Orientation Framework

Water, Sanitation and Hygiene

Imprint

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Of the three components of WASH (water, sanitation and hygiene), hygiene behaviour has been demonstrated to make the most impact on community health; the cover photo shows a hygiene education poster at a rural clinic in southern Ethiopia (Photo: Stedtler/Welthungerhilfe)

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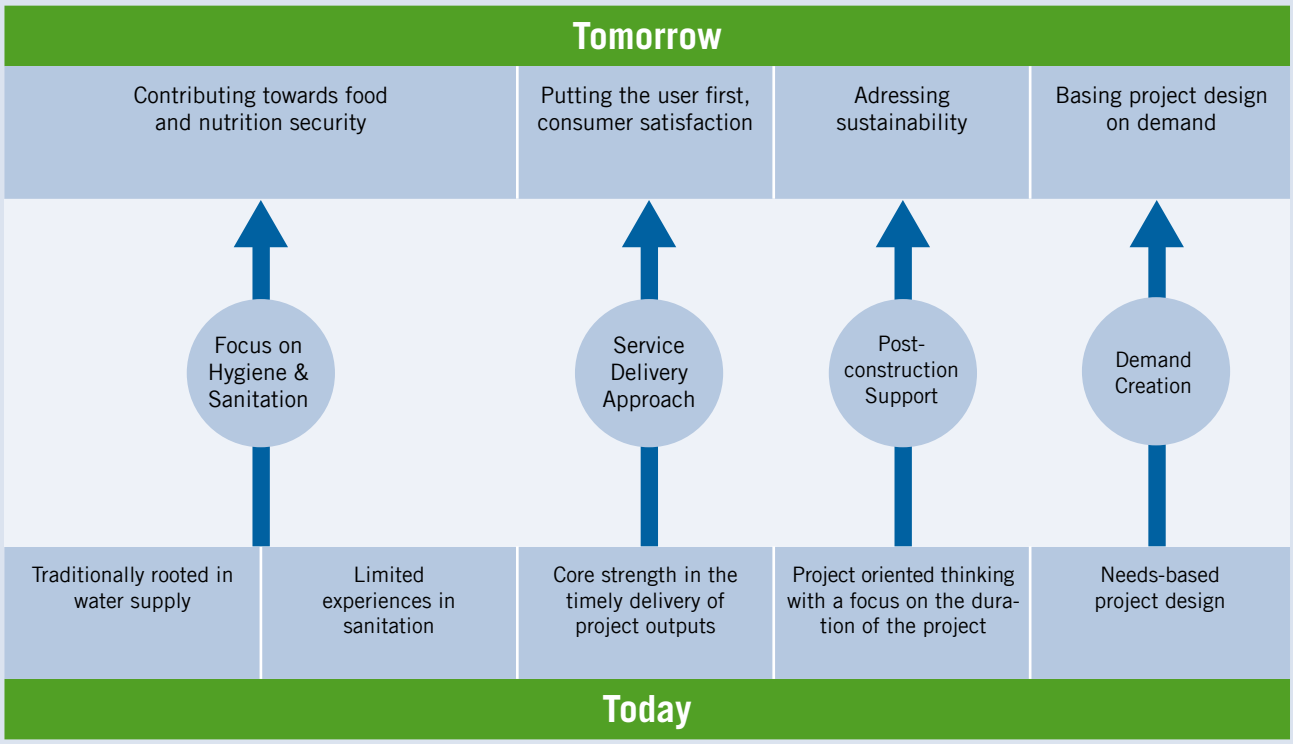
Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development
CapEx	Capital Expenditure
CBM	Community-based Management
CCA	Climate Change Adaptation
CHAST	Children Hygiene and Sanitation Training
CHC	Community Health Club
CLTS	Community-Led Total Sanitation
CoC	Cost of Capital
DFID	Department for International Development (UK)
DRR	Disaster Risk Reduction
ExpDS	Expenditure on Direct Support
ExpIDS	Expenditure on Indirect Support
FAO	Food and Agricultural Organization of the United Nations
FNS	Food and Nutrition Security
GTO	German Toilet Organisation
HDR	Human Development Report
HWTS	Household Water Treatment and Safe Storage
INGO	International Non-governmental Organisation
IRC	International Water and Sanitation Centre
JMP	Joint Monitoring Programme
KAP	Knowledge, Attitudes and Practices
LCC	Life Cycle Costs
LCCA	Life Cycle Cost Approach
lcd	Litres per capita, per day
MDG	Millennium Development Goals
MUS	Multiple-Use Water Services
NGO	Non-governmental Organisation
O&M	Operation and Maintenance
ODF	Open Defecation Free
OpEx	Operational & Maintenance Expenditure
PHAST	Participatory Hygiene and Sanitation Transformation
PoE	Point of Entry
PoS	Point of Source
PoU	Point of Use
RWH	Rainwater Harvesting
RWSN	Rural Water Supply Network
SME	Small and Medium Enterprises
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Emergency Fund
USD	US Dollar
VIP	Ventilated Improved Pit latrine
WASH	Water, Sanitation and Hygiene
WEDC	Water, Engineering and Development Centre, Loughborough University, UK
WHO	World Health Organization
WSP	Water and Sanitation Programme (World Bank)
WSSCC	Water Supply & Sanitation Collaborative Council

Chapter

1

The WASH Sector of Welthungerhilfe, Today and Tomorrow



"The idea to consolidate Welthungerhilfe's extensive experience and conduct research on best practices, standards and learning in the WASH sector, with the goal of making our work more effective and forward-looking, was initially expressed by Welthungerhilfe staff during a WASH meeting in Addis Ababa in May, 2009. A three year development process was required to finally bring this Orientation Framework into existence. This required the implementation of a WASH sector evaluation, the setting up of a central WASH sector support at headquarter level, an analysis of the latest research results and sector trends, a detailed needs-assessment among Welthungerhilfe staff, as well as the founding of the German WASH Network, with the significant support of Welthungerhilfe. All the important findings from these processes have been included in this Orientation Framework. Putting the user first, addressing sustainability, converting needs into demand, and most of all, the promotion of hygiene behaviour change to effectively block the transmission of waterborne diseases, are fundamental requirements for providing water and sanitation services that can make a successful impact on hunger and poverty reduction".

Mathias Mogge
Executive Director, Programmes
Welthungerhilfe

Chapter

1

1.1 Today

With its large and diverse portfolio of activities in the fields of water, sanitation and hygiene – commonly known as WASH –, Welthungerhilfe has been implementing humanitarian interventions, as well as long-term development programmes in many developing countries around the world, for five decades. In recent years, 15-20 new WASH related projects have been approved with an average volume of 700,000 €, reaching approximately 44,000 beneficiaries, primarily located in the rural areas of sub-Saharan Africa and South-East Asia. Most projects are focused on rehabilitation efforts, with an average implementation term of 18 months.

In 2009, Welthungerhilfe commissioned an evaluation of its WASH sector to determine the status of its WASH work, to deduce critical factors affecting the success or failure of WASH projects and to identify a way forward for improving WASH related project work. The successes highlighted by the evaluation included Welthungerhilfe's ability to deliver high quality outputs, particularly in the water supply sub-sector. Challenges included: a) the translation of outputs into sustainable impacts, and b) moving sanitation out of the shadow and making it a priority. Furthermore, the sector evaluation revealed there has been no clear strategy for safeguarding the sustainability of Welthungerhilfe's WASH work, nor for meeting the challenges arising after the construction and implementation phase, particularly those related to sustaining service quality and benefits [1]. The results of the sector evaluation, together with findings based on the latest WASH research, form the foundation for the development of this WASH Orientation Framework.

1.2 Purpose of the WASH Orientation Framework

The WASH Orientation Framework outlines Welthungerhilfe's purpose as an organisation in the field of water, sanitation and hygiene, and serves as a benchmark against which to weigh future actions and decisions. With the WASH Orientation Framework, Welthungerhilfe intends to introduce quality standards and good WASH practices for its' employees in Germany, regional offices and projects around the world, for external experts who assess, plan and consult on projects and for partner organisations in the respective countries. At the same time, the WASH Orientation Framework is directed at Welthungerhilfe bodies and committees – as an instrument to be used in their decisions concerning project support –, and at the interested public, to outline Welthungerhilfe's position and principles of work.

1.3 Tomorrow

In search of an entry point for this WASH Orientation Framework, the following mission statement was formulated, with the purpose of creating a long-term goal for Welthungerhilfe's WASH programming:

Welthungerhilfe's WASH Mission Statement[1]

Access to safe water and sanitation is a human right and a prerequisite for fighting hunger and poverty. Together with its implementing partners, Welthungerhilfe strives to make a contribution to the realisation of this right through the promotion of hygiene behaviour change and sustainable water, sanitation and hygiene (WASH) services that are equitable, and continue providing benefits to consumers over time.

[1] Most of the terms used in the Missioan Statement are specified in the WASH glossary, Annex 1.

In order to fight hunger and poverty, and contribute towards the realisation of the Human Right to safe drinking water and sanitation, Welthungerhilfe will pay special attention to the following aspects during the implementation of WASH activities:

1. **Linking WASH with food & nutrition security** (→ Chapter 2, 6, 7)
   Positive health impact and consequently, nutrition security, requires an integrated approach which includes a focus on improved sanitation and hygiene. Sanitation and hygiene will be considered in all water and nutrition security programmes.
2. **Addressing sustainability through the promotion of effective operation & maintenance management systems and post construction support** (→ Chapter 3, 4)
   Capacity building and institutional development measures which support the establishment of effective and sustainable O&M management structures, are essential for the long-term functionality, and use, of WASH supply systems. Furthermore, a body of evidence suggests that the quality and sustainability of rural WASH services improve when community-based service providers regularly receive post-construction support in the operation, maintenance and administration of WASH services [2].
3. **Putting WASH users at the centre of all efforts** (→ Chapter 4)
   Considerations about the provision of water and sanitation from a service perspective can pose a significant challenge which requires thinking far beyond the official end of the project term. Services are not time and location-specific "projects" that simply end after infrastructure has been constructed or rehabilitated. Services are continuous and aim to provide permanent and stable support for both "hard" and "soft" infrastructure.
4. **Promoting safe water at the point of use** (→ Chapter 5)
   The safe handling of water and its storage, as well as critical sanitation and hygiene behaviour, must be addressed in all WASH interventions. Household water treatment is a necessity when the quality of the water at the source cannot be assured.
5. **Creating demand for better WASH services and stimulating hygiene behaviour change** (→ Chapter 7)
   The desire for better WASH services already exists, though it needs to be converted into demand. WASH is at least as much about behaviour change as it is about latrines, boreholes or other technical solutions. Drivers to change poor hygiene practices, sanitary habits and the use of unsafe water for drinking are often not motivated by perceived improvements to health. Understanding the motivating factors behind the desires for improved WASH services can help in preparing the right approach. Privacy, convenience, safety, dignity and status are highly valued by households, though these desires are often not the focus of WASH programmes [3]. Welthungerhilfe will shift the emphasis from the provision of facilities alone, towards the inclusion of information and education on behaviour and practices with the use of practical and interactive methods, rather than only passing on information. With its partners, Welthungerhilfe will advocate for project periods of a minimum of 1.5 to 2 years, a necessary timeframe for entering into real dialogue with a community, and stimulating behaviour change.
6. **Taking disaster risk reduction and climate change adaptation into account** (→ Chapter 8)
   In order to incorporate climate change adaptation into WASH interventions in disaster prone areas, the diversification of water supplies, improvements to the resilience of WASH systems, adaptation to water quality degradation, as well as awareness raising, must be taken into account during the planning stage of a project.

Chapter

2 Why Welthungerhilfe is Engaging in WASH. The Impact of WASH on Food and Nutrition Security

Preparation of Flat Bread, Ethiopia (Photo: Stedtler, Welthungerhilfe)

"This photo depicts how easily food can become contaminated by dirty hands during its preparation. Diarrhoea is a leading cause of under-nutrition and childhood mortality in developing countries. Interventions aimed at reducing the burden of such intestinal infections – which may consequently improve nutrition security, – should be accompanied by measures which aim to tackle the root causes of the problem: inadequate water, sanitation and hygiene. Simply washing hands with soap, can make a big difference".

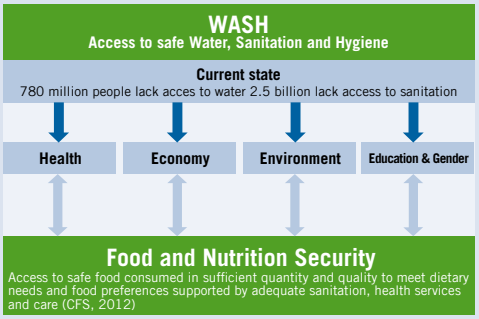
Ute Latzke
Advisor, Food Security and Nutrition
KnowledgeXchange Unit
Welthungerhilfe

Fighting hunger and poverty is the core mandate of Welthungerhilfe and anchored it its overall goal and vision[2]. Inadequate sanitation and hygiene practices and poor access to safe drinking water are key aspects in the cycle of disease, hunger, and poverty. The positive effects of WASH directly linked to food security, in particular on health and nutrition, but also on economy, education and gender, appear to be derived from multiple interactions linked to improvements in household sanitation and hygiene practices, improvements in water quality and the quantity of water consumed.

The Impact of WASH: facts and figures

Health

Healthy people are better able to absorb the nutrients in food than those suffering from water-related diseases. Malnourished people are even more susceptible to diseases, such as diarrhoea. The WHO estimates that approximately 2.4 million deaths and 7% of the total disease burden could be prevented each year with safe WASH [4].



Economy

A households' financial and livelihood security rests on the health of its members; illnesses caused by unsafe drinking water and inadequate sanitation lowers productivity and generates health costs that can claim a large share of a poor households' income. The time spent collecting water cannot be used for other livelihood activities. Every year, five billion work days [5] and more than 440 million school days [6] are lost as a result of diseases associated with inadequate water and sanitation.

Environment

Improved sanitation reduces flows of human excreta into waterways, helping to protect human and environmental health.

Education and Gender

Improved water supply and sanitation services relieve girls from water-fetching duties, allowing them to attend school. Reducing illness related to water and sanitation, including injuries from water-carrying, improves school attendance, especially for girls. Water sources and sanitation facilities located closer to home also put women and girls at less risk of sexual harassment and assault whilst gathering water, or searching for privacy [7].

According to a definition recommended by the Committee on World Food Security, "Food and nutrition security exists when all people at all times have physical, social and economic access to food, which is safe and consumed in sufficient quantity and quality to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services and care, allowing for a healthy and active life" [8].

This chapter explains the complex relationship between WASH and Food and Nutrition Security, and outlines some of the most important challenges and opportunities for interventions in this area.

[2] Welthungerhilfe's vision: "A world in which all people can exercise their right to lead a self-determined life in dignity and justice, free from hunger and poverty".

Chapter

2

2.1 The impact of WASH on nutrition security

As formulated in its strategy paper, Welthungerhilfe, "will place its core mandate, sustainable food and nutrition security, at the centre of all its work" [9]. In this context, Welthungerhilfe will pay increased attention to the use and utilisation of food – the third pillar of food security[3] which is directly linked to the concept of nutrition security and critically dependent on access to sustainable WASH services. Several studies emphasise that sanitation and hygiene are key determinants of a childs' nutritional status. Perhaps 50% of the consequences of under-nutrition can be attributed to poor environmental health conditions as a result of diseases such as diarrhoea, tropical enteropathy, and intestinal worms [10]:

- A pooled analysis of nine studies focused on two year-olds revealed that 25% of all stunting cases were attributable to experiencing five or more episodes of diarrhoea [11]. Children tend to eat less during diarrhoeal episodes and their ability to absorb nutrients is therefore reduced. Each episode contributes to malnutrition, reduced resistance to infections, and when prolonged, to impaired growth and development [12].
- Environmental enteropathy[4] is receiving increasing attention in the development community. Faecal bacteria ingested in large quantities by young children living in conditions of poor sanitation causes damage to the intestinal wall, decreasing the capacity to absorb micronutrients [11].
- Soil-transmitted helminths, commonly known as intestinal worms, are amongst the most common infections worldwide. Recent estimates suggest that Ascaris (roundworm) infects over one billion people, Trichuris (whipworm) 795 million, and hookworms 740 million, resulting in a wide range of clinical symptoms and robbing their hosts of calories by hindering nourishment from food. Infection is caused by the ingestion of eggs from faecally contaminated soil (Ascaris, Trichuris), or by active penetration of the skin by larvae in the soil, as in the case of hookworms [13].

The relationship between under-nutrition and infection is well established and understood. Infections result in decreased dietary intake and malabsorption of nutrients, leading to under-nutrition, which itself reduces peoples resistance to infection, increasing the likelihood of repeat infections (refer to the figure below).

[3] At the World Summit on Food Security in 2009, the concept of Food Security was extended to four pillars: 1) the availability of food, 2) the access to food, 3) the use and utilisation of food, and 4), the stability of the other three dimensions over time. The nutritional dimension (Nutrition Security) is integral to the concept.

[4] Environmental enteropathy is a malabsorption disease which usually commences with an attack of acute diarrhoea, fever and malaise. After a variable period, the patient experiences a chronic phase of diarrhoea, weight loss, and nutritional deficiencies.

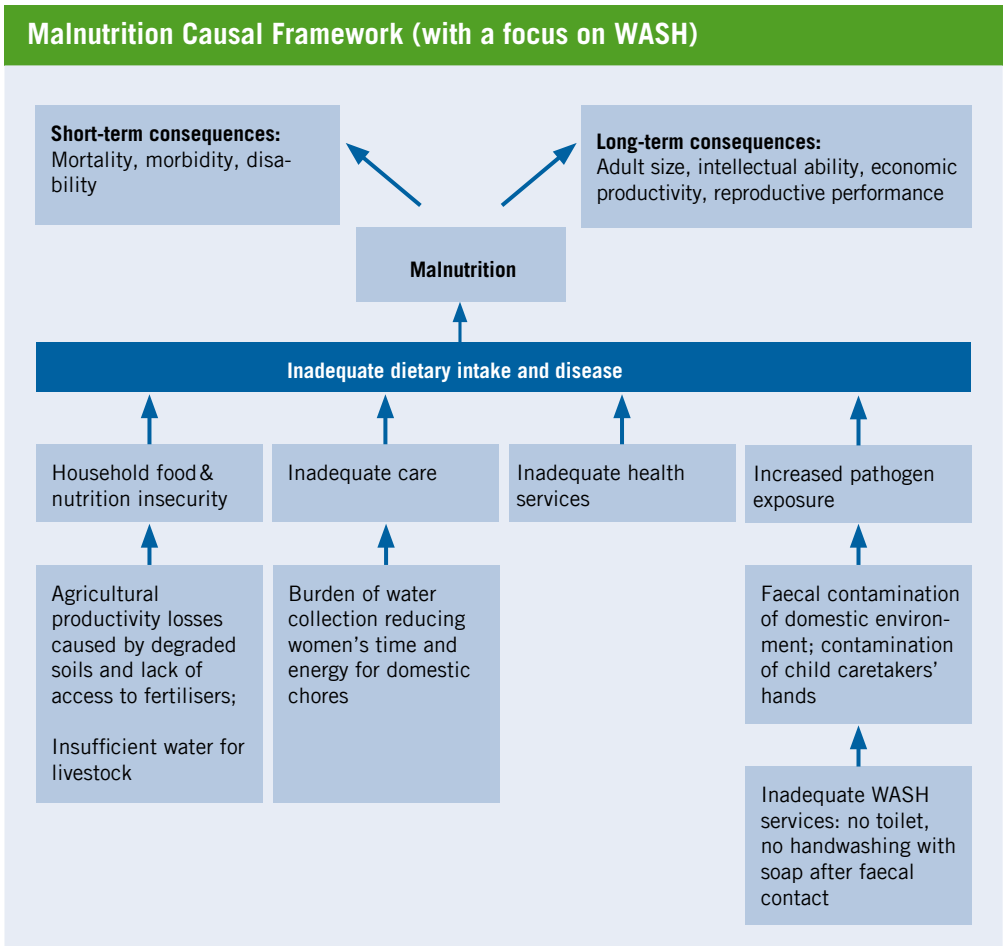


Fig. 1: Adapted from DFID, [14]

In a publication in the The Lancet [11] focused on the interrelationship between WASH and nutrition, J. Humphrey from The Centre for Human Nutrition concludes that, "Undoubtedly, the complex problem of child under-nutrition will not be solved with toilets and handwashing alone but the prevention of gastrointestinal infections, which afflicts almost all children in the developing world, will be crucial to normalise child growth and might offer a solution to the intractable problem of child under-nutrition – and this will not be possible without provision of adequate WASH services".

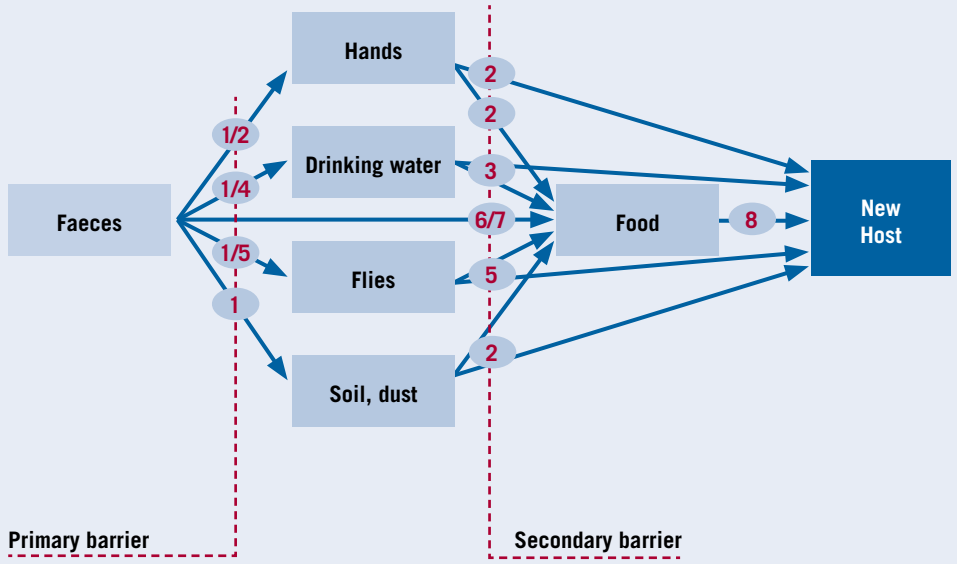
Chapter

2

2.2 Effective WASH interventions to improve health and nutrition

The movement of pathogens from the faeces of a sick person to where they are ingested by somebody else can take direct and indirect pathways. Barriers can stop the transmission of disease; these can be primary (preventing the initial contact with the faeces), or secondary (preventing it from being ingested by another person).

Main Pathways of Faecal-oral Transmission



Main barriers / WASH interventions to stop transmission

1 Sanitation, safe disposal of excreta
2 Handwashing
3 HWTS
4 Water source protection
5 Fly control
6 Correct treatment of wastewater and excreta before using it for agricultural production
7 Washing agricultural products before food preparation
8 Careful preparation and storage of food

Fig. 2: Critical Pathways and most important WASH Interventions to block Transmission

Safe disposal of stool (e.g. in latrines) and handwashing with soap after faecal contact, are important primary barriers to faecal-oral transmission since they prevent faeces from entering the domestic environment. The most important WASH interventions to block the faecal-oral transmission of pathogens are presented in figure 2.

There is strong evidence demonstrating the protective impact of WASH interventions to reduce diarrhoea morbidity in children under five. The effectiveness of different interventions presented in the figure below, is based on a review of 71 WASH impact evaluations undertaken by the International Initiative for Impact Evaluation in 2009 [15]. The review indicates that handwashing with soap and the usage of toilets reduces and prevents diarrhoea by an average of 37% and 34%, respectively.

Reduction in Diarrhoea by Intervention Type

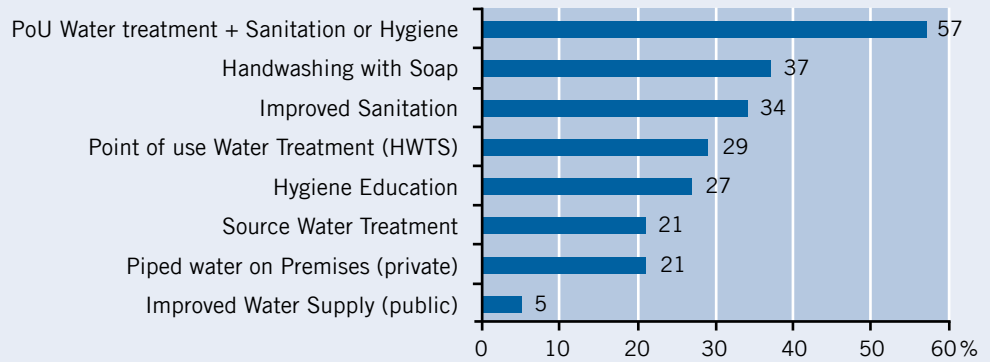


Fig. 3: Adapted from 3IE, [15]

It is important to note that it has yet to be sufficiently demonstrated that improvements in water supply can have a profound impact on nutritional status, without accompanied improvements in hygiene and sanitation [16]. When sanitation conditions are already poor, water quality improvements may have minimal impact on nutritional status.

2.3 Integrating WASH in nutrition programmes

Two aspects might be important to consider when integrating WASH interventions into projects and programmes with a focus on nutrition security:

1. The identification of the critical transmission pathways of enteric pathogens and the consequent ways to block them is important for prioritising activities. If the interventions do not block the critical pathways they are unlikely to be effective. Single-pathway interventions will have minimal benefit and ultimately, an intervention will only be successful if all sufficient pathways are eliminated. However, when one pathway is critical for maintaining a disease, public health efforts should focus on that one [17].
2. The integration of WASH interventions should be primarily guided by nutritionrelevant health data. WASH infrastructure coverage data is deemed to be a secondary step in the selection and definition of relevant projects.

Safe drinking water, sanitation and good hygiene are of extreme importance in feeding centres and health facilities. Hygiene education with special attention on handwashing with soap at critical times, safe water storage, and sanitation, should be given to all patients and caretakers. Fly control measures should be considered at kitchen areas and wet feeding areas. Where possible, soap, safe water containers, and if appropriate, a device for household water treatment should be provided to the patients/mothers upon their exit from treatment centres, especially in emergency situations.

2.4 The impact of WASH on the availability of food

The 'availability of food'[3] addresses the supply side (quantity, quality and seasonality) of food security, which particularly depends on local agricultural production and productivity. This demands sufficient water and soils rich with nutrients, to enable plant growth. Agricultural productivity losses are partly caused by degraded soils and a lack of access to soil conditioners and fertilisers. Human excreta as with animal manure, contains all the relevant nutrients, organic matter and water needed for plant growth, and can serve as an important source for soil amelioration and higher yields. Growing food and achieving food security has been historically and strongly linked with the idea of reusing liquid and solid waste from households, though somewhat forgotten over the years.

'Productive sanitation' is the general term used for a variety of sanitation system solutions that aim to make productive use of the nutrients, organic matter, water and energy content of human excreta and wastewater, in agricultural production and aquaculture. It enables nutrient recovery, minimises the consumption and pollution of water resources and supports the conservation of soil structure as well as agricultural productivity, thereby contributing to food security. Productive sanitation solutions can be considered sustainable if technical, institutional, social and economic aspects are appropriately considered [18].

The productive sanitation approach can be seen as a promising and integrated attempt to assure food security in urban settings (urban agriculture), as well as for rural subsistence farmers, replacing expensive, synthetically produced fertilisers, with the re-use of human excreta and wastewater. However, despite all the convincing benefits, productive sanitation may not be a realistic option in every context. Issues, such as the required behavioural change and cultural acceptability of handling and productively reusing excreta, need to be carefully evaluated at the early stage of a project. It is also important to note that reuse-oriented sanitation approaches tend to require a considerable degree of operation and maintenance by the users, or otherwise, respective service structures need to be put into place. If productive sanitation is to be considered a viable approach, it is recommended that interventions are accompanied with a longer-term commitment from Welthungerhilfe in the region. This is in order to ensure that the systems are used, operated, and sustainably maintained to be beneficial in the long-term.

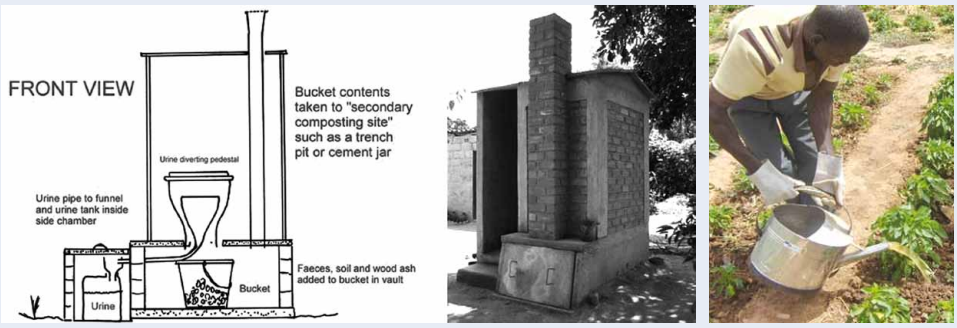


Fig. 4: Composting Toilet with Separate Urine Tank and Movable Container [19]; Urine application (Photo: Linus Dagerskog)

2.5 The impact of WASH on access to food

'Access to food'[3] refers to a households economic and physical capacity to procure sufficient food to satisfy the nutritional needs of all its' members [20]. Household livelihood security rests on the health of its members; adults who are ill or who must care for sick family members are less productive. Illnesses caused by unsafe drinking water and inadequate sanitation generate health costs that can claim a large share of a poor households' income [21]. Furthermore, there is good evidence that a lack of access to water significantly impacts women - women carry two-thirds of the burden for water collection [4]. Significant time savings are associated with WASH improvements – time that can be used to work in the fields to improve household food security. Reducing women's time and energy in domestic chores is necessary to free up time for adequate childcare and nutrition.

Chapter

3 Addressing the Sustainability Crisis

A Temporarily Fixed Bushpump, Zimbabwe (Photo: Simon, Welthungerhilfe)

"Thousands of people, who once benefitted from a safe drinking water supply, now walk past broken handpumps or taps and on to their traditional, dirty water point. Despite the best intentions, the fact is that we, sector professionals and practitioners, have contributed towards the problem in numerous ways".

Rural Water Supply Network
Executive Steering Committee
[22]

The last thirty years have seen the investment of billions of dollars into rural WASH infrastructure in developing countries – a trend accompanied by a move from supply driven, government-led programming to demand-driven approaches that depend on community participation and management. The result has been significant progress at the global level, however, this heartening picture of aggregate growth conceals a less encouraging reality: for far too many people in rural areas, water and sanitation services are unreliable and substandard. Lack of local management capacity, poor maintenance of infrastructure and inadequate financing means that the initial gains of rural water and sanitation supply are often not sustained [23].

The poor sustainability of WASH services is one of the greatest challenges facing the international development community today:

- At any given time, between 30 to 40 percent of rural water supply systems in Africa are not functioning or are performing well below their expected level.

Functionality Estimates of Rural Handpumps in African Countries

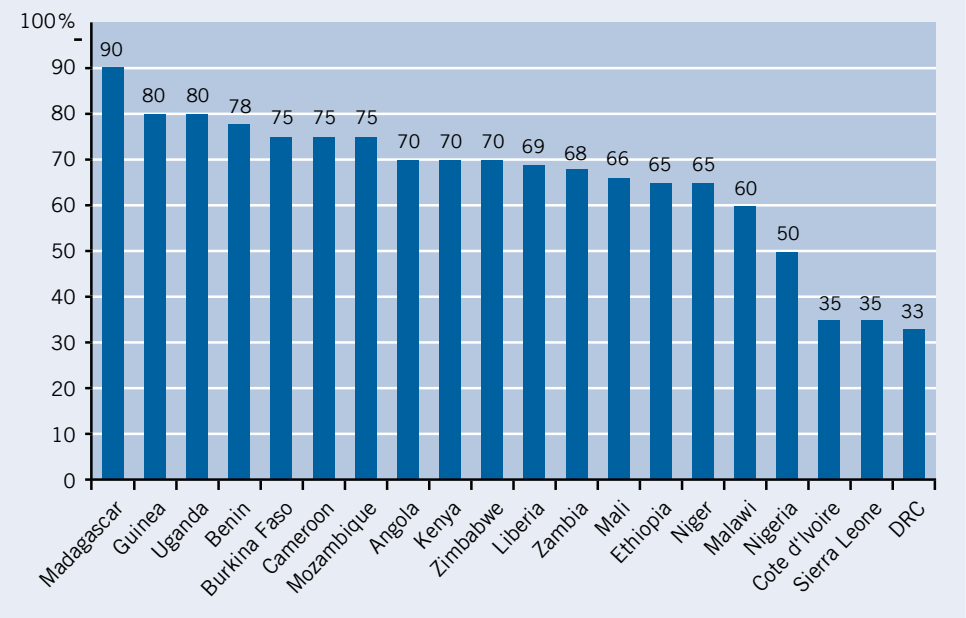


Fig. 5: Adapted from RWSN [22], [24]

- Even though thousands of latrines have been built in the past decade, impact remains very limited: too many programmes focused exclusively on the delivery of hardware, without sufficient attention to changing behaviours, or effectively targeting households who really wanted a latrine. As a consequence, many newly constructed and heavily subsidised latrines ended up as tool sheds or storage facilities and failed to serve their purpose.
- Asides from project hardware, behaviour change processes can also be affected by poor sustainability. A recent WaterAid study on the CLTS-approach found that less than two years after the end of an intervention, a significant number of communities that had declared ODF status were no longer open defecation free [25]. In some cases, whole communities reverted back to their old behaviour patterns.

Chapter

3

Factors affecting WASH sustainability

A comprehensive literature review carried out by Lockwood et al. [2] identified 20 factors impacting on WASH sustainability. Consistently rated of "highly critical importance" is "the issue of cost recovery" and „some form of external post construction support". Factors of "critical importance" include the management capacity of communities, user satisfaction, motivation and willingness to pay, maintenance, spare parts availability, continued training and support to sanitation and hygiene education interventions, and environmental factors. The factors identified are discussed in the following chapters.

3.1 Defining sustainability in the WASH sector

WASH-sustainability definitions available from various institutions have three features in common: a) they look at WASH from a service perspective, b) they refer to services instead of technical infrastructure and c), they emphasise that services have to continue permanently, over time. A more tangible definition that includes these features has been developed by Brikké [26] and has been revised for the Welthungerhilfe context, as follows:

WASH-sustainability Definition

A WASH-service is sustainable when:

- It functions and is being used
- It is able to deliver an appropriate level of benefits that meet user needs, priorities and expected service levels
- It continues over a prolonged period of time which goes beyond the life-cycle of the equipment
- It's life cycle costs are covered at local level through user fees, or alternative financial mechanisms
- It can be operated and maintained at local level with limited but feasible, external post-construction support
- It does not negatively affect the environment

3.2 Understanding the challenges of operation and maintenance (O&M)

No technical system will run on its own and function, without repair and routine replacement of its' components. In developed countries, water supply systems are operated and maintained by water works or municipalities. The situation for a rural population with limited access to safe water in many developing countries is often different. Under these difficult conditions, effective operation and maintenance (O&M) of WASH supply structures becomes a bottleneck for sustainability.

3.2.1 Defining O&M

O&M refers to all post-construction activities needed to operate, maintain and manage a water supply or sanitation system. Welthungerhilfe's understanding of O&M goes beyond a mere technical definition and includes all managerial aspects necessary to run WASH infrastructure i.e. selecting personnel for water committees, managing spare parts and material, financial management, setting of tariffs, management of assets and the planning of extensions. O&M must be considered at each functional interface of water supply and sanitation systems; in the case of sanitation it ranges from the user interface for collection, transport and treatment, to the final reuse or disposal of sanitation products and, in the case of water supply, it ranges from abstraction at the water catchment, to the distribution and use of water, and to the final reuse or disposal of grey-water at the household level.

Components of Water Supply and Sanitation Systems

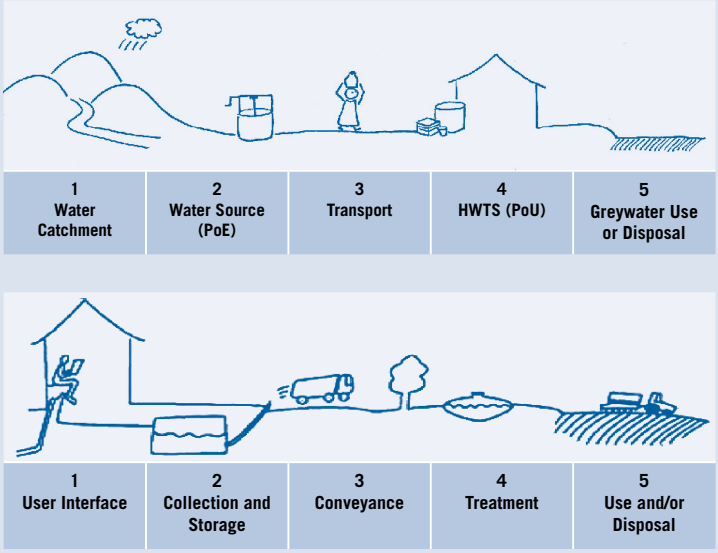


Fig. 6 and 7: Adapted from R. Gensch and J. Wijkmark [27]

Operation refers to the daily, technical and service activities required to run the infrastructure, as well as the correct handling and usage of the facilities by users. In the sanitation context, operation additionally includes the planning, control and performance of the collection, transport, treatment and disposal or reuse, of the excreta or wastewater flows. **Maintenance** on the other hand, involves the activities required to sustain existing assets in a serviceable condition [28], whereas **rehabilitation** entails the correction of major defects and the replacement of equipment to enable a facility to function as originally intended. Rehabilitation becomes necessary when it is no longer technically feasible or economically viable to maintain a facility in good working order. Maintenance will become uneconomic if the long-term cost of rehabilitation and subsequent operation is more favourable than the expenditure for continued repair and maintenance [29].

3.2.2 Reasons for system failure

Factors impacting upon the sustainability of O&M services are varied. The most critical factors contributing to system failure are described below.

Communal and social factors

There are significant differences between societies and their understanding of management needs for water supply and sanitation. Some societies have a strong communal approach to meeting their needs whilst others prefer an individualistic approach. The availability of water may also affect the management of WASH services: communities in arid regions with precarious water supplies have a highly sophisticated set of rules and responsibilities for managing their water supply facilities whereas communities located near rivers may not have a rigorous management system, since water is readily available. Communal and social factors affecting the sustainability of WASH services include:

- **Insufficient knowledge of the motivational factors for using the system**
  Understanding the motivational factors affecting the demand for improved WASH structures helps in preparing the right approach. WASH is at least as much about demand and behaviour change as it is about latrines, boreholes or other technical solutions. Drivers to change poor hygiene practices, sanitary habits and the use of unsafe water for drinking are not necessarily motivated by perceived improvements to health. Privacy, convenience, safety, dignity and status are highly valued by households, though not often the focus of WASH programmes [3].
- **High management burden**
  Water users make a calculated and rational choice that the effort (financial cost, time involved, conflict between users or within committees) involved in managing an engineered supply outweighs the perceived benefits it provides. For example, if costs for keeping the system running are high, communities may return to their original form of unimproved supply, especially if alternative sources are available [30].
- **Lack of motivation and insufficient incentives for water user committees**
  Water user committees are almost universally organised on a voluntary basis and membership does not necessarily generate income. Initial enthusiasm for a project can dwindle away and crucial drivers that initiated the project may drop out. Just as the physical "hardware" of water supply sooner or later falls into disrepair, so too do community institutions: people lose interest in providing voluntary service, financial irregularities arise, mistrust or conflicts develop, committee members and technicians move away [30].

Technical factors

Potential sanitation and water supply technologies need careful evaluation with regards to local appropriateness, cultural acceptability and the O&M requirements associated with each technology. Systems often fail because of:

- **Inappropriate technical design**
  The technical options chosen are not always best suited to the local physical and socio-cultural environment in which they shall be operated. Technology which fails to fulfil the needs of its users, which is poorly installed or difficult to maintain, pose significant challenges for sustainability [25].

- **Inconsiderate introduction of an innovative/new technology**
  Moving from an unimproved to an engineered water supply system increases community dependence on external organisations to provide support. If that support does not follow, then systems may fail. NGOs should always bear in mind that with the introduction of a new WASH technology, as well as a new management structure, "innovations" are introduced into a community – something that was not there before. The introduction of an innovation needs to be supported over a certain period of time and often even beyond the termination of the project period [30].
- **Underestimation of O&M requirements for sanitation systems**
  The O&M component of sanitation systems often receives no or insufficient attention compared to the design and construction phases. As a consequence, poor or non-functioning sanitation systems may fail to be used or pollute the environment and thereby negatively affect people's health – in short, making things worse.
- **Insufficient analysis of the different system components with regards to O&M**
  Planning for and implementing functional O&M procedures requires consideration and examination of the technical and institutional needs of each component of the system. There are a variety of technologies that can be used for each functional group in water supply and sanitation systems, each with their own O&M requirements [31].

Financial factors

Financial factors affecting sustainability, such as insufficient user fees and the willingness and ability to pay, are explained in Chapter 4.1.

Institutional and policy factors

For a functional and sustainable WASH system it is important that roles, responsibilities, maintenance timetables, as well as accountability criteria have been clarified and agreed with all stakeholders during the planning stage. This includes technical, as well as training issues during the implementation phase, but most importantly, on-going post-construction support to the community-based service providers and continued training and support for sanitation and hygiene education interventions.

3.3 Management models for O&M systems

A distinction must be made between the activities needed to operate and maintain a water supply or sanitation system (defined as O&M) and the management concept behind such systems. Several management models are applied worldwide. The most critical of these for Welthungerhilfe's WASH work include:

Community-based management (CBM): The majority of rural villages in developing countries run water supply services using a community-based model for the management of operation and maintenance requirements. CBM assumes that the user community owns the water supply system, contributes to installation, sets and collects tariffs and finances O&M with the initial support of an implementing agency. Although CBM is widespread, it has been unable to deliver anticipated levels of sustainability since communities are not always willing and able to assume such management tasks [32]. Even though community-based O&M has its disadvantages, it is often the only option in many remote, rural areas, in the developing world, given the weakness of existing central and regional governments and the absence of other organisations and institutions which would be able and willing to take over responsibility for O&M.

Self-supply (management at the household level): Self-supply at the household or community level generally implies strong ownership, as well sharing of the supply, with those households located nearby – effectively providing a privately managed communal service, frequently without fees. Household management models are commonly used for toilet facilities, hygiene facilities, individual water supply facilities and waste disposal. Self-supply is based on incremental improvements in service levels which are easily replicable and can be undertaken through user investment, at levels affordable to the user. WASH facilities owned and managed by households at family level are often the most sustainable options, though these can be more expensive in capital outlay to cover the same number of people and may be difficult for some water source options. Self-supply management is more likely to be feasible with domestic rainwater harvesting, shallow wells or birkads, than for deep boreholes or gravity supply schemes [33].

Institutionally managed O&M systems: Facilities managed by schools, health centres, or other institutions, typically include water supply systems, sanitation facilities and/or solid waste disposal facilities. Institutions can manage facilities effectively since there is usually an established and committed management structure in place. O&M has to be embedded into such local structures and the roles and responsibilities of involved stakeholders with regards to O&M need to be clearly defined and evaluated in terms of their long-term feasibility, prior to implementation. Motivational elements (e.g. monthly awards for the cleanest school toilet) or enforcement rules, if necessary, should also be taken into consideration. Additional income-generating support is helpful to cover longer-term O&M costs if alternative forms of support are limited e.g. support from government [33].

Centrally managed systems: In such systems, responsibility resides with either a water authority, the municipality, or water company, under the direction of local or central government. This management model is commonly initiated when installing centralised and larger, water supply systems – consisting of source, storage, distribution and household connections.

Private-sector managed systems: outsourcing the complete infrastructure management services to a private company.

The choice of an O&M management model is influenced by several key issues and primarily depends on the capacity of traditional community organisations, key community skills, the complexity of technology, government leadership, policies, legislation, the capacity of the private sector, and above all, on available cost-recovery mechanisms.

Chapter

4

From Project-oriented Thinking Towards Service Delivery: putting the user first

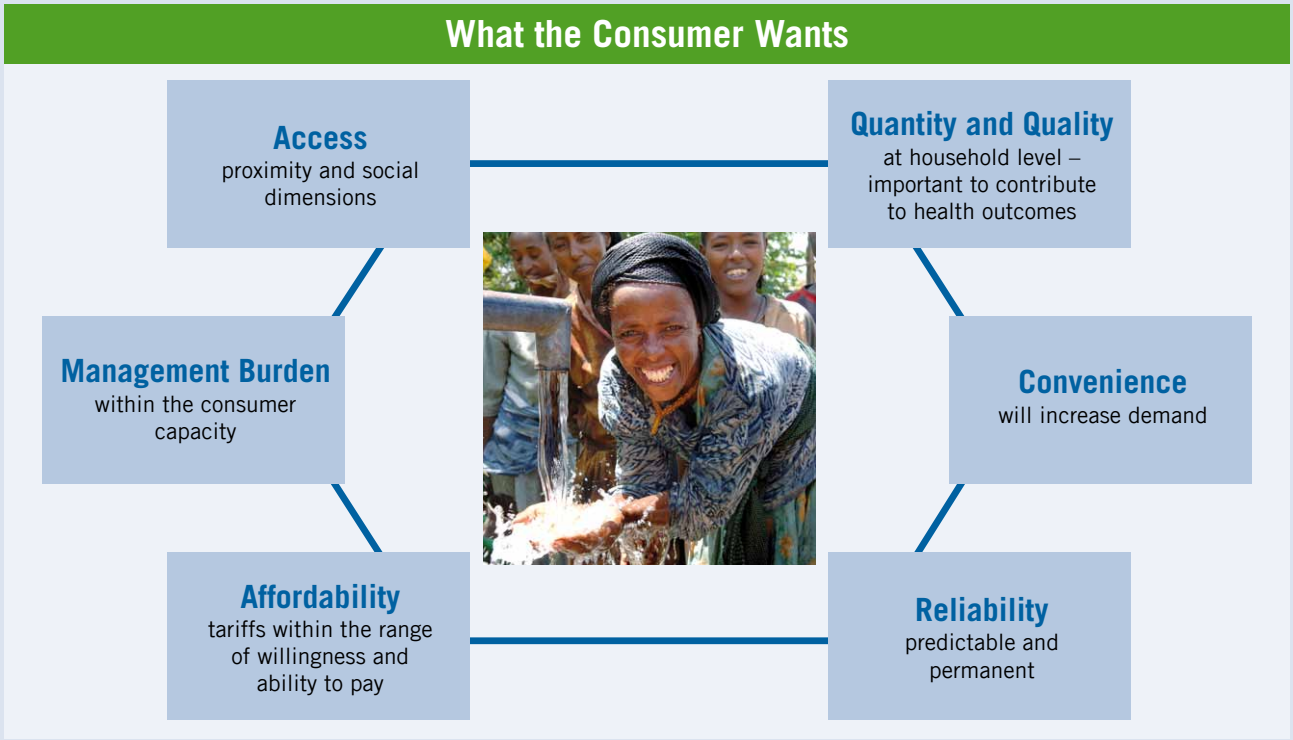


Diagram adapted from R. Carter, [24]

"Sustainability is about what consumers receive! Delivering services is far more complex than delivering a piece of infrastructure. You need to monitor the service delivered, check water quality, repair, upgrade and replace – the daily concerns for delivering a water service. Financing, fee setting, planning, regulation and monitoring performance are part of securing the service in the long term. That is a hell of a job; that is about governance, about management, about policy making and enforcement, about capacities and transparency. That is a lot more complex than providing and/or replacing pieces of infrastructure. But it is the only way to go".

Ton Schouten
Senior Programme Officer
International Water and Sanitation Centre
[34]

Chapter

4

With universal entitlement, "without discrimination, to water and sanitation that is sufficient, safe, acceptable, physically accessible and affordable for personal and domestic uses" [35], the Human Right to Water and Sanitation puts the user of WASH-services at the centre of all efforts. Putting the user first and user satisfaction is also an idea embedded in the service delivery approach, as promoted by the IRC-led Triple-S initiative [23].

Services are not time and location-specific 'projects' that end after infrastructure has been constructed or rehabilitated. Services are continuous and cater for the ongoing, external support, to those providing the service – whether community-based organisations or small private operators – and for local government institutions that carry out planning, coordination and oversight functions; all supported by strong national policies and institutional frameworks [23]. This includes support to both hard and soft infrastructure, the provision of technical services and spare parts, building capacities, and adequate financing.

Every country faces unique challenges in the provision of water and sanitation services to rural people. These range from technical issues related to topography or climate, to social, economic and political challenges related to conflict, insufficient financial resources, or lack of political will. According to IRC [23], countries with low levels of water and sanitation coverage should prioritise laying the foundation for sustainable services. This could be achieved by:

- Formalising the role of community-based organisations in water management and their relationship with local government
- Emphasising and initiating investment in post-construction support to community-based service providers in aspects such as (re)training and technical assistance
- Improving monitoring systems to focus on the quality of services delivered
- Improving the coordination and harmonisation of national government and development partners

Considering the provision of water from a service perspective is a radical change and challenge for an organisation like Welthungerhilfe, which is rooted in project cycle management (PCM) approaches. It requires thinking far beyond the official end of the project term. However, this change is desperately needed in the WASH-sector in order to improve sustainability and impact.

4.1 Financing sustainable service delivery

4.1.1 Tariff setting in rural water supply

Although capital investments in rural water supply tend to be highly subsidised at present, it is relatively rare to encounter water user communities which pay no tariff for an engineered water supply. Most governments and NGOs observe the principle that operation and maintenance incurs costs, and that those costs should be borne by those who enjoy the service.

In many African communities a fixed, monthly cash payment per household is the norm. In other cases the tariff is collected on a seasonal or annual basis, sometimes on a volumetric basis (per jerry can or bucket), and occasionally in-kind. The agreed tariffs are usually based on the norms elsewhere in the country or on a level which households feel able or willing to afford. Rarely, if ever, is there any reference to the actual costs of repair, maintenance and eventual replacement of the physical assets. Furthermore, the revenues that could be collected by such a tariff system are very likely to fall short – as low as 25-30 percent – of the theoretical total, due to poverty-related exemptions and regular defaulting by the entire community [36]. Based on estimates of true life cycle costs, it becomes apparent that with the average actual revenue that can be realistically expected, only minor repairs and basic O&M costs are covered. As soon as a major breakdown occurs, communities rely on external support which is seldom provided by the local government because of inadequate resources and limited mandate.

Rural Consumers' Willingness and Ability to Pay

(adapted from R. Carter, WaterAid, [36])

Ability and willingness to pay for water services

Cash is scarce and it has not traditionally been spent on water supply in many rural settings. Discussions with rural households often reveals the fact that actual spending priorities put water tariffs near the bottom of the list, while the value placed by those same households on safe drinking water is very high. There is a mismatch between peoples' expressed demand for engineered water supplies and their willingness to pay their true costs. Undoubtedly, in some communities, the difficulty is not so much an unwillingness to pay as a true inability. Household and communities may be in particular situations of vulnerability or poverty, and where income-generating opportunities are very limited, they may simply be unable to pay the tariffs required for O&M. Furthermore, improved water supplies may not be used if there are unimproved sources (such as rivers) nearby and the cost of water from the improved source is considered too high. Water quality is often ignored if water can be obtained free of charge from an unimproved source.

Ability and willingness to pay for sanitary services

Sanitation usually ranks low in individual household priority and is often a tabooed subject. Despite its importance and the obvious needs, there is usually little demand for sanitation, which also affects the willingness to invest in the construction, as well as to pay for the necessary O&M, of sanitation facilities. Demand creation and awareness raising activities should therefore be taken into consideration prior to any sanitation intervention, in order to create a supportive environment and the potential willingness to pay.

If possible, potential users should be surveyed at the beginning of the project cycle to determine their willingness and ability to pay. These surveys require the use of appropriate sampling techniques to ensure accurate answers to delicate questions related to personal financial preferences. Water and sanitation interventions must be scaled to a level compatible with the ability to pay.

Ideally, user tariffs should cover the recurrent costs necessary to maintain an existing service level, permanently. However, the expectation that communities can cover all of these costs may need to be reconsidered: O&M should be a shared responsibility between communities, local authorities and central government. If adequate financing mechanisms[5] cannot be identified, the technology level may need to be downgraded; otherwise the system may risk breaking down.

Tariff systems for WASH services need to be poverty-oriented. Social hardship cases, for example, should be exempted from the payment of fees. As a reference point, poor households should not be required to spend more than five percent of their monthly disposable income on water and sanitation [37]. Tariffs should be arranged in rising blocks, corresponding to different levels of consumption, especially in water-poor areas, such as those where Welthungerhilfe is engaged.

The chapter below outlines how such recurrent costs can be broken-down and determined.

4.1.2 The Life-cycle Costs Approach

Unless all of the costs related to providing and maintaining a service (technical, human resources, institutional) are identified, calculated and covered in a coherent manner, a system cannot be considered to be sustainable. Normally, applied approaches to cost-recovery consider the system construction, operation and maintenance costs, as well as costs for the provision of training to the community and local NGOs during project implementation. System rehabilitation and extension costs as a result of population growth or increased demand for service levels, and the maintenance of the existing capacities and institutions within the community, are often not taken into account. Additionally, the costs for extension staff e.g. from a water service authority to monitor and maintain the existing structures and capacities, are often overlooked.

The Life-cycle Costs Approach (LCCA), as recommended by the IRC-WASHcost research programme (www.washcost.info), utilises an adaptation of the regulatory accounting approach to aggregate costs, separating investment costs (capital expenditure) from recurrent costs (refer to fig. 8 below). These recurrent costs comprise of operation and maintenance expenditure, capital maintenance expenditure, the cost of capital, as well as expenditure on direct and indirect support, and make up the best approximation of the total annual costs of operating any system, sustainably [38].

[5] Community funds, micro credit schemes, subsidies from government, social development funds, overseas development assistance (donors with a long-term commitment for a specific region)

The Life-Cycle Costs of Water Services

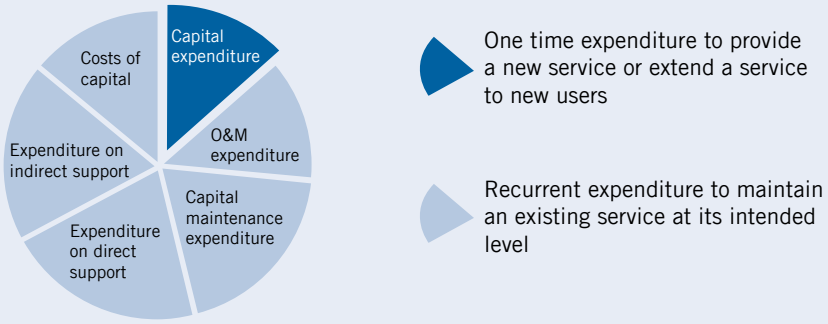


Fig. 8: Adapted from IRC, 2012 [23]

Type of Cost	Description	Comment
CapEx Capital expenditure	Initial costs of putting new services into place: 'hardware', such as pipes, toilets and pumps and one-off 'software', such as planning costs, initial trainings and consultations	One-off investment costs which are typically highly subsidised, or donated to developing countries
OpEx Operation and maintenance expenditure	Routine maintenance and operation costs crucial to keep services running, e.g. wages, fuel, or any other regular purchases	Recurrent expenditure typically included in cost recovery. Neglect has long-term consequences for service delivery, e.g. expensive capital maintenance expenditure and/or service failure
CapManEx Capital maintenance expenditure	Occasional large maintenance costs for the renewal, replacement, and rehabilitation of a system	These essential recurrent expenditures are required before failure occurs to maintain a level of service and needs to be included. This is one of the most frequently forgotten costs
CoC Cost of Capital	Interest payments on loans. The Cost is often a given percentage over the loan amount (typically 5-20% per year)	Large loans are often under the responsibility of a financial ministry
ExpDS Expenditure on direct support	On-going post-construction support to service providers, users or user groups, including training technical, administrative and organisational support	These recurrent costs are often forgotten in rural water and sanitation estimates but are necessary to achieve long-term functionality and scale
ExpIDS Expenditure on indirect support (macro-level)	The cost of planning, policy making, capacity building and management, at governmental level	

Table 1: Life-cycle cost components, adapted from IRC [38], [40]

By applying the LCCA, the relative magnitude of different costs over a period of time can be analysed to inform policy-makers about necessary budgets. Furthermore, the LCCA can help to estimate and compare costs of different types of technical options (e.g. handpumps versus protected springs).

Nevertheless, any comparison of LCC between different types of WASH structures should be undertaken with caution. Specific regional framework conditions, the level of services provided, the quality of construction, the lifespan and the size of the system, as well as the number of users connected to it, are only some of the factors affecting the amount of costs necessary, to keep a system running sustainably. Annualising the costs, and per person calculations, as presented in the table below, might provide a reasonable basis for comparing different technologies that have different dimensions (e.g. domestic and communal solutions) and lifespans.

So far, surveys have been extensive, but the collection of valid cost information has been limited because of the absence of records and lack of sector memory. Still, the data compiled by the IRC WASHCost project and presented in the table below provides a first indication of the costs required for the sustainable management of WASH infrastructure. Depending on different service levels of rural WASH systems, recurrent costs may range from between two and ten USD per person per year. If the expenditure is much lower than the benchmarks presented, then the services being planned or delivered may be likely to be unsustainable [39].

Cost Benchmarks for Basic WASH Service Levels

Type	CapEx USD per person	Recurrent expenditure OpEx USD/person/year	CapManEx USD/person/year	ExpDS USD/person/year
Borehole and handpump	20-61	0.5-1	1.5-2	1-3
Small and medium schemes serving up to 5,000 persons (piped schemes, mechanised boreholes)	30-131	0.5-5	1.5-7	1-3
Traditional pit latrine	7-26	0.5-1	0.5-1.5	0.5-1.5
VIP type or latrine with a concrete slab (emptying every 5 years)	36-358	1-4	1-3	0.5-1.5
Pour flush or septic tank latrine (emptying every 2 years)	92-358	1-4	2-6	0.5-1.5

Table 2: Adapted from IRC [39]

4.2 Providing post-construction support

There is ample evidence that the absence of post-construction support, in many cases, contributes to system failure [2]. Initially, minor problems in the management of WASH infrastructure, such as a small leakage, or errors in accounting, may soon turn into bigger problems beyond the capacity of the user community, if not addressed in a timely manner. The quality and sustainability of rural WASH services may improve when community-based service providers regularly receive post-construction support in the operation, maintenance and administration of WASH services, including technical, administrative and organisational support.

The results of a WaterAid study revealed that in general, continued and on-going external support to community organisations contributed both to an increase in the impact of interventions and to the length of time over which these impacts were sustained. This positive result was not limited to sustaining technical aspects of projects, but also in at least one case, to sustained improvements in hygiene behaviour [2].

Structured and systematic post-construction support to community-based service providers, users or user groups, might include [40]:

- **Monitoring activities** – monitoring service delivery and sustainability gives us the opportunity to identify technical as well as managerial problems in good time. Activities might include water quality testing, checking of accounts, general inspection of the water supply status, filling status of pit latrines, performance of water user committees etc.
- **Technical advice** on operation and maintenance activities e.g. support in setting chlorination levels or pump operation, may be based on results of monitoring visits
- **Training and refresher courses** for water committees and their staff (plumbers, operators and administrators) and the provision of information material
- **Administrative support** for issues such as tariff-setting and external auditing of accounts
- **Organisational development support** for community-based service providers, moving away from voluntary arrangements towards more professional service provision e.g. formal registration as a legal entity
- **Conflict resolution** by moderating between different groups in the community
- **Support to capital maintenance** by identifying capital maintenance needs
- **Capacity support to service authorities,** such as ensuring that local government staff have the capacity and resources to help communities manage contracts for new works, to react when systems break down or monitor private sector performance
- **Resource mobilisation** – pointing communities to possible sources of funding for repairs, materials, or help in accessing materials or spare parts

Welthungerhilfe's Position on Post-construction Support

Being an INGO, it is not Welthungerhilfe's duty to take over full responsibility to support community-based service providers in the long-term. However, it should be our task to make sure that those local institutions that are responsible, but lack the resources, or institutional mechanisms to fulfil their mandate, are supported to do so. For this purpose, post-construction activities, as described above, are recommended for all non-emergency WASH interventions.

Post-implementation monitoring, in particular, can provide a great opportunity for institutional learning. It can help to understand why some previously installed water and sanitation systems are performing well and expose the factors behind why others cannot be maintained by its users. Indeed, it is advisable to organise and carry out post-implementation monitoring activities on a regular basis. As a first step, an **inventory of water points and sanitation facilities** as well as hygiene promotion activities has to be introduced. Secondly, regularly updated post-construction data on the continued functionality and performance of services in (former) project areas should be recorded in a standardised manner for at least three to five years. Post-construction data should be thoroughly analysed and discussed internally to adapt and improve current and future project design, and subsequently shared with the users, local stakeholders and responsible authorities.

Post-construction support (PCS) requires clear institutional structures with well-defined roles and responsibilities. There are different models for the provision of PCS. Depending on the local framework conditions, the local or central government, parastatal organisations, subcontracted agencies, NGOs, or the Private Sector, may play a more or less important role.

According to cost benchmarks for ExpDS presented in table 2, realistic costs for post-construction support are likely to be in the magnitude of 1 - 3 US dollars per user, per year, which may represent a significant percentage of the total life-cycle costs for WASH services. These costs may however be minimal, when one considers that effective post-construction support can extend the lifespan of WASH infrastructure by around 50 percent, providing savings amounting to 8 USD per user, per year, capital expenditures [41].

4.3 Unlocking demand and creating incentives for the private sector

Private sector participation to improve the management and sustainability of rural WASH services is suggested by a number of studies conducted by research institutes and donors [42]. They call for a greater involvement of small and medium enterprises (SMEs) in the supply of equipment, spare parts and services (e.g. pump attendants, network operators, and the replacement of spare parts). However, participation of the private sector is still limited, especially in rural areas. In general, the weak profitability of infrastructure maintenance and operation activities is mentioned as a limiting factor. Rural areas have low population densities and incomes, poor communication, and a weak cash economy – all factors which act as disincentives for private sector engagement.

The key requirements for developing successful supply chains in the WASH sector are a combination of unlocking demand among consumers and incentivising SMEs to enter the sector. Without adequate demand for products and services, a supply chain will not develop and function sustainably. Apart from the need for safe water supply and sanitation services felt by users, demand-creating factors may include price, product appropriateness, transport duration and the simplicity of the technology. There must also be effective flow of information between stakeholders, effective supply chain management and an enabling environment that does not restrict trade [43]. Some important aspects to consider are described below:

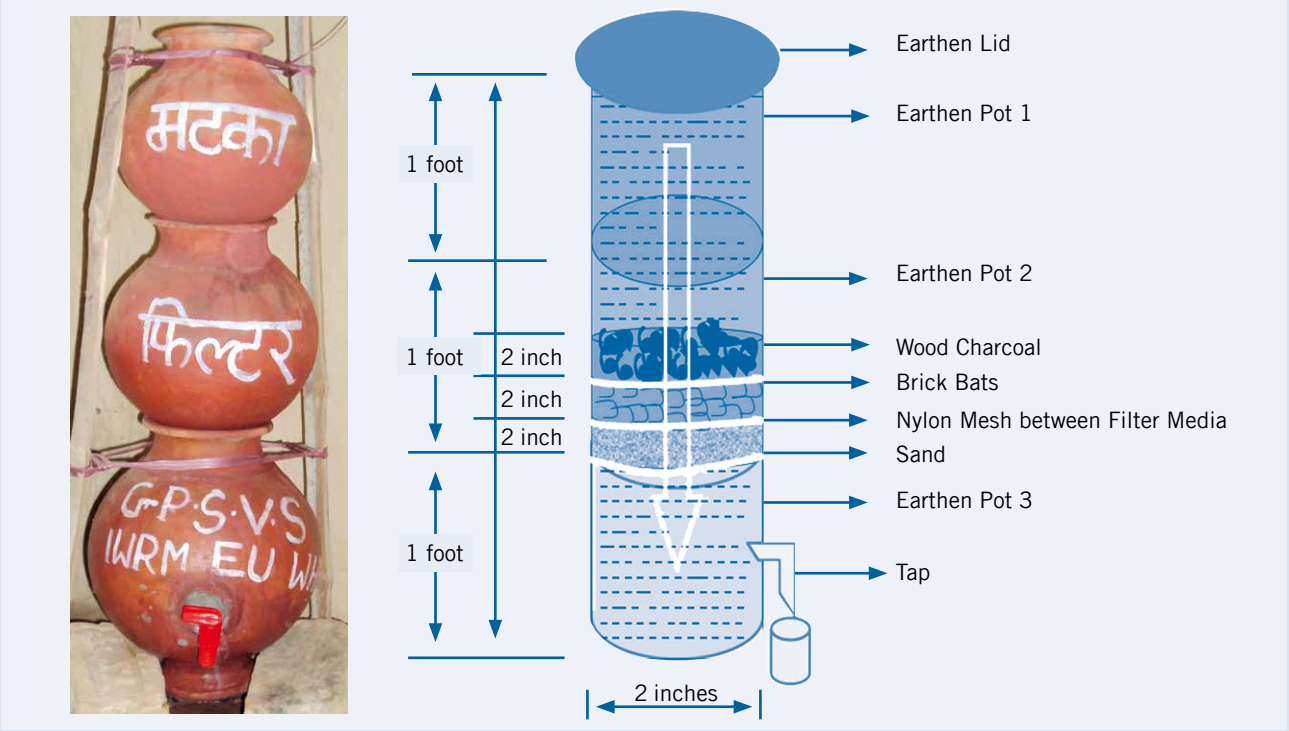
- The technology of a product needs to be simple enough that people understand its functions and how to fix it when it fails, otherwise it may be left unrepaired.
- The product should be available at an acceptable price to the consumer. A product is only accepted when there is willingness and the ability to pay. It must be kept in mind that rural incomes vary with seasons.
- High population densities make it easier for SMEs to maintain their business due to shorter delivery distances, closer suppliers and potentially higher demand. In sub-Saharan Africa, private sector businesses may have to supply over large distances, often on bad roads, to deliver products and carry out maintenance repairs. Lacking customers within shorter distance can make business less profitable.
- Adequate quality and constant availability of products contributes to consumer demand. Trade-offs between price and quality are also common: rural consumers may purchase cheaper and less reliable technologies, rather than expensive technology that lasts for a longer time, due to seasonally variable cash flows.
- Adequate product and service information is a key prerequisite for stimulating demand. When projects do not inform users where to buy spare parts or how to get support for O&M issues, sustainability may be undermined.

In order to attract SMEs in manufacturing, distributing, wholesaling, retailing and repair services for the WASH sector, the right incentives need to be created. SMEs will only realise business opportunities when they anticipate revenues. Therefore, entrepreneurs need access to accurate and reliable information relating to consumer demand, population densities, existing supply chains and infrastructure.

SMEs in rural environments often operate with low profit margins, hence, factors such as a stable macroeconomic environment, well developed communication and transport infrastructure, an open trade investment regime and a competitive financial sector (access to credit), may also be incentivising factors for SMEs to establish business and enter into the sector.

Chapter

5 Important Aspects of Sustainable Water Supply



Design of a Matka Filter, adapted from Megh Pyne Abhiyan, Bihar, 2011

"The groundwater in the flood prone regions of North Bihar contains excessive iron, resulting in the population suffering from gastro-intestinal problems. Together with its partner organisation, GPSVS, Welthungerhilfe promoted an affordable filter system for the affected households: the Matka filter – which completely removes the contaminants. The increasing demand for Matka filters is an indicator of their local acceptance. In addition, Matka filter production has provided local potters with an opportunity to strengthen their traditional business".

Nivedita Varshneya
Programme Manager
Welthungerhilfe, India

5.1 How much water is needed for domestic use? The importance of water quantity

It is commonly believed that the main health benefits from improved water supply are due to increased water quality, which reduces the ingestion of pathogens. Reviews, however, suggest that the health improvements associated with better water quality may be less significant than those obtained through increases in the quantity of water used, which enables better personal and domestic hygiene practices (e.g. hand washing, food washing and household cleaning). Population groups that consistently use more water have better health than those which use less water. This has been repeatedly demonstrated for a variety of health outcomes, such as specific diarrhoeal pathogens, diarrhoeal morbidity, and child growth [44]. Whilst there has been extensive debate about the relative importance of WASH in protecting and improving health, international guidelines, or norms for minimum water quantities in domestic water supply are currently lacking[6] [45]. According to several organisations, a minimum quantity should fall within the range of 20 to 40 litres, per capita, per day, for domestic uses, if health improvements are to be sustained. In a frequently quoted publication, Peter Gleick [46] even argues for 50 litres, per capita, per day.

People use water for a wide range of activities, some of which are more important than others. For example, having a few litres of water to drink a day is more vital than washing clothes, though people will still need to wash clothes if skin diseases are to be prevented and their physiological needs met. Each additional water-use results in health and other benefits, though with decreasing urgency [47].

Suggested Minimum and Basic Water Requirements for Domestic Use in lcd
(litres, per capita, per day)

	WEDC [47]	**SPHERE**[7]	**FAO** [48]	**Carter** [49]	**Gleick** [46]
Minimum – "survival" (drinking, food)	7		2-4		
Basic needs – short term (drinking, food, hygiene)		7.5-15			
Basic needs – medium term (drinking, food, hygiene, laundry)	15-20		20	20	
Drinking	3-4	2.5-3			2-9
Food preparation	2-3	3-6			10
Personal hygiene	6-7	2-6			5-15
Laundry	4-6				
Local cattle	20-30		20		
Goat, sheep			3-5		
Chicken	0.1-0.2				
Vegetable per m^2	3-6				

[6] WHO has not published specific guidance on the quantities of water as targets for health protection and promotion. This is in contrast to the effort made to establishing international standards and guidelines for drinking-water quality [45]

[7] SPHERE Standards, Edition 2011

People's needs are not always predictable. For example, the need to wash sanitary towels or to wash hands and feet before prayer may be felt to be more important than other uses. Different populations may also have specific needs, such as using water for anal cleansing, or different genders may have different priorities: women, for example, may be most concerned about basic household needs, men perhaps with livestock, girls with the need for water to wash during menstruation, and boys with swimming. Waste, spillage and leaks also need to be taken into consideration when assessing water needs within a community. Furthermore, water uses may also vary seasonally, based on climatic factors and household activities [47].

Since water may have multiple uses, not all water has to come from the same source, or be of drinking water quality. Some water requirements may be met by using lower quality (untreated) water (e.g. for livestock, domestic hygiene etc.), or with recycled water (e.g. growing food). Therefore, it may be preferable to provide separate water supplies within a community for bathing, washing, watering animals, as well as for hospitals, feeding centres and schools.

It seems obvious that people adapt their needs to the availability of supply. Even if plenty of water is available, there may be other limits to its use, such as the time taken for people to travel and queue up to get it. If people take more than 30 minutes to collect water, the amount they collect will reduce considerably (see figure below). At the one extreme, with household connections, the average per capita use, per day, ranges from 150 to 400 litres (also used for gardens) [46]. At the low extreme, the bare minimum, 2 - 4 litres, per capita, per day, is used for drinking and cooking – certainly not enough to live a healthy and productive life.

Relationship between Water Collection Time and Domestic Consumption

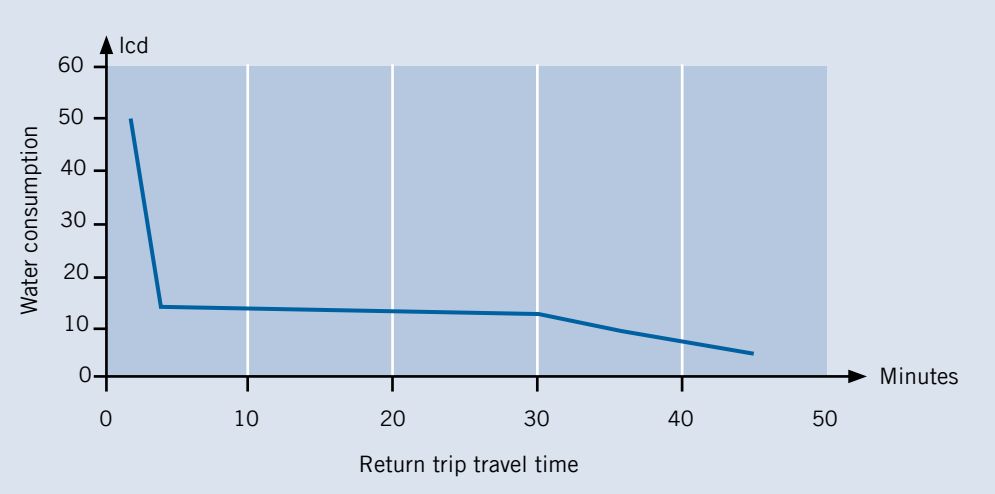


Fig. 9: Adapted from WEDC, [47]

5.2 Water source selection, site identification and appropriate technologies

Water professionals often pay insufficient attention to the practices of taking water from multiple sources, and/or using it for multiple purposes. As seen in the previous chapter, drinking water quality is not required for every form of water use. For this reason, the development and use of different water sources may be a viable option.

Several types of water sources, such as wells, ponds, rivers, earth dams or springs, have been traditionally used for multiple purposes (refer to textbox below). As these systems may not be operational throughout the year (e.g. during dry seasons), communities may have to balance their water needs across the remaining sources available to them, in order to meet their daily water requirements. Ideally, the accessibility of all water supply systems should be matched to the requirements, needs and priorities of a community.

Main Water Sources for the Development of Drinking Water Supplies [50], [51]

Collecting **rainwater** from either an existing roof structure or a ground level catchment area[8] can provide a useful supplementary source of water, even if it is not used as the main supply. Storage tanks are usually required to make the best use of rainwater.

Surface water (river, pond, lake, earth dam) is often the easiest to access, but can become easily polluted or affected by seasonal variations in contamination, turbidity and flow.

Groundwater may be obtained in several ways: a spring source may be used either to supply water through a gravity scheme or to provide water to a single outlet, running continuously. The rate of flow of water from the spring is likely to vary seasonally. It is necessary to measure the flow of the spring at the end of the dry season to determine its potential reliable yield.

Hand dug wells can be constructed using local techniques and labour. Their use is restricted to suitable soil types, such as clays, sands, gravels and mixed soils where only small boulders are encountered. The depths of hand dug wells typically range from about five metres deep (shallow wells), to over 20 metres (deep wells). An excavation of around 1.5 metres in diameter provides adequate working space for the diggers and allows a final internal diameter of about 1.2 metres, after the well has been lined.

Shallow or deep boreholes require drilling equipment and an experienced drilling team, but they can provide highyield supplies of good quality water. Locating groundwater can be difficult. Extensive field trials may be required to determine acceptable borehole locations.

The following issues need to be considered to ensure that the most appropriate water sources and water supply technologies are selected:

[8] e.g. Rock Catchments in Kenya

Facilitate informed choices
Before selecting a water source or choosing a technology, communities have to be made aware of the financial and managerial implications of each possible source and technology option. Water users should have the freedom to choose what type and level of water services they are capable of managing, without any undue external pressure.

Involve target groups at all stages of decision making
Thorough participatory assessments have to be carried out to identify people's needs and priorities with regards to water and these could be complemented by knowledge, attitudes and practices (KAP) surveys. Care must be taken to ensure that all groups in the community are represented and are able to make their concerns and needs heard and understood. It is often women and children who are most involved in water collection and its use. They are also likely to have the most knowledge about existing sources and it is therefore essential that they are involved in every stage of a water supply project.

In a second step, all possible water sources in the vicinity, including existing or traditional sources used by the community and other potential but untapped sources, should be mapped using local knowledge and further analysed. Various factors have to be taken into account for the selection of the most appropriate source, since these should match the ideal requirements, needs and priorities of a community, as further explained below.

The consideration of **social and cultural framework conditions** is as important as the technical requirements for the selection of appropriate water sources and technologies[9]. If systems are not culturally appropriate and cause security difficulties or restrict access for certain groups, such as women or disabled people, the benefits of a new source will be limited (e.g. if a water source is an important meeting place for women, the walking distance and the comfortable surrounding have to be considered first and foremost. Queuing time might be a less relevant factor).

Yield versus demand: caution should be exercised with planning water supply systems based on current demand. If a more convenient or reliable supply system is developed, consideration must be given to a potential increase in demand and to the possible migration of outsiders into the community, particularly in areas where water is scarce.

Water quality can only be discussed meaningfully when it is related to a specific use (e.g. water for livestock or domestic hygiene does not need to be of drinking water quality). If used for drinking and cooking, it is not only important that water sources are located appropriately with respect to potential sources of contamination and adequately protected, but it is also important to examine the risk of post-collection water pollution by inadequate handling, extraction, transport or storage.

The **operation and maintenance** requirements for the selected water source and supply system must be appropriate to the resources available. If the supply system cannot be operated and maintained by the villagers themselves, or with support from organisations, governmental institutions or the private sector within the area, then the systems are likely to be misused or fall into disrepair.

[9] An Appropriate Technology Checklist can be found under
www.akvo.org/wiki/index.php/Appropriate_Technology_checklist

The status of current land ownership and **legal requirements** related to the abstraction of water (e.g. obtaining permits) should also be considered, when selecting a water source. Sources on private land may cause access problems for certain groups which may not be apparent at the outset. The consequences of **siting decisions** must be considered carefully. In all cases, siting should be conducted through consultation with the community, or communities concerned, and in relation to environmental, hydrological and hydrogeological conditions, on-site sanitation, community preferences and land ownership.

The consideration of **potential risks** for people and the environment is indispensable to water source selection and technical design decisions. For example, when the targeted community is located in an area with higher risks of natural disasters (e.g. flooding, landslides) the selection of the source location and its protection has to considered with special attention (refer to Chapter 8). Negative **impacts to the environment** may include loss of vegetation, erosion (caused by overgrasing and excessive animal pressure on water supplies), overexploitation (falling ground water levels), or contamination of an aquifer.

Planning for Water Supply Systems Step by Step

1. Meet with community members to determine their needs, priorities and expected service levels
2. Gather background information on available water sources and users knowledge, attitudes, habits and practices (KAP)
3. Examine physical, social and cultural features, as well as security issues of the sources available. Preselect sources for further investigation
4. Examine water quality and consider water treatment options for the preselected sources
5. Roughly evaluate the requirements for the development of the preselected sources, the construction of an adequate supply system and its sustainable operation and maintenance. Evaluate life cycle costs and analyse managerial and economic risks
6. Select source and decide on technical design in consultation with the users, reaffirming that the needs and expectations identified in step 1 are met

5.3 Household water treatment and safe storage (HWTS)

Approximately 780 million people, worldwide, lack access to improved drinking water and use unsafe surface and groundwater sources. Even those who have access to 'improved' water supplies such as household connections, public standpipes and boreholes, may not have water that is microbiologically safe, due to a high risk of microbiological contamination of drinking water during both water-collection and storage, in the home.

A systematic meta-analysis of 57 studies measuring bacteria counts for both source water and stored water in households identified significant contamination after water collection in approximately 50 percent of all the cases analysed [52], supporting the argument for safer household water storage and point-of-use water treatment, together with point-of-use water quality monitoring. Studies indicate that interventions aimed at improving water quality at the household level, through safer household water handling, storage and treatment, are about twice as effective as those focused on the source, due to the ease at which water can be contaminated during and after the collection stage [53]. As already shown in Chapter 2, household water treatment at the point-of-use, may reduce diarrhoea by 29% (refer to fig. 3, Chapter 2); some studies even report a reduction of up to 40% [54].

Despite all of the positive HWTS results reported, it is important to bear in mind that water is only one critical pathway in the transmission of water-borne diseases (refer to fig. 2, Chapter 2). The benefits of a water quality intervention still depend on the overall sanitation and hygiene conditions. When sanitation conditions are poor, water quality improvements may have minimal impact, regardless of the amount of water contamination. Apart from that, research voices and practitioners are still divided over the question of acceptability, scalability and sustainability of HWTS [55].

It might not always be necessary to include household water treatment in a water chain. If the source is safe, all that is required, is to keep the water free from subsequent contamination. This is most simply and cost effectively achieved by promoting safe water handling and storage. In addition, critical sanitation and hygiene behaviour should be addressed with urgency. However, if the quality of the water at the source cannot be guaranteed, a treatment process to purify the water before drinking might be taken into account, with consideration of the sustainability and scalability of the approach. The most appropriate HWTS option for a location depends on existing water and sanitation conditions, water quality, cultural acceptability, implementation feasibility, the availability of HWTS technologies, and other local conditions.

5.3.1 The Multi-barrier Approach to HWTS

There are several options for water quality interventions. Using a multi-barrier approach is the best way to reduce the risk of drinking unsafe water [56]:

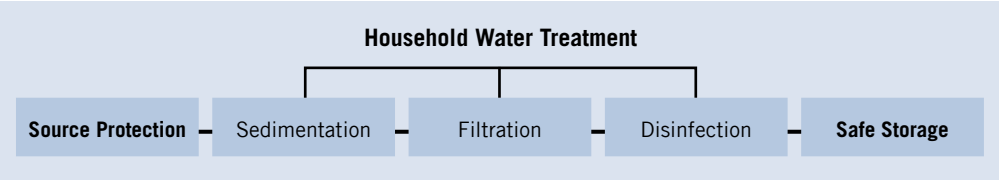


Fig 10: Water Quality Interventions (adapted from CAWST [56])

Source Protection

Water source protection does not usually belong to HWTS, but can become an important and effective water quality intervention. Risks, which may threaten drinking water quality at the source or point of collection include: poor site selection or protection, poor construction and deterioration, or damage to structures and a lack of hygiene and sanitation knowledge in the community. Actions that can be taken at the community level to eliminate these risks may include: regularly cleaning of the area around the water source. moving latrines away from and downstream of water sources, building fences to prevent animals from getting into open water sources, lining wells to prevent surface water from contaminating the ground water, and/or building proper drainage for wastewater around taps and wells.

Sedimentation and Filtration

Sedimentation is a physical treatment process used to reduce the turbidity of the water. Since bacteria and viruses are often attached to particle surfaces, the removal of particles through sedimentation facilitates a marked reduction in bacterial concentrations. This can be done simply, by settling the water using a natural reservoir, a settling pond, or a large tank. The sedimentation process can be accelerated through the use of coagulants and flocculants. These are natural (e.g. Moringa) and synthetic (e.g. purifier of water, PUR) chemicals that change the electrical charges of the suspended materials. This allows the particles to join together, thereby increasing their mass so that they settle to the bottom of the container.

Filtration is commonly used after sedimentation to further reduce turbidity and remove pathogens. Filters remove pathogens in several ways. These include straining, where the particles or larger pathogens such as worms become trapped in the small spaces between the grains of filter media, adsorption, where pathogens become attached to the filter media, or biological processes, where pathogens die naturally or the microorganisms living in the filter consume the pathogens. Sand and ceramic are the most common filter media, although cloth filters are also often used.

Disinfection and Pasteurisation

Typically, disinfection involves the addition of chemicals such as chlorine. It can also be induced by ultraviolet radiation, such as natural sunlight or artificial UV rays. Reducing turbidity and organic matter by sedimentation and filtration before the treatment, is necessary to improve the effectiveness of these disinfection methods. Heat can also kill microorganisms and this process is called pasteurisation. Pasteurisation has almost the same effect as disinfection. The most common methods to disinfect or pasteurise water include boiling, chlorination, solar disinfection (SODIS) or solar pasteurisation.

Safe Storage

Safe storage means keeping treated water away from sources of contamination, and using a clean and covered container. The container should prevent hands, cups and dippers from touching the water, so that the water does not get recontaminated. A safe water storage container should have a strong and tightly fitting lid or cover, a tap or narrow opening and a stable base so it does not tip over. It should be of durable and strong material which should not be transparent and the container should be easy to clean. Concerning the safe storage of water, disinfection with chlorine has an advantage over the other methods, since chlorine has a residual effect.

5.3.2 Scaling up HWTS interventions

HWTS is not only about products and technologies – community mobilisation, social marketing and behaviour change are also critical components. Effective and robust implementation strategies for rolling out the adopted HWTS approach are very important for successful up-scaling [57]. This requires leveraging existing commercial structures, securing donor funding for campaigns (but not product subsidies), Ministry of Health support, community-based approaches, and collaboration with all partners. Opportunities for scaling up HWTS include government commitment to promote awareness and generate demand, the use of schools, clinics and NGOs to encourage uptake and behaviour change, as well as partnerships with social marketing organisations and the private sector, to expand access and coverage. Like most other household-based water interventions, the provision of facilities/products must be accompanied by an extensive behavioural change programme to stimulate adoption and continued utilisation of the systems.

5.3.3 Sustainability of HWTS interventions

Regardless of the technology, attempting to implement HWTS programmes without a substantial education component is likely to decrease the long-term sustainability and impact of the intervention [58]. Furthermore, maintaining high post-implementation use levels is critical for the sustainability of HWTS. Other sustainability features of a HWTS-technology may include the following [59]:

1. The ability to consistently produce sufficient quantities of safe water to meet daily household needs
2. Effective technology for treating different locally available water sources and quality levels (e.g. including turbid and high organic content waters)
3. Technology requiring relatively little user-time to treat water, thereby preventing additional labour-burden on households
4. Affordable investment and O&M costs which are relatively insensitive to fluctuating incomes, such that households can continue to afford treating water and maintain systems
5. Access to a reliable and affordable supply chain for replacement units or spare-parts which consumers are willing to pay for
6. Maintaining high post-implementation use levels after cessation of intensive surveillance and education efforts, such as field trials and marketing campaigns

5.4 Introducing standard operating procedures

The multiplicity of designs and equipment installed under different donor projects in the past has left many countries with such a wide variety of facilities that it has become difficult to develop/improve the overall performance of the sector. To address this problem, many governments have developed policies and guidelines, and introduced national standards for both technical aspects (e.g. type of pump or design of piped systems), as well as, soft aspects such as tariff levels and O&M. It is important that donors and INGOs respond with a willingness to support national standardisation strategies and adhere to the standards applicable in the respective countries.

Although Welthungerhilfe has only installed a limited variety of technologies in its programme countries, the WASH sector evaluation revealed that the technical realisation of different technical systems may vary in quality. Local technicians (often sub-contracted) frequently have different ideas about how systems should be constructed and lack the necessary expertise and equipment to properly complete constructions. Welthungerhilfe's Regional Offices, who regularly implement WASH projects, should therefore develop consistent quality standards, such as, guidelines for technical design and standards for technical equipment, to ensure uniform construction quality standards[10]. Additionally, guidelines for the implementation of hygiene promotion, O&M training and financial training (tariffs, budgeting etc.), may be useful.

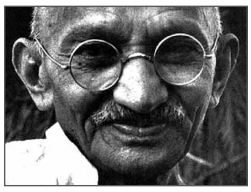
The standardisation of equipment, parts, designs, construction methods etc., has many benefits. In some cases, however, standardisation may be detrimental, particularly where it limits user-choice. Insisting that all families should construct a simple pit latrine with a concrete floor slab and brick superstructure may prevent the compliance of poor households because of the high cost, and may also deter the wealthy because of the perceived low level of technology being promoted. Standardisation must never be so narrow that it prevents users from choosing from several options to suit their income and preference [60]. Furthermore, guidelines and other standard operating procedures must not prevent trainers and social change agents from adapting their agenda to the specific needs of a particular community.

[10] Welthungerhilfe Zimbabwe and Pakistan have already introduced countrywide WASH standards for their interventions

Chapter

6 Important Aspects of Sanitation: achieving a hygienic environment, step by step

Traditional pit latrine, Uganda (Photo: Ullerich, Welthungerhilfe)



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"The cause of many of our diseases is the condition of our lavatories and our bad habit of disposing of excreta anywhere and everywhere. I, therefore, believe in the absolute necessity of a clean place for answering the call of nature and clean articles for use at the time, have accustomed myself to them and wish that all others should do the same. The habit has become so firm in me that even if I wished to change it I would not be able to do so. Nor do I wish to change it".

Mahatma Gandhi
Published in the Navajivan on 24.5.1925

Chapter

6

The importance of sanitation in the fight against hunger and poverty is well known, as has already been highlighted in the previous chapters. In the past decade an enormous amount of resources have been expended for the provision of sanitation facilities, yet around 2.5 billion people, worldwide, still have no access to improved sanitation and 15% of the world's population is still practicing open defecation [61]. There are numerous reasons for this situation. A major issue is the fact that sanitation rarely receives the required attention and is not prioritised by politicians or civil society despite its key importance for society. Political will for placing sanitation high on the development agenda has largely been lacking. This has often pushed sanitation into the shadows of water supply projects, limited innovation in the sector [62] and faced with frequent challenges from weak institutional structures, unclear responsibilities and mandates, limited resources and inappropriate approaches.

The term sanitation generally refers to the provision of facilities and services for the safe management of human excreta (urine and faeces), including the collection, transport, treatment, reuse/disposal of urine and faeces, or wastewater. The main objective of sanitation is to prevent diseases by hindering the transmission pathway of pathogens, or disease-causing organisms found in excreta and waste-water, from entering the environment and posing a threat to people. Sanitation includes the construction of adequate collection and disposal/reuse facilities and the promotion of proper hygiene behaviour, so that facilities are effectively used at all times. Non-technical measures also contribute significantly to the success of sanitation interventions. These include awareness raising, participatory planning of technical implementation and servicing structures, hygiene education, marketing, and public relations related to such interventions [63].

This chapter focuses on the 'sanitation ladder' framework and on sanitation planning criteria, rather than hardware solutions. Further information on technical solutions is provided in Chapter 9. The reuse of treated human excreta (productive sanitation) has already been introduced in Chapter 2.4.

6.1 The sanitation ladder framework: Achieving a hygienic environment, step by step

Sanitation and hygiene behaviour change should be understood as a process from there being no key behaviours, to the practice of a small number of behaviours, and finally, towards effective practice of all key behaviours to achieve a hygienic environment. Interventions should be selected to respond to the current set of behaviours in a community and seek to make sustainable moves up the ladder, step by step.

A sanitation ladder is a useful tool that is currently being used to monitor progress towards the sanitary/hygienic status of a community. The Stockholm Environment Institute (SEI), recently introduced a sanitation ladder framework which focuses on the desired functions and impacts of a sanitation system, rather than on a hierarchy of predefined sanitation technologies, as proposed by WHO/UNICEF to monitor the sanitation MDG [64]. The sanitation ladder presented below, is based on the SEI-model. The lower ladder fragment including the steps 1-6, should be applicable for most of Welthungerhilfe's project environments:

Sanitation Ladder Framework

Bottom of the Ladder: no sanitation facilities and no demand
At the bottom of the ladder lie those who lack any kind of sanitation facility, having to resort to open defecation. No sanitation and hygiene services are available to the majority of the population. All faecal-oral transmission pathways are open and no key behaviours are practiced. Sanitation is not regarded as a priority, with little or no demand for sanitation among the target population.

1 **First Rung: basic knowledge, awareness and demand**
Households or communities who reached the first rung already have some basic knowledge of the importance of safe sanitation and hygiene practices. The target group is aware that sanitation and proper hygiene practices are an issue within the community and there is an articulated demand for sanitation services. First indications and efforts to contain excreta can be observed (e.g. cat sanitation) and the population shows willingness to contribute their own resources (money, labour, building materials), in order to improve the current situation.

2 **Second Rung: safe excreta containment**
The function of the second rung is focused on preventing the spread of faecal-oral transmitted diseases, by proper excreta containment. Sanitation systems are in obvious use and clean, free of vectors (including flies), have no faecal matter lingering around the latrine, and include a hand washing facility. The second rung refers to various kinds of traditional pits for disposal of excreta and also includes public, or shared, latrines.

3 **Third Rung: safe access and availability (improved sanitation)**
In addition to assuring the functions on the first two rungs, the third rung considers the issue of safe access and availability, meaning that all users of a specific latrine have safe, reliable access to the sanitation facilities, 24-hours a day, year-round, including privacy, personal safety and shelter. Essentially, the facility must be very close to, or within, the individual compound. The third rung would be the equivalent of the term "improved sanitation" in the sanitation ladder used by the JMP.

4 **Fourth Rung: greywater management**
The fourth rung maintains all the functions from the lower steps, with the addition of greywater management. This implies that the household has no stagnant water within the compound, or in the street outside the compound. It thus requires proper management of greywater (bathing, dish and washing water) and a properly maintained, individual household latrine.

5 **Fifth Rung: pathogen reduction through excreta treatment**
The fifth rung includes functions for the wider environment and population, beyond the household. Again, all the functions on the lower steps still apply, and treatment of the excreta is now added to assure pathogen reduction.

6 **Sixth Rung: safe use of treated excreta (productive sanitation)**
The sixth rung begins to close the loop on resource flows through the safe use of nutrients, and/or organic matter contained in human excreta for crop production, or other productive uses, as long as the lower rungs of treatment and pathogen reduction have already been achieved. What was once considered 'waste' can now become a valuable resource that can contribute to local food and nutrition security and income generation, in addition to all the health benefits generated at the lower rungs of the ladder.

Fig. 11: Adapted from SEI, [64]

6.2 Planning for sustainable sanitation systems

As a general principle, any potential sanitation intervention should put the people/user and their preferences, at the centre. It is essential to understand that people always have a choice, whether or not they will make use of the implemented sanitation facility. If the users do not feel comfortable with the offered solution (or the O&M efforts required), or if it doesn't offer the necessary benefits that are convincing enough to use it, many people might prefer to revert back to old habits or practices. Finding out what really motivates people to use toilets and practice hygienic behaviour requires that the users and all other stakeholders are actively involved in planning and decisionmaking, as well as implementation and follow up processes, in order to ensure the long-term sustainability of projects and programmes. Most project planning approaches should cover at least the following four steps:

1. **Initial Assessment:** At the beginning of the planning process a preliminary assessment of the current status, definition of boundaries and analysis of all stakeholders should be carried out. This may include but is not limited to baseline or sanitation KAP surveys, focus group discussions, semi-structured interviews, transect walks and locality mapping, stakeholder identification, and analysis.
2. **Demand Creation:** If there is no or little demand for sanitation services from the target community, project approaches should trigger initial demand so that the request for solutions come from the people, not the implementing agency. This includes participatory community ignition activities such as CLTS, awareness raising activities such as social marketing, media campaigns, advocacy, or the creation of information materials. Demand creating software approaches are explained in further detail in Chapter 7.
3. **Decision Making on Technical Design:** the consideration of social and cultural framework conditions are as important as technical and O&M requirements, for the selection of an appropriate sanitation solution. If systems are not culturally appropriate and/or cause security difficulties or restrict access for certain groups such as women or disabled people, the use of a new sanitation system will be limited.
4. **Inclusion:** quite often, sanitation facilities merely require minor structural changes in order to be inclusive and barrier-free, and thus adapted to the needs of people with disabilities. This can be achieved through wider entrance doors, and the installation of additional handrails, or ramps. This would also benefit other social groups such as the elderly, pregnant women and parents with small children. The cost of constructing barrier-free sanitation facilities is often only a slight increase on the overall construction costs. Taking into consideration the needs of people with disabilities during the planning stages can prevent expensive adjustments and alter-ations at a future point. People with disabilities must be directly included in the planning phase if their needs are to be met [63]

The individual planning steps should also reflect the 'Bellagio Principles for Sustainable Sanitation' which were endorsed by the members of the Water Supply and Sanitation Collaborative Council (WSSCC) in the year 2000:

- Human dignity, quality of life and environmental security at household level should be at the centre of any sanitation approach
- In line with good governance principles, decision-making should involve participation of all stakeholders, especially the consumers and providers of services
- Waste should be considered a resource, and its management should be holistic and form part of integrated water resources, nutrient flow and waste management processes
- The domain in which environmental sanitation problems are resolved should be kept to the minimum practicable size (household, neighbourhood, community, town, district, catchments, city)

Ideally, the chosen sanitation solutions should be reproducible by the target group. They should therefore be affordable, create the necessary benefits and fit local needs and desires, so that the target group is willing and able to replicate the introduced sanitation solutions, on their own.

Affordability of technology in terms of capital and O&M costs can be a challenge which needs to be balanced with the consideration of subsidies. The use of subsidies in sanitation programmes is a debated issue and generally, the trend has been a move away from giving hardware to households, towards investment subsidies in small business creation, or into sanitation promotion programmes. Such subsidies are generally thought to be more effective than previous hardware subsidies [65].

Chapter

7

Promoting Hygiene Behaviour Change

Hygiene Education at a School (Source unknown)

"The spreading of disease cannot be stopped solely by spreading knowledge; true behaviour change takes time – and more. Practicing handwashing routines in schools, over and over again, helps pupils to engrain habits, which they carry home and spread in their families. Now, that's a type of infection we're looking for!"

Thilo Panzerbieter
Director, German Toilet Organization (GTO)
Co-author of this Orientation Framework

Of the three components of WASH (water, sanitation and hygiene), hygiene behaviour has been shown to make the most impact on community health [66]. Hygiene promotion is not only one of the most effective WASH interventions (refer to fig. 3, Chapter 2), but also the most efficient one (refer to figure below).

Efficiency of WASH Interventions

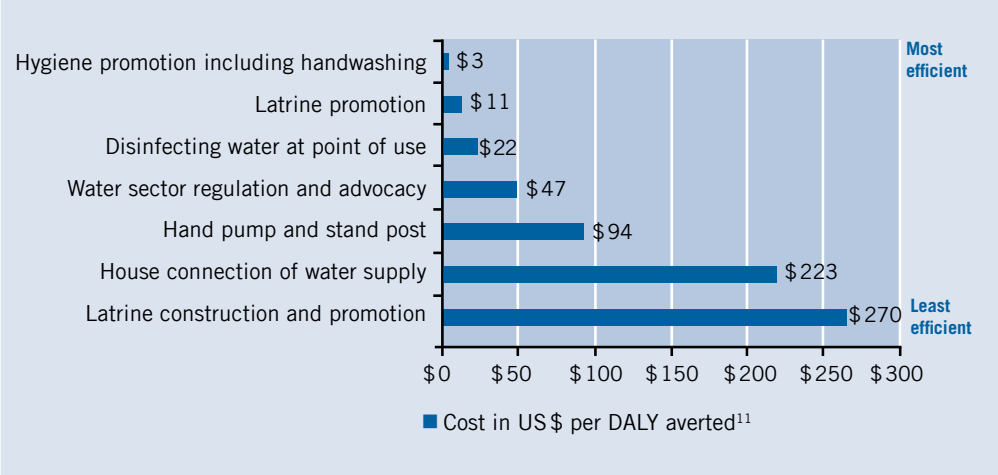


Fig. 12: Adapted from Conrad-Hilton Foundation, [54]

Good hygiene and sanitation practices are closely linked, and there is evidence that hygiene behaviour change is an essential part of achieving the health impacts associated with improved water supply and sanitation. The term 'hygiene' is used to refer to a multitude of behaviours and measures intended to break the chain of infection transmission in the home and community. These include:

- Handwashing with soap at critical times
- Personal hygiene
- The safe disposal of faeces (including child faeces)
- Ensuring safe water at the point-of-use
- Menstrual hygiene
- Food hygiene (cooking, storing, preventing cross-contamination)
- Respiratory hygiene
- General domestic hygiene (laundry, surfaces, toilets, baths, sinks)
- Disposal of solid waste
- Control of wastewater and rainwater

Not all of these practices are important for health and promoting all of them may be impractical, or unnecessary. Nevertheless, handwashing with soap, safe and sustained ways of disposing of and handling human excreta, and ensuring safe water at the point-of-use are known to have the greatest impact on people's, and especially children's health, as they effectively break the chain of faecal-oral transmission.

[11] DALY (Disability Adjusted Life Years) is a measure of overall disease burden expressed as the cumulative number of years lost due to ill health, disability, or early death.

Promoting handwashing with soap at critical times, is the most effective and critical hygiene intervention. Recent studies have shown that handwashing with soap can reduce diarrhoeal disease by between 37-48% [67]. Handwashing with soap can also prevent trachoma and ascaris infections, as well as reduce other health problems, such as respiratory infections, by approximately 23% [68]. There is general consensus that the two most critical times for handwashing are: (1) after faecal contact (e.g. after using the toilet, after cleaning a baby), and (2) before eating and preparing food. It is recommended not to promote too many critical times (or sub-times) at once, since messaging can become confused.

7.1 Understanding hygiene behaviour change

People's behaviour is usually deeply ingrained within a specific cultural and personal context. Sanitation and hygiene behaviours are learned at a very early age, assimilated into daily routine and most often, not discussed. Appropriate hygiene behaviour often implies a change in daily routines, which cannot be addressed just by passing on information [69]. Hygiene education programmes, whilst important, are not in themselves sufficient to bring about desired changes in hygiene practices and the vast majority of evidence shows that it has been largely ineffective, in the past. Effective hygiene promotion should therefore rely on what really motivates people to improve their hygienic situation. Research has found that increased comfort, privacy, convenience, safety for women (especially at night) and for children, dignity, and higher social status, are ranked more important than health benefits or reduced illnesses [70].

Hygiene promotion programmes should take into account that enduring hygiene behaviour is achieved through habitual practice and through interventions focused on embedding hygiene behaviour into daily routines [71]. Targeting children is particularly important since children act as change agents, have an important extension function in the communities, and are also easier to "form". What children learn about hygiene and sanitation has a high potential to be absorbed as a new norm, or model.

Although the desire for better WASH services does exist, it needs to be converted into demand in order to stimulate behaviour change. Software approaches as described in the following chapter, may help to potentially unlock such demand.

7.2 Creating demand and stimulating behaviour change

The complexity of introducing improved sanitation should not be underestimated, since sanitation is strongly influenced by socio-cultural perspectives and taboos. In many instances, even though new toilets and washing facilities have been built, and coverage is recorded as relatively high, proper usage often remains low and little or no benefit is derived. The methods used to address this problem aim to engage target groups (individuals, households, communities, institutions, or even organisations), enable a change in behaviour, or create demand for services. They must be well-designed to allow practitioners to facilitate changes that are appropriate and sensitive to cultural differences arising from gender, ethnicity, beliefs and customs, as well as by the different attitudes between those living in urban and rural locations.

The most important software tools for improving sanitation and hygiene practices include: Community-Led Total Sanitation (CLTS), Community Health Clubs (CHCs), Sanitation Marketing, Behaviour Change Communication (BCC), PHAST and CHAST. These approaches are briefly described below:

The Most Important Software Tools for Improving Sanitation and Hygiene Practices

Community-Led Total Sanitation (CLTS): a participatory planning approach that aims to create open-defecation free communities by using an upfront approach and shaming techniques to achieve behavioural change. It uses participatory methods, such as open defecation mapping, to stimulate discussion that enables local communities to analyse their sanitation conditions and collectively internalise the terrible impact of open defecation on public health, and on the entire neighbourhood environment. The basic assumption behind CLTS is that no human being can stay unmoved once they have learned that they are ingesting other people's shit. By raising awareness of the fact that as long as a minority continue to defecate in the open, everyone is at risk of disease, CLTS triggers the community's desire for change, propels them into action and encourages innovation, mutual support and appropriate local solutions, thus leading to greater ownership and sustainability. It focuses on community mobilisation and ignites a change in behaviour, rather than hardware [72]. CLTS also encourages handwashing with soap or ash, and other hygiene-related behaviour.

Community Health Clubs (CHC): CHCs refer to a participatory approach that aims to create a "culture of health" among community members. Over a period of around six months, CHC members gather weekly, to discuss and debate ways to improve hygiene, as well as a total of around 20 different health topics, ranging from HIV/AIDS, to malaria, pit latrines, hand washing and refuse pits. The approach creates demand and value for hygiene and sanitation, ensures maintenance and high levels of behaviour change. The assumption is that without an increase in 'social capital' through sound knowledge, solid organisation and increased capacity, no amount of external assistance will produce sustainable improvement. CHCs require good facilitation and institutional support from local health workers and promoters, for a relatively long period of time. However, CHCs have been proven to be quite effective in paving the way for the later implementation of water and sanitation projects [70].

Behaviour Change Communication (BCC) can be described as the strategic research and development of communication materials to promote positive health, social, or economic outcomes. It builds on formative research to understand both the factors or behavioural determinants that are influencing demand among households, and constraints and opportunities within the sanitation supply chain [3].

Sanitation Marketing aims to strengthen the private sector in delivering services to the poor. It incorporates BCC with best practices from social and commercial marketing. Sanitation marketing employs what is called the, "marketing mix", or "Four Ps" – product, price, place, and promotion –, to scale up the demand and supply for improved sanitation, particularly among the poor. 'Product' refers to a physical product, a service, or even an idea that spurs a behaviour change. When making product decisions, the team working with the local private sector should focus on products that have features and benefits that consumers consider both desirable and useful. 'Price' focuses on providing households and sanitation entrepreneurs with access to financing options that make producing and purchasing products and services more affordable. 'Place' refers to where a product or service is sold or obtained and the means and channels through which it is distributed. In rural areas, sanitation marketing to develop or strengthen the supply chain is often necessary to ensure that products and goods are accessible. 'Promotion' (also referred to as communication) is, in many ways, the glue that ties the marketing mix together [3].

Participatory Hygiene and Sanitation Transformation (PHAST) is a participatory learning methodology that aims to enable communities to overcome constraints to behavioural change and promotes participatory hygiene/sanitation concepts that seek to help communities improve hygiene behaviours, reduce diarrhoeal disease and encourage effective community management of water and sanitation services. PHAST is primarily a decision-support tool that uses a "seven step" participatory approach to facilitate community planning and action. PHAST works on the premise that as communities gain awareness of their WASH situation through participatory activities, they are empowered to develop and carry out their own plans to improve this situation. The plans adopted may include both construction and management of new physical facilities as well as safer individual and collective behaviours [70].

Children Hygiene and Sanitation Training (CHAST) is a recently developed approach for promoting good hygiene among children. It is based upon the PHAST approach and uses a variety of exercises and educational games to teach children about the direct links between personal hygiene and good health. CHAST is based on the proven premise that personal hygiene practices are usually acquired during childhood and that it is much easier to change the habits of children than those of adults. Because the PHAST approach was initially designed for adults, it has been carefully revised and adapted to suit the needs of young children [70].

7.3 Planning for hygiene promotion

It is recommended to consider the following six steps during the planning of hygiene promotion interventions:

1. **A baseline behaviour assessment** is crucial for identifying critical hygiene and sanitation issues, and behaviours, in the respective target community, and to determine their relevance/importance for subsequent hygiene promotion interventions. The FOAM (Focus, Opportunity, Ability & Motivation) model, recently developed by the WSP, was in particular, designed to analyse sanitation and hygiene behaviour and support the design of effective hygiene promotion programmes [73]. KAP (Knowledge, Attitude & Practice) surveys are also suitable for a baseline behaviour assessment.
2. Different communities and user groups, as well as different genders and age groups, are likely to have different wants and needs and may also differ in their capacities. Therefore, it is important to identify and **analyse the characteristics of the target audience** in a second step. Different communication strategies, messages and content for dialogue, will be needed for each group.
3. The hygiene promotion intervention will have to be designed and tailored to the identified local needs, knowledge, attitudes and practices. **Target behaviours should be determined,** as do the perceived barriers and drivers for the foreseen behaviours. The determination of corresponding indicators is also crucial since this enables the measurement of any impact that has been made.
4. **Potential tools, interventions, events or media channels** that are socially acceptable, effective, economically appropriate and enable reaching the identified target audience, will have to be identified. The selected hygiene promotion activities should ideally be pre-tested in order to determine if they have the desired impact and should be adjusted, if necessary. The planning also involves the development of a long-term strategy (including the exit), as well as details of the monitoring and evaluation system.
5. **Sufficient time, financial resources and personnel** to carry out hygiene promotion activities need to be allocated. It is also recommended to look for potential external support from other groups, institutions and organisations, including the private sector. A project period of a minimum 1.5-2 years is recommended, in order to enter into real dialogue with a community and not only subject them to a formalised training intervention.
6. Guided by the indicators set during the initial project planning stage, **regular monitoring and evaluation** activities should be planned and conducted to evaluate if interventions produce the desired results and impact.

Chapter

8 Taking Disaster Risk Reduction and Climate Change Adaptation into Account

Collapsed School Toilet Building after Heavy Rains (Photo: Source unknown)

"Hundreds of toilets collapsed following the severe floods in Pakistan 2010, leading to the faecal contamination of many water sources. Although the risk of flood was already known, many toilet facilities were built close to rivers, without the appropriate safety measures."

Jürgen Mika
Project Manager
Emergency Response Team
Welthungerhilfe

Although there is growing recognition of climate change and its contribution to the risk of disasters, the challenge of incorporating DRR and CCA measures into project planning is often underestimated. In its 2012-2014 strategy, Welthungerhilfe highlights the importance of CCA as one means of safeguarding sustainable project outcomes. Indeed, the incorporation of climate change adaptation into interventions in disaster prone areas, is obligatory[12].

8.1 The impact of climate change and natural disasters on WASH service delivery

Disasters resulting from extreme weather events (droughts, floods, mud-slides, storms etc.), as well as earthquakes and volcanic eruptions, affect WASH service delivery in several ways:

- Typically, during a period of **drought,** surface water and soil moisture begins to disappear, leading to greater reliance on groundwater for both irrigation and domestic uses. As the groundwater table drops, water levels in bore holes and shallow wells also reduce, or even dry up, causing some to cease operation. This results in increased stress on neighbouring, or deeper boreholes, increasing the probability of pump breakdown and salt-water intrusion through over-use.
- **Flash floods,** result amongst other things, from heavy rainfall, inundating vast areas within a short period of time. Sanitation facilities constructed in flood prone areas are vulnerable to collapse, potentially resulting in the transmission of human excreta across entire neighbourhoods and communities, especially when penetrating the aquifer through unprotected wells, and subsequently leading to severe health risks. Likewise, the construction of water supply infrastructure (wells, boreholes and storage facilities) in low-lying areas, without the knowledge of possible flood scenarios (e.g. statistical mean of a ten year recurring flood), may be prone to destruction.
- There is already mounting evidence of a long-term regional change in climate, especially in sub-Saharan countries, as noted by a very irregular and marked decline in rainfall (e.g. in Sudan), resulting in **desertification and soil degradation** that is being further accelerated by deforestation, overgrasing and poor farming practices. Soil degradation will increase the risk of flash flooding during heavy rainfall, negatively impacting upon the recharge of groundwater reservoirs, and causing heavy siltation of surface water supply systems during the rainy season.
- **Storms, mud-slides and earthquakes** destroy WASH infrastructure such as toilets, boreholes and water storage facilities leading to an immediate breakdown of service delivery and the risk of successive flooding.

8.2 Adaptation options and practices in the WASH sector

Measures to prepare for and respond to interannual climate variability and extreme hydro-meteorological events are known – in the climate change terminology –, as adaptation. Adaptation should not be understood as simply implementing the correct (WASH) technology or practice. Moreover, it should be part of a coherent inter-sectoral strategy to

[12] Welthungerhilfes' publication "Climate Proofing: An instrument for taking into consideration climate change and its impacts in the projects and programmes of Welthungerhilfe" provides several tested, participative analysis and planning tools, to involve communities in the planning process, in order to align project design with the requirements, realities and interests of the people, to integrate their knowledge, and to enhance long-term commitment for the planned measures.

ensure sustainable WASH service delivery, without disregarding other sectors. Diversification of water supplies, improving the resilience of systems, as well as awareness raising, are effective measures to protect livelihoods and the assets of communities and individuals from the hazardous impacts of climate change.

8.2.1 Diversification of water supply

During dry seasons and even more so during droughts, the failure of one water source increases the pressure placed on remaining water sources, resulting in overexploitation and potential contamination. Additionally, overstraining the technical capacity of an installed system may result in hardware failure. Diversification of water supply is one of the most important strategies to prepare for extreme weather events. Options to develop additional water sources include rainwater and surface water harvesting technologies, as well as the reclamation of used water, especially in urban environments. Rock catchments in Kenya are examples of such systems installed by Welthungerhilfe. Similar examples include Hafir dams in Ethiopia and Sudan (earth dams which store surface water), and domestic rain-water harvesting systems, such as those installed in many Welthungerhilfe project countries.

8.2.2 Improving the resilience of WASH supply systems

Exploring the capability of groundwater systems

Groundwater systems typically show a much slower and muted response to drought and heavy precipitation, as compared with surface water [58]. Deep tube wells, usually defined as those that penetrate at least one impermeable soil layer, generally have much greater resilience to drought than traditional water supply systems such as springs, hand dug wells, or surface water sources. Increasing access to groundwater is a key predrought mitigation strategy for drought-prone domestic and community water supply. Drilling new boreholes requires groundwater surveys and proper siting in order to achieve maximum impact. Repairing damaged boreholes or deepening existing ones might be a more efficient alternative [58].

Improving the resilience of water supply systems

Consideration of technical adaptation measures is relevant for many water supply systems such as, spring protections, gravity supply schemes, communal tap stands, water reservoirs and sand dams. For example, the key vulnerabilities of wells during flooding are the ingress or infiltration of contaminated waters, the lack of wellhead access due to flood waters, and the collapse of unlined hand dug wells when soil becomes saturated. Wells should be constructed up the hydraulic gradient (uphill) from latrines and animal waste[13]. Sealing abandoned wells is also essential to protecting groundwater quality in flood prone zones. If an abandoned well is not properly sealed, floodwaters that inundate the abandoned well are likely to contaminate both shallow and deep groundwater. Retro-fitting of wells by elevating hand pumps, is another means to make them flood proof.

[13] Concerning the distance between a latrine and a well or borehole, the literature often provides distances in metres (e.g. 30-50m) as a one-size-fits-all measurement. However, to determine the minimum safe separation distance between a latrine and well, one needs to consider: a) the direction in which the groundwater is moving, b) the distance between the bottom of the latrine and the water table and c) the type of soil between the bottom of the latrine and the water table.

Flood-proofed Handpump in Bahraich, India: the apron is one metre high and the slope of the base gradual enough to prevent damage to the base during flash floods (Photo: District Administration, Uttar Pradesh, India).

Improving the resilience of sanitation systems against flooding

The key vulnerability of sanitation facilities (e.g. latrines) during flooding, involves the inundation of the pit from below (in areas with high groundwater tables), or from above (in flood-prone or tidal areas). To prevent pits from inundation from above, latrines should be raised (raised-surface latrine). This type of latrine can also be used for areas with high groundwater table, or flood-prone and tidal areas. To address inundation of the pit from below, the prevailing groundwater table in the rainy season and the soil type (permeability) needs to be taken into consideration during the planning phase. Pits which reach the groundwater level require a special lining. For example, the construction of pit latrines with concrete or bricklined pits prevents groundwater from entering the underground part, assuming that the lining material is of adequate quality. In order to improve the resilience of latrines, the construction of shallow pits should be considered and they should be more frequently emptied. Dry-composting latrines provide another option to prevent groundwater contamination in case of pit collapse.

Resilience to water quality degradation

When drought conditions persist and groundwater reserves are depleted, the residual water that remains is often of inferior quality. This is caused by the leakage of saline or contaminated water from the land surface, the confining layers, or adjacent water bodies that have highly concentrated quantities of contaminants. HWTS can significantly reduce the incidence of waterborne diseases. The developments of Water Safety Plans provide another option to improve resilience against water quality degradation.

8.2.3 Raising awareness and education

Working together with partners, local administrations and communities at grassroots level, as well as line ministries in charge of policy development and technical standardisation, places Welthungerhilfe in a good position to raise awareness about, and stimulate discussion, on climate change issues. Raising basic awareness of the causes and impacts of climate change is crucial for empowering households, communities and decision makers, to adapt and increase their resilience to current and future climates. ‘Module D’ of the Welthungerhilfe guideline document, ‘Climate Proofing’, provides several tested and participatory analysis and planning tools to involve the community into the planning process.

Chapter

9 Service and Sector-support

Stand of Viva Con Agua at the Southside Festival 2011 (Photo: Koegler, Welthungerhilfe)

"Through the facilitation of thematic funds for WASH, and the great support of our partner, Viva Con Agua, as well as many other donors, we will not only be able to support more projects in our WASH sector on a needs-oriented basis, but also focus more on the funding of innovative project designs, and the promotion of impact orientation and long term sustainability".

Michael Hofmann
Executive Director, Marketing
Welthungerhilfe

9.1 WASH Library, Checklists and other information tools

Welthungerhilfe's WASH Library

More than 450 thematic publications are available in Welthungerhilfe's WASH Library. These documents are numbered, categorised and accessible online[14], without registration, through Google Drive, a Google file storage and synchronisation service. The publications contained in the library have been utilised for informing this Orientation Framework. The six-digit WASH Library Number (e.g. 120202) is a source identifier, enabling the easy download of publications sought from the WASH library. Important key references and links are listed in the table below.

Key References and Links	
Water Supply	Technology overview in 060102, 060103, 060106, 140101 www.rural-water-supply.net/en/resources www.akvo.org/wiki/index.php/Portal:Water www.lboro.ac.uk/well/
Sanitation	Technology overview 100704 100301, 100304, 100701, 100706, 100711 www.susana.org/lang-en/practitioners www.akvo.org/wiki/index.php/Portal:Sanitation www.sswm.info/category/implementation-tools/wastewater-treatment
Hygiene Promotion	020110, 020302, 020402, 100606, 100801, 110102, 110104, 110202 www.ceecis.org/washtraining/index.html www.irc.nl/page/115 www.redr.org.uk/washmaterials/ www.cawst.org/en/resources/pubs
HWTS, Water Quality Interventions	Technology overview 070101-070122 070204, 070301, 070303, 070505 www.cawst.org/en/resources/pubs www.sswm.info/category/implementation-tools/water-purification www.who.int/household_water/network/en/
Baseline, Indicators, PM&E, Logframe Support	070506, Welthungerhilfe WASH Library Folder 04: https://docs.google.com/folder/d/0B1zx2E-vMw2OUVpaTG94ckIDNU0/edit
WASH by topic, search and find	Welthungerhilfe WASH Library – full text search www.watersanitationhygiene.org/References/Technical%20Resources.htm www.wsscc.org/resources www.wsscc.org/topics www.akvo.org/wiki/index.php/Main_Page
WASH by country	060106 www.rural-water-supply.net/en/region-and-countries www.waterwiki.net/index.php/Countries www.en.wikipedia.org/wiki/Category:Water_supply_and_sanitation_by_country www.wsscc.org/countries

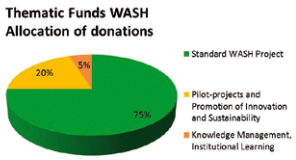
WASH Checklists and other tools

A number of checklists, planning tools and compilations, specifically related to the content of this Orientation Framework, are available in the WASH Library folder 1402. Included are checklists and planning tools on O&M, supply chain management, HWTS, demand assessment, post construction support, appropriate technologies and others.

[14] https://docs.google.com/folder/d/0B1zx2E-vMw2OaVhIdndoc2kyaG8/edit

9.2 WASH sector support through the Headquarter

WASH sector support for country programmes is provided through the KnowledgeXchange unit, based at Welthungerhilfe's HQ, in Bonn. The unit is responsible for: a) the development of standards and guidelines, b) advisory services with regards to grant applications, internal consultation and professional back stopping, c) knowledge exchange and internal networking[15], and d) external networking and advocacy. Additionally, regional knowledge exchange workshops on specific topics are organised and facilitated by the unit.



Water Initiative

To enable the financing of WASH projects, Welthungerhilfe's marketing department has introduced the Water Initiative, a thematic fund for WASH. 25% of the funds are earmarked for innovative project approaches, the promotion of impact orientation and long-term sustainability, as well as knowledge exchange.

External networking, advocacy

Welthungerhilfe is a co-founder of the German WASH-Network www.washnet.de/en/, an umbrella initiative to strengthen the entire German WASH sector in humanitarian aid and development cooperation, in order to implement the Human Right to Water and Sanitation. At present, 18 Germany-based and WASH-affiliated NGOs are members of the network.

WASH Sustainability Charter

Welthungerhilfe has also endorsed the WASH Sustainability Charter (www.sustainablewash.org/), a collaboratively-developed set of guiding principles for sustainable solutions in water, sanitation, and hygiene education. The website provides a platform to assess, learn, and share best practices related to WASH sustainability.

[15] At present, the KnowledgeXchange unit disseminates regular WASH related information to more than 100 staff members from Welthungerhilfe and partner organisations, interested in WASH. This serves as an important internal resource for knowledge exchange and institutional learning.

Annex

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Welthungerhilfe's WASH-glossary

Access People are described as having access to water or sanitation services if they can, or have the means, to use a functioning facility within a reasonable distance of their home, and without exclusion on the basis of race, tribe, religion, gender, or other such cause [25].

Appropriate Meeting the needs of local contexts, communities and households [33].

Benefits Benefits depend on the needs, priorities and service level expectations of users and are usually related to accessibility, quality, quantity, convenience, affordability and the reliability of WASH services.

CHAST CHAST is a recently developed approach for promoting good hygiene among children. It is based upon the PHAST approach and uses a variety of exercises and educational games to teach children about the direct links between personal hygiene and good health. CHAST is based on the proven premise that personal hygiene practices are usually acquired during childhood, and that it is much easier to change the habits of children, than those of adults [70].

CHC Community Health Club CHCs or Community Health Clubs, refer to a participatory approach that aims to create a "culture of health"among community members. Over a period of around six months, CHC members gather weekly to discuss and debate ways to improve hygiene, including a total of around 20 different health topics ranging from HIV/AIDS, to malaria, to pit latrines, hand washing and refuse pits. CHCs create demand and value for hygiene and sanitation, ensure maintenance, and high levels of behaviour change [70].

CLTS CLTS or Community-led Total Sanitation, is an integrated approach for achieving and sustaining the open defecation free (ODF) status of communities. CLTS entails the facilitation of a community in their own analysis of their sanitation profile, their practices of defecation and related consequences, leading to collective action to reach ODF status [74].

Consumers By consumers we mean the users of WASH services.

Disaster Risk Management The systematic process of using administrative decisions, organisation, operational skills and capacities, to implement policies, strategies and coping capacities of the society and communities, in order to reduce the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention), or to limit (mitigation and preparedness), the adverse effects of hazards (ISDR, terminology of DRR).

Disaster Risk Reduction The conceptual framework of elements considered to have the possibility of minimising vulnerabilities and disaster risks throughout a society, to avoid (prevention), or to limit (mitigation and preparedness), the adverse impacts of hazards, within the broad context of sustainable development (ISDR, terminology of DRR).

Drought Drought is a sustained and regionally extensive occurrence of below average natural water availability and is mainly caused by low precipitation and high evaporation rates. Drought can be characterised as a deviation from normal conditions in the physical system (climate and hydrology), which is reflected in variables such as precipitation, soil water, groundwater and stream flow [75].

Environmental Degradation The reduction in the capacity of the environment to meet social and ecological objectives, and needs (ISDR, terminology of DRR).

Equitable by 'equitable' we mean that services shall be accessible to even the poorest and most vulnerable people and that no part of a community is left without their basic needs met.

Annex

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Feasibility

Feasibility in the context of WASH covers at least five factors: health (e.g. water quality parameters), technical (e.g. hydrologic parameters to extract water from an aquifer), cultural (e.g. defecation practices), socio-economical (e.g. the financial capacity to run a water supply system), and environmental (e.g. preservation of the resource) [33].

HWTS

The abbreviation 'HWTS' stands for 'Household Water Treatment and Safe Storage' and comprises a variety of simple and efficient drinking water treatment options at household level, that help to significantly reduce the incidences of waterborne diseases. HWTS includes practices such as the boiling, filtration, chlorination, and the solar disinfection (SODIS) of water.

Hygiene

The term 'hygiene' is used to refer to behaviours and measures which are used to break the chain of infection transmission in the home and community. All of the following contribute in some way to reducing the burden of infectious diseases circulating in the community: hand hygiene and personal hygiene, safe disposal of faeces, ensuring safe water at the point-of-use, menstrual hygiene, food hygiene (cooking, storing, preventing cross-contamination), respiratory hygiene, general hygiene (laundry, surfaces, toilets, baths, sinks), the disposal of solid waste and the control of wastewater and rainwater [76].

Hygiene Behaviour Changes

Hygiene behaviour changes are essential for creating demand for improved WASH services. Welthungerhilfe will shift increased emphasis from the provision of facilities, to the inclusion of information and education on behaviour and practices. Hygiene promotion programmes advocate for the development of skills, in collaboration with the existing local government structures, using practical and interactive methods, rather than just passing on information.

Hygiene Education

Hygiene education refers to the provision of education and/or information to encourage people to maintain good hygiene, and prevent hygiene related diseases. It is a part of hygiene promotion and is often most effective when undertaken in a participatory, or interactive way [76].

Hygiene Promotion

Hygiene promotion can be understood as the systematic attempt to enable people to take actions to prevent water and sanitation related diseases and to maximise the benefits of improved water and sanitation facilities [76].

Implementing Partners

By implementing partners, we mean partners who provide services towards implementing the project. This can be either a consortium partner, a local NGO or other non-state-actor (including the private sector), national governments (specifically ministries responsible for water and sanitation), and local administrations.

Life Cycle Cost Approach (LCCA)

The Life-cycle Cost Approach is a methodology for monitoring and costing sustainable water, sanitation and hygiene (WASH) services by assessing costs and comparing them against levels of service provided [39].

Life Cycle Costs (LCC)

Life-cycle costs as defined by the IRC WASHcost research programme, refers to the (recurrent) costs of ensuring the delivery of adequate water, sanitation, and hygiene services to a specific population, in a determined geographical area, not just for a few years, but indefinitely [38].

Malnutrition Malnutrition[16] results from deficiencies, excesses or imbalances in the consumption of macro- and/or micronutrients. Malnutrition may be an outcome of food insecurity, or it may relate to non-food factors, such as: (a) inadequate care practices for children, (b) insufficient health services and (c) an unhealthy environment due to inadequate WASH service delivery. Under-nutrition encompasses stunting, wasting and deficiencies of essential vitamins and minerals.

Mitigation Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards (ISDR, terminology of DRR).

Nutrition Nutrition is a broad term referring to processes involved in eating, digestion and the utilisation of food by the body, for growth and development, reproduction, physical activity, and the maintenance of health.

Operation and Maintenance, (O&M)[17] O&M in general, refers to all post-construction activities needed to operate, maintain and manage a water supply or sanitation system. O&M must be considered at each functional step of the system, from the user interface to the reuse, or disposal, of sanitation products and from the water catchment, to the storage of water at household level (water supply).

PHAST PHAST or Participatory Hygiene and Sanitation Transformation, is a participatory learning methodology that aims to enable communities to overcome constraints to behavioural change and promote participatory hygiene/sanitation concepts that seek to help communities improve hygiene behaviours, reduce diarrhoeal disease and encourage effective community management of water and sanitation services [70].

Post-construction Support Post-construction support refers to the (on-going) direct support to (community-based) service providers, users or user groups by an outside agency, in the operation, maintenance and administration of a water and sanitation supply service, including technical and organisational support (adapted from [40]).

Preparedness in the context of DRR Activities and measures taken in advance, to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people, and property, from threatened locations (ISDR, terminology of DRR).

Prevention in the context of DRR Activities to prevent the adverse impact of hazards and provide the means to minimise related environmental, technological and biological disasters (ISDR, terminology of DRR).

Recovery in the context of DRR Decisions and actions taken after a disaster with a view to restoring, or improving, the pre-disaster living conditions of the disaster-stricken community, while encouraging and facilitating the necessary adjustments to reduce disaster risk (ISDR, terminology of DRR).

Resilience The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event, in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement, of its essential basic structures and functions [77].

[16] The term malnutrition technically includes under-nutrition and over-nutrition. In this document we refer to under-nutrition, as the most pervasive form of malnutrition.

[17] The need of setting up an O&M system refers to water projects with a minimum duration of one year undertaken as a rehabilitation and development intervention and not within the context of emergency water supply projects.

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Resilience in the context of DRR

The capacity of a system, community or society, potentially exposed to hazards, to adapt, by resisting or changing, in order to reach and maintain an acceptable level of function and structure. This is determined by the degree to which the social system is capable of organising itself to increase its capacity for learning from past disasters to improve future protection and risk reduction (ISDR, terminology of DRR).

Risk Assessment/Analysis in the context of DRR

A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat, or harm people, property, livelihoods, or the environment, on which they depend (ISDR, terminology of DRR).

Safe Drinking Water

Safe drinking water is water with microbiological, chemical and physical characteristics, that meet WHO guidelines or national standards, on drinking water quality.

Sanitation

Sanitation generally refers to the provision of facilities and services for the safe management of human excreta (urine and faeces), including the collection, transport, treatment and reuse/disposal, of urine, faeces, or wastewater.

Sanitation (Improved/Unimproved)

An improved sanitation facility is defined as one that hygienically separates human excreta from human contact. Following the JMP classification, improved sanitation facilities are:

- Flush or pour-flush to piped sewer systems, septic tanks or pit latrines
- Ventilated improved pit latrines (VIP)
- Pit latrines with slabs
- Composting toilets

Unimproved sanitation facilities are:

- Flush or pour flush to elsewhere
- Pit latrines without slabs or open pits
- Buckets
- Hanging toilets or hanging latrines
- No facilities; use of the bush or field (open defecation)

The JMP does not consider sanitation facilities to be improved when shared with other households or open for public use. However, Welthungerhilfe adopts the position [78] not to exclude shared facilities, provided that there is no other option and that personal safety of users, and cleanliness of the facilities can be assured.

Services

Services are not time and location-specific projects that cease after a construction or rehabilitation phase. Services are continuous and cater for post-construction technical and institutional support. For example, a 'water service' is defined as "the sustainable provision of water of a given quality and quantity at a given place, with predictability and reliability" [79].

Service Delivery Approach

A service delivery approach focuses on the long-term provision of WASH services, at scale, as opposed to the implementation of discrete, one-off projects at the community level. The approach thus includes both the physical infrastructure and the management systems and capacities required at multiple levels, to keep services running over time [23].

Sustainability

A WASH service is sustainable when [adopted and revised from [26]:

- It functions and is being used
- It is able to deliver an appropriate level of benefits that meet the user's needs, priorities and expected service levels
- It continues over a prolonged period of time, exceeding beyond the life-cycle of the equipment
- It's life cycle costs are covered at local level through user fees, or alternative financial mechanisms
- It can be operated and maintained at local level, with limited, but feasible, external post-construction support
- It does not negatively affect the environment

The Human Right to Safe Drinking Water and Sanitation

On 28/07/2010, 122 countries formally acknowledged the Human Right to Safe Drinking Water and Sanitation in the General Assembly resolution (A/64/292) which was adopted by the UN Human Rights Council in September, 2010 [35]. There are three aspects of the right to safe drinking water and sanitation that should be noted in the context of rehabilitation work and development aid: the right affirms "the need to focus on local and national perspectives" in considering WASH issues, reaffirms that governments are ultimately responsible for creating enabling environment for the availability, accessibility, affordability and quality of services – and, it urges development partners to adopt a human rights-based approach when designing and implementing development programmes in support of national initiatives and plans of action related to the safe drinking water and sanitation [35].

WASH

The concept of WASH used in emergency relief, rehabilitation work, and development aid, refers to water, sanitation and hygiene services and facilities, for personal and domestic use. It is generally accepted that water supply, sanitation and hygiene promotion have to be combined to achieve the maximum potential health benefits. Large-scale irrigation is not a subject of the term 'WASH'.

Water

Water in the context of WASH, refers to domestic/household water supply.

Water Governance

Water governance refers to the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society [80].

Annex

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Water Source
(Improved/Unimproved)

An improved drinking water source is defined as a drinking water source, or delivery point, that, by nature of its construction and design, is likely to protect the water source from outside contamination, in particular from faecal matter. Following the JMP classification improved drinking water sources include [61]:

- Piped water into dwellings, plots or yards
- Public taps/stand pipes
- Tube wells/boreholes
- Protected dug wells
- Protected springs
- Rainwater collection systems (harvesting)

Unimproved drinking water sources are:

- Unprotected dug wells
- Unprotected springs
- Carts with small tanks/drums
- Tanker trucks
- Surface waters (rivers, dams, lakes, ponds, streams and irrigation channels)
- Bottled water

Water Supply System
in the rural context

A system providing either public water services (i.e. public hand pumps, public taps supplied by treated surface water, protected springs, boreholes, communal RWH-systems), or private water services (individual hand pumps, household connections, rainwater harvesting at the household level). Improved water supply systems are designed to offer benefits in terms of water quantity, water quality, reliability of supply and closer and easier access to safe water (convenience).

Annex

2

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Most of the publications used for informing this Orientation Framework are accessible online through Welthungerhilfe's WASH Library www.docs.google.com/folder/d/0B1zx2E-vMw2OaVhIdndoc2kyaG8/edit (refer to Chapter 9). The six-digit source identifier e.g. "(030601)" refers to the WASH library code-number to facilitate easy retrieval.

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