly in India but also in other parts of the world.
- **Urban**
- ☑ **Peri-urban**
- ☑ **Rural**

Topics
- **Comparison of pros and cons of technologies**
- ☑ **Construction** - Descriptions and simple diagrams are provided for each of the included technologies.
- ☑ **Operation and maintenance**
- ☑ **Community involvement**
- **Institutional aspects**
- ☑ **Cost of technologies** - There is a simple chart that lists the costs of sanitation technologies.
- **Financing—access to capital**
- **Evaluation and monitoring**
- **Scalability and replicability**

- **Case studies**

Other
- **User interface**

7. Lantange, Quick, and Mintz 2007.

"Household Water Treatment and Safe Storage Options in Developing Countries: A Review of Current Implementation Practices." in *Water Stories: Expanding Opportunities in Small-Scale Water and Sanitation Projects.*
Link to PDF: http://www.wilsoncenter.org/topics/pubs/WaterStoriesHousehold.pdf

Description
Lantange et al. provides a summary of five of the most common household water treatment technologies: chlorination, filtration (biosand and ceramic), solar disinfection, combined filtration/chlorination, and combined flocculation/chlorination. It describes the implementation strategy for each option, identifies organizations that are implementing the technologies, and includes the successes, challenges, and obstacles to implementation. The paper also describes sources of funding and the potential to scale-up and sustain the presented technologies.

The authors evaluate the options based on the following criteria:
1) Does the household water treatment and safe storage (HWTS) option remove or inactivate viral, bacterial, and parasitic pathogens in water in a laboratory setting?
2) In the field, is the HWTS option acceptable, can it be used correctly, and does it reduce disease among users?
3) Is the HWTS option feasible at a large scale?

The paper is intended for policy makers and researchers in the field of water treatment and supply. It is not written as a how-to guide, and therefore does not contain detailed information on technical specifications.

One of the strengths of this review paper is its use of specific examples from the field and its inclusion of cost figures from these experiences. The paper also includes "implementation strategies" for the technologies, which describe the avenues through which they are currently being disseminated.

Another strength of paper is the inclusion of concrete "next steps" for future research and work based on the findings from the paper.

Elements

Sector
- **Water supply**
- ☑ **Drinking water treatment**
- **Sanitation**
- **Wastewater treatment**
- **Hygiene**

Locale
☑ **Regional specificity** - The paper provides examples and descriptions of regional-specific organizations and programs.

☑ **Urban**
☑ **Peri-urban**
☑ **Rura**l

Topics
- **Comparison of pros and cons of technologies**
- **Construction**
- **Operation and maintenance**
- **Community involvement** - Although the authors allude to the social aspects of the introduction and adoption of the technologies when they discuss user-friendliness issues, there is not an explicit discussion of the required process for successful dissemination and sustainability.
☑ **Institutional aspects**
☑ **Cost of technologies** - The paper describes costs of the technologies in many different ways (e.g. unit cost for a bottle of sodium hypochlorite solution, the cost of a ceramic filter).
☑ **Financing—access to capital** - A few financing strategies are explored through examples of organizations which have disseminated the technologies.
- **Evaluation and monitoring**
☑ **Scalability and replicability**
☑ **Case studies**

Other
- **User interface**

8. ROLAC, UNEP 2003.

"Recommendations on Basic Sanitation and Municipal Waste Water for Latin America & the Caribbean."
Link to PDF :
http://www.stakeholderforum.org/fileadmin/files/RECOMMENDATIONS_FOR_DECIS ION-MAKING_IN_LA_C.pdf

Description
"The objective of this document is to help key stakeholders and decisionmakers to identify, evaluate and select appropriate, environmentally sound, technically feasible, and economically viable systems for basic sanitation services and municipal wastewater management in Latin America and the Caribbean. Our primary focus is on promoting alternative sustainable solutions for sanitation and wastewater treatment, such as ecological sanitation (ecosan), on the one hand; and resource efficient water-based systems, such as ecological engineering, low-cost sewer systems (e.g. small-bore condominium systems) and stabilization ponds."

The report is both a policy paper that advocates for alternative sanitation and wastewater solutions, as well as a source of case studies and comparison charts on many relevant topics including costs, financing, and legislation. Taken as a whole, the report makes a valuable contribution to the decision-making process.

Elements

Sector
- **Water supply**
- **Drinking water treatment**
- ☑ **Sanitation**
- ☑ **Wastewater treatment**
- **Hygiene**

Locale
☑ **Regional specificity** - The report focuses on wastewater and sanitation in Latin American and Caribbean countries.
☑ **Urban**
☑ **Peri-urban**
☑ **Rural**

Topics
☑ **Comparison of pros and cons of technologies** - There are a number of useful comparison charts in the report, including ones on technology costs, legal framework, and financing options.
☑ **Construction** - Basic information is included on the construction requirements for the various wastewater systems described.
☑ **Operation and maintenance** - Basic information is included on the operation and maintenance requirements for the wastewater systems described.

☑ **Community involvement** - Community involvement is discussed as it pertains to some of the wastewater conveyance systems (e.g. condominial) and demand generation for improved sanitation.

☑ **Institutional aspects** - The report treats institutional aspects of wastewater and sanitation a very thoroughly, discussing local, national, regional, and global policy constraints and opportunities.

☑ **Cost of technologies** - A basic cost comparison is given for different technologies.

☑ **Financing—access to capital**

- **Evaluation and monitoring**

☑ **Scalability and replicability** - This is indirectly addressed in the case studies and through the topics such as legal framework, institutions, and financing.

☑ **Case studies**

Other
- **User interface**

9. Skinner, Brian; WELL 2003.

"Small-Scale Water Supply: A Review of Technologies."

<u>Description</u>
"Small-scale Water Supply provides non-specialists with an overview of the technologies available for water supply in low-income communities in rural areas of developing countries. Focusing chiefly on point supplies such as wells, boreholes, springs and rainwater catchment systems, the book also introduces the reader to powered pumps, water treatment and piped distribution systems. Chapters cover design capacity, sources of water, raising water, storage and water treatment. The book contains useful illustrations of each of the technologies and outline guidance on making appropriate choices between technologies. The subject of water supply is vast and this handy book shows the reader where to begin in designing water supply systems. Extensive appendices point the reader to sources of further information for each technology, both in printed form and from Internet web pages. Published in collaboration with WELL (Water and Environmental Health at London and Loughborough)."

This book is a collection of technical briefs that provide succinct overviews well-suited for a non-technical audience.

<u>Elements</u>

Sector
- ☑ **Water supply**
- ☑ **Drinking water treatment**
- **-** **Sanitation**
- **-** **Wastewater treatment**
- **-** **Hygiene**

Locale
- **-** **Regional specificity**
- ☑ **Urban**
- ☑ **Peri-urban**
- ☑ **Rural**

Topics
- **-** **Comparison of pros and cons of technologies**
- ☑ **Construction** - Detailed information on the logistics of construction and construction procedures are included.
- **-** **Operation and maintenance** - O & M is scantly covered in the general descriptions of the technologies.
- **-** **Community involvement**
- **-** **Institutional aspects**
- **-** **Cost of technologies**
- **-** **Financing—access to capital**
- **-** **Evaluation and monitoring**

- **Scalability and replicability**
- **Case studies**

Other
- **User interface**

10. Smet, Jo and Christine van Wijk (eds); International Water and Sanitation Centre 2002.

"Small Community Water Supplies."

Description
In 1981, the International Water and Sanitation Centre (IRC) published the first version of *Small Community Water Supplies*, which became one of their bestselling books because it was one of the few resources "to link water supply science and technology with the specific needs of small communities in developing countries." The 2002 edition is an updated version of the original. "While the book was primarily written for an engineering readership, it is intended to also appeal to the wider group of stakeholders now involved in planning, designing and implementing programmes to bring improved water supplies to literally billions of people…. The latest water supply technology is the foundation for the book, but design and technology are continuously addressed in the context of the social and institutional support structures needed to bring sustainable water supply improvements."

This is an impressive book mainly for its scope, but also for the comparison tables and detailed technical information that is contained in nearly every chapter. The introductory chapters set the context for the technologies that are detailed in the following portion of the book. Because of its scope and depth, the book could serve as both a technology reference and decision-making tool. Engineers will be most comfortable with the content and structure of the chapters, but non-engineer practitioners will also find the chapters to be accessible and useful for learning about potential options.

Elements

Sector
- ☑ **Water supply**
- ☑ **Drinking water treatment**
- **Sanitation**
- **Wastewater treatment**
- **Hygiene**

Locale
- **Regional specificity**
- **Urban**
- ☑ **Peri-urban**
- ☑ **Rural**

Topics
- ☑ **Comparison of pros and cons of technologies**
- ☑ **Construction**
- ☑ **Operation and maintenance**

☑ **Community involvement** - While not the focus of any chapter, community involvement is addressed in several different chapters, including "Planning and Management," and "Integrated Water Resources Management."

☑ **Institutional aspects** - This is not the focus of any chapter, but it is addressed in several different chapters, including "Planning and Management" and "Integrated Water Resources Management."

- **Cost of technologies** - A few cost figures are provided, but for the most part cost is not discussed.

☑ **Financing—access to capital** - Some chapters contain financing information as it pertains to specific technologies. It is also mentioned in the context of Planning and Management.

- **Evaluation and monitoring**
- **Scalability and replicability**
- **Case studies**

Other
    User interface

11. UNEP 2000.

"International Source Book on Environmentally Sound Technologies for Wastewater and Stormwater Management."
URL: http://www.unep.or.jp/ietc/publications/techpublications/techpub-15/main_index.asp

Description
The intended audience of the Source Book includes decisionmakers involved in providing wastewater and stormwater services—from politicians and high ranking government official to community leaders. The Source Book provides overviews of a diverse range of wastewater technologies. It also has specific information for each of the major world regions: Africa, Asia and the Pacific, Europe, Latin America and the Caribbean, and North America. The book is divided into three sections: section 1 presents a framework for wastewater and stormwater management; section 2 details environmentally sound technologies and practices for all aspects of wastewater and stormwater; and section 3 contains regional overviews of wastewater and stormwater conditions. These overviews include a characterization of the region's collection, treatment, reuse, disposal, policy and institutional framework, public education, sources of information, and case studies.

If the regional chapters were updated and the technology-centered chapters included additional comparison tables, this would be a useful and usable decision-making tool. As they are, none of the Source Book's sections contain the depth necessary for them to be standalone references or tools.

Elements

Sector
- **Water supply**
- **Drinking water treatment**
☑ **Sanitation**
☑ **Wastewater treatment**
- **Hygiene**

Locale
☑ **Regional specificity** - The sections on the five regions provide brush strokes of the situations one could encounter, in addition to the status of technology adoption and use in the wastewater and strormwater sectors. These sections are not necessarily representative, however, and the information in often outdated. As an example, the Source Book describes the wastewater treatment system in Windhoek, Namibia, using data from 1984, when Whindhoek's population was 1/15 of what it is today. The contact information listed at the conclusion of each regional section is similarly out of date.
☑ **Urban**
☑ **Peri-urban**
☑ **Rural**

Topics
- ☑ **Comparison of pros and cons of technologies**
- ☑ **Construction**
- ☑ **Operation and maintenance**
- ☑ **Community involvement** - Community involvement is briefly discussed.
- ☑ **Institutional aspects**
- ☑ **Cost of technologies** - Most economic data is found in the regional section, though additional data is scattered throughout the report. There is also an appendix which compares the relative costs of wastewater treatment technologies.
- ☑ **Financing—access to capital**
- - **Evaluation and monitoring**
- - **Scalability and replicability**
- ☑ **Case studies**

Other
- - **User interface**

12. UNICEF, United Nations Childrens Fund 1997.

"Towards Better Programming: A Sanitation Handbook."
Link to PDF: http://www.unicef.org/wes/files/San_e.pdf

Description
"A Sanitation Handbook" was written as a comprehensive overview of managing sanitation interventions for UNICEF field staff. The relevant chapters include: 3) Working as a Catalyst for Better Programming Design; 5) Identifying Communities; 6) Community Participation; 7) Technology Options; 8) Financing; 9) Institutional Arrangements; and 10) Building Political Will. The handbook leaves it up to the individual to seek local, appropriate technology options and resources. To make appropriate technology choices, a framework and list of criteria is provided in chapter 7. Each chapter concludes with a section titled, "What Do We Know, and What Do We Need to Know? Information Checklist," that is tailored to the theme of the chapter.

"A Sanitation Handbook" has elements of both a how-to guide and a decision-making tool. The chapters on "Community Participation," "Technology Options," "Financing," "Institutional Arrangements," and "Building Political Will" present overviews of important considerations without taking a proscriptive attitude.

Despite being published ten years ago, the handbook remains relevant and reflects the important issues that one encounters in the sanitation sector. One exception is the overly-negative stance of the financing chapter towards subsidies. In recent years, many people in the water and sanitation field have begun to counter the World Bank's vehement opposition to subsidies because of the obvious connections between public health and sanitation at all scales.

Elements

Sector
- **Water supply**
- **Drinking water treatment**
☑ **Sanitation**
☑ **Wastewater treatment**
☑ **Hygiene**

Locale
- **Regional specificity** - The document provides general advice to UNICEF staff without mention of regionally-specific information.
☑ **Urban**
☑ **Peri-urban**
☑ **Rural**

Topics
- **Comparison of pros and cons of technologies**
- **Construction**

☑ **Operation and maintenance** - O&M is discussed generally as it applies to planning and community involvement in a project, but requirements for specific technologies are not included.

☑ **Community involvement**

☑ **Institutional aspects**

- **Cost of technologies**

☑ **Financing—access to capital** - The chapter on financing provides a framework that covers many relevant elements to be considered when drafting a financing plan for sanitation interventions, including the variability of costs. Specific options that are described include: community self-financing, house-owner financing with credit, private sector financing, cross-subsidies, and subsidies and grants.

- **Evaluation and monitoring**

☑ **Scalability and replicability**

☑ **Case studies**

Other

User interface

13. UNICEF, United Nations Childrens Fund 1999.

"Towards Better Programming: A Water Handbook."
Link to PDF: http://www.unicef.org/wes/files/Wat_e.pdf

<u>Description</u>
"A Water Handbook," which primarily offers an introductory overview for planning and carrying out a water supply project. As it was prepared for generalists and non-water staff in UNICEF, it is not a very useful handbook for practitioners. The guide contains five chapters: Water and Sustainable Development, Community Participation and Management, Cost and Cost Effectiveness, Water Technologies, and Maintenance of Water Supply Systems. In addition, it contains an extensive bibliography.

This guide is well suited for the novice or aspiring practitioner who wants a general overview of the field. The bibliography, while useful, would be a better reference if it was annotated. A major limitation is that the reader is told what is common practice in the field, without giving supplemental information necessary to make informed, independent decisions.

<u>Elements</u>

Sector
- ☑ **Water supply**
- ☑ **Drinking water treatment**
- **- Sanitation**
- **- Wastewater treatment**
- **- Hygiene**

Locale
- **- Regional specificity**
- ☑ **Urban**
- ☑ **Peri-urban**
- ☑ **Rural**

Topics
- **- Comparison of pros and cons of technologies**
- **- Construction**
- ☑ **Operation and maintenance** - O&M is discussed within a general, planning framework.
- ☑ **Community involvement**
- ☑ **Institutional aspects**
- ☑ **Cost of technologies** - The handbook includes a cost chapter that includes not only numbers, but guidance on the economics of water supply, including information on variables affecting cost, systems management, capacity building. There are also chapters on "Ensuring Community Management and the Participation of Women," "Technical and Logistical Considerations," "Local Production Of Materials and Spare Parts," and

contracting. Except for the relative costs of different drilling techniques, the handbook does not include a breakdown of costs for each technology.
- **Financing—access to capital**
- **Evaluation and monitoring**
- **Scalability and replicability**
☑ **Case Studies**

Other
    User interface

14. WAWTTAR; Water and Wastewater Treatment Technologies Appropriate for Reuse Model. Developed and Programmed by Brad A. Finney, and Robert A. Gearheart, University of Humboldt.

URL: http://firehole.humboldt.edu/wawttar/wawttar.html

Description
"The WAWTTAR is a Microsoft Windows based program that was designed to assist financiers, engineers, planners, and decisionmakers in improving their strategies for sustainable water and sanitation coverage while minimizing impacts on water resources. This program focuses on the concept that when equipment or technology is supplied, it should be only after a means of supply for repair parts and operational and maintenance resources are known to be available. This includes having trained and equipped operators to ensure that the environmental and monetary investments are protected."

WAWTTAR is a planning tool that requires a significant amount of input data, including detailed characteristics of the community and hydro-meteorological data. A detailed knowledge of wastewater engineering and treatment processes is necessary to use the tool, as the user is responsible for designing their own treatment train, requiring knowledge of how to put different treatment systems in a linear process. Another shortcoming is that the tool requires the costs of local goods and services to be entered as a ratio of the costs of same goods and services in the United States. Without access to specific engineering publications, however, this calculation is impossible. In other instances, costs must be entered in the 1992 U.S. dollar equivalent. The 1992 U.S. dollar equivalent can be easily calculated online, but this requires Internet access. It is also indicative of some of the program's clunky features. Also, while performing calculations using the Demo feature available on the WAWTTAR website, the program crashed repeatedly when we either forgot to fill in required fields or defined the scope of the calculation outside of WAWTTAR's computing capabilities. Unsaved data is not recoverableable after a crash. For a project engineer who builds or finances community wastewater systems as a career, spending the time to learn WAWTTAR could be a useful investment, providing him/her with an additional project planning tool.

Elements

Sector
- ☑ **Water supply**
- **-   Drinking water treatment**
- ☑ **Sanitation**
- ☑ **Wastewater treatment**
- **-   Hygiene**

Locale
- **-   Regional specificity**
- **-   Urban**
- ☑ **Peri-urban**

☑ **Rural**

Topics
☑ **Comparison of pros and cons of technologies**
☑ **Construction**
☑ **Operation and maintenance**
☑ **Community involvement**
☑ **Institutional aspects**
☑ **Cost of technologies**
- **Financing—access to capital**
☑ **Evaluation and monitoring**
- **Scalability and replicability**
- **Case studies**

Other
☑ **User interface** – The seemingly limitless community and process options of WAWTTAR could make it a valuable tool.

15. WELL (various authors and dates). Ian Smout, editor. (33 briefs).

"WELL Technical Briefs."
URL: http://www.lboro.ac.uk/well/resources/technical-briefs/technical-briefs.htm

Description
"Originally published individually in Waterlines, these illustrated technical briefs bring together a body of information and guidance which has already proved of great practical help to agencies and fieldworkers. The collection is available online and in print as Running Water, published by ITDG Publishing in association with WELL and available from WEDC. Running Water complements The Worth of Water, the first collection of briefs (nos. 1 to 32). Prepared by Rod Shaw, Design and Production Editor of WEDC publications, in association with leading authors in the field, each short brief concludes with useful sources of further information."

Taken as a compendium, the technical briefs by WELL could serve as a decision-making guide for selecting among available techniques and technologies. Because only a few of the briefs ("Simple Drilling Methods," and "Choosing an Appropriate Technology") contain comparison tables or other tools for evaluating technologies side-by-side, "Running Water" seems best suited as a simple how-to construction/implementation guide for do-it-yourself type practitioners.

Elements

Sector
- ☑ **Water supply**
- ☑ **Drinking water treatment**
- ☑ **Sanitation**
- ☑ **Wastewater treatment**
- ☑ **Hygiene**

Locale
- - **Regional specificity**
- ☑ **Urban**
- ☑ **Peri-urban**
- ☑ **Rural**

Topics
- ☑ **Comparison of pros and cons of technologies**
- ☑ **Construction**
- ☑ **Operation and maintenance**
- - **Community involvement**
- - **Institutional aspects**
- - **Cost of technologies**
- - **Financing—access to capital**
- - **Evaluation and monitoring**
- - **Scalability and replicability**

- **Case studies**

Other
  User interface

16. WELL; UK Department for International Development 1998.

URL: http://wedc.lboro.ac.uk/publications/details.php?book=0%20906055%2058%20X

<u>Description</u>
The United Kingdom's Department for International Development (DFID)commissioned this guidance document to assist its staff and partners in implementing water and sanitation improvements. It serves mainly as a guidance document and educational guide for project staff to understand all aspects of water and sanitation work, including areas beyond their expertise.

The manual addresses a wide range of WASH issues, including hygiene and demand promotion using social marketing. It also provides an overview of the entire implementation process from project initiation to institutional partnerships to community involvement to operation and maintenance. This serves the main purpose of the guide, which is to introduce project staff to all aspects of the water/wastewater project lifecycle. Case studies from DFID experiences are discussed throughout.

Despite these strengths, it is primarily a guidance document and not a decision-making tool. Many topics are covered in a cursor way. Not enough information on the technologies or the differences between them is provided to allow for adequate comparison. A user interface that allows a user to go from a particular problem or context to suggested technologies or solutions is not provided.

<u>Elements</u>

Sector
- ☑ **Water supply**
- ☑ **Drinking water treatment**
- ☑ **Sanitation**
- ☑ **Wastewater treatment**
- ☑ **Hygiene**

Locale
- ☑ **Regional specificity**
- **- Urban**
- ☑ **Peri-urban**
- ☑ **Rural**

Topics
- **- Comparison of pros and cons of technologies** - This manual provides a limited comparison of pros and cons of different technologies. While some side-by-side comparison tables are provided, the comparison tools are not systematic for each sector.
- **- Construction** - Limited information on design specifications for particular technologies is included in the manual.
- ☑ **Operation and maintenance**

☑ **Community involvement** - The document provides basic information on how to involve the community, but does not describe a variety of different community involvement approaches.

☑ **Institutional aspects**

☑ **Costs of technologies** - The document provides some side-by-side comparisons of different technology costs, although not in a thorough or systematic manner.

- **Financing—access to capital**
- **Evaluation and monitoring**
- **Scalability and replicability**

☑ **Case studies**

Other
- **User interface**

17. World Bank 2006.

"Manual on Low Cost Sanitation Technologies For Ger Areas, Mongolia."
Link to PDF: http://siteresources.worldbank.org/INTTOPSANHYG/Resources/1923125-1166719802892/SWAT_Mongolia_ManualonSanitationMongolia_0106.pdf

Description
This manual is one in a set of five manuals that promote hygiene and sanitation for Ger Areas in Ulaanbaatar City, Mongolia. They are intended to guide field workers in planning and implementing hygiene promotion and improved low-cost sanitation. The first manual provides an overview of the hygiene and sanitation conditions in Ger Areas. The second, "The Manual on Promotion of Hygiene and Sanitation in Ger Areas, Mongolia," is a guidebook for workers employing the community-based demand creation methodology.

In the "Manual on Low Cost Sanitation Technologies for Ger Areas, Mongolia," a decision-making tool is provided to inform sanitation choices, in particular, it provides various latrine options based on the needs (demand) and capability of the communities and their families. The fourth manual is a guidance document and tool that workers can use to undertake community-based demand creation for hygiene and sanitation. The final manual consists of guidelines for implementing low cost sanitation projects using Japanese Development funding.

The manual describes the various latrine options, their advantages, disadvantages, building materials, bill of materials, costs, etc. It covers a range of sanitation options from the basic level of no hardware investment sanitation to gradually-improved latrine types using a 'sanitation ladder' of upgraded sanitation options. For instance, it covers a basic hole in the ground, but then provides information on how to turn that hole into a vented toilet, an ecosan toilet, and ultimately into a community toilet bank. It provides useful information on each step in the construction process and a comparison of construction costs.

While it provides very specific references to the climatic and soil conditions in Mongolia that will affect ongoing maintenance, it neglects financing issues, such as how people can access capital or plan to finance new construction

Elements
(Including information from all of the Ger Areas manuals)

Sector
- **Water supply**
- **Drinking water treatment**
- ☑ **Sanitation**
- ☑ **Wastewater treatment**
- ☑ **Hygiene**

Locale

☑ **Regional specificity**
- **Urban**
☑ **Peri-urban**
☑ **Rural**

Topics
☑ **Comparison of pros and cons of technologies**
☑ **Construction**
- **Operation and maintenance** - Limited information on operation and maintenance is provided.
☑ **Community involvement** - The manual does not describe a variety of different community involvement approaches but gives guidance on how to involve the community.
- **Institutional aspects**
☑ **Costs of technologies** - The manual provides costs for constructing various latrines and community toilet bank systems.
- **Financing—access to capital**
- **Evaluation and monitoring**
- **Scalability and replicability**
- **Case studies**

Other
- **User interface**

18. Water Utility Partnership (Africa), Water and Sanitation Program, Special Interest Group in Urban Settlement-MIT 2003.

"Water and Sanitation for All: A Practitioners' Companion."
URL: http://web.mit.edu/urbanupgrading/waterandsanitation/

Description
This 2001 web-based toolkit was developed by the Special Interest Group in Urban Settlement-MIT for the African Water Utility Partnership, through funding and support from the European Union, Water and Sanitation Program, and the World Bank Africa Unit. The toolkit is intended to aid water sector practitioners and policy and decisionmakers in addressing water and sanitation challenges, specifically in low income, urban communities.

The toolkit is developed as a guidance manual leading practitioners through the process of understanding policy and community assessment. The information presented includes: advice on how to better evaluate the needs of low income customers; the pros and cons of a variety of service delivery options; how various institutions may support improvements in service delivery; identification of key policy, legal, and regulatory features; and financing issues and mechanisms.

The toolkit can be accessed in a variety of forms. For instance, a practitioner can enter the toolkit by asking any number of different questions: including questions-about community involvement, regulatory environment, or technology choice. The toolkit is user friendly in that practitioners can have access to the numerous resources on the site, simply by asking one question that is relevant to their situation.

One of the strengths of the toolkit is that it was created to address the needs of water utility professionals, which were compiled during a series of workshops. It also provides an extensive list of tools, and case studies where appropriate. Tools are provided on a range of issues including: community participatory process, trainings and education materials, policy statements, financial forecasting tools, and example contracts.

The manual focuses only on poor urban areas. There is also minimal cost information as it relates to evaluating different technology options (initial, ongoing, overhead, lifetime, etc). In addition, the toolkit does not provide complete information on how to construct different options for water and wastewater treatment.

Elements

Sector
☑ **Water supply**
- **Drinking water quality**
☑ **Sanitation**
☑ **Wastewater treatment**
- **Hygiene**

Locale
- ☑ **Regional specificity** - Africa
- **-** **Urban**
- ☑ **Peri-urban**
- **-** **Rural**

Topics
- ☑ **Comparison of pros and cons of technologies** - While the manual provides limited comparisons of different technologies through side-by-side comparison, they are not systematic for each sector.
- **-** **Construction**
- **-** **Operation and maintenance**
- ☑ **Community involvement** - The manual does not describe a variety of different community involvement approaches but gives guidance on how to involve the community.
- ☑ **Institutional aspects**
- **-** **Costs of technologies**
- **-** **Financing—access to capital**
- **-** **Evaluation and monitoring**
- **-** **Scalability and replicability**
- ☑ **Case studies**

Other
- ☑ **User interface** – The way the site is designed, the user can ask a question that is relevant to their condition, and find a way into the numerous resources on the site that answer their question. The user interface is quite friendly to non-technical users in that way.