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No Food and Nutrition Security without Water, Sanitation and Hygiene

Introduction

People cannot live without water, and the daily toil involved in fetching it is a defining feature of poverty. But water is not just essential for life. Water and sanitation are a human right and the cornerstone of development, underpinning every single one of the MDGs.

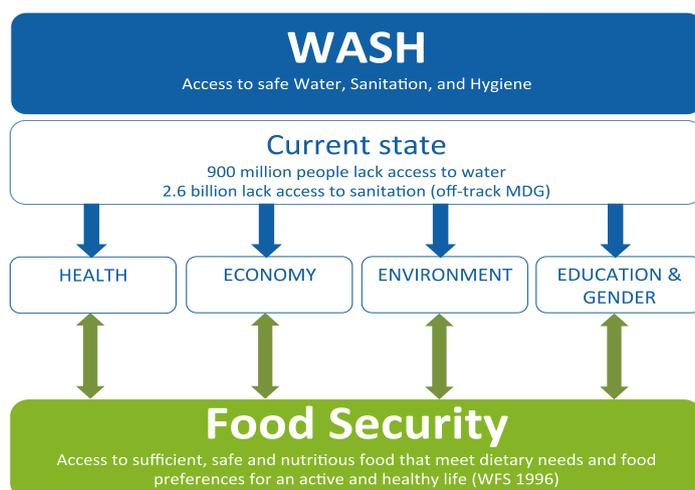
For the world's poorest citizens, however, the right to safe water and adequate sanitation remains a promise unfulfilled. 886 million people lack access to safe water, and 2.6 billion lack access to basic sanitation, a silent humanitarian crisis that each day takes thousands of lives, robs the poor of their health, thwarts progress toward gender equality, and hamstring economic development, particularly in Africa and Asia. Every year millions of people, most of them children, die from diseases associated with inadequate water supply, sanitation, and hygiene. According to WHO, each and every day some 4,000 children die because of dirty water or poor hygiene; diseases transmitted through water or human excrement are the second-leading cause of death among children worldwide. Water scarcity, poor water quality, and inadequate sanitation negatively impact food security, livelihood choices, and educational opportunities for poor families across the developing world.

This means that unless we tackle water, sanitation and hygiene issues now, development efforts in areas such as health, food security, education and economic growth will not achieve their full potential.

The concept of WASH used in development aid and emergency relief refers to "Water⁴, Sanitation⁵ and Hygiene". The three issues are closely linked and have to be addressed together, because simply providing clean water does not resolve the many health problems and related issues that arise if sanitation and sound hygiene practises such as hand-washing with soap are not available. In fact, improving water, sanitation and hygiene services and managing water well are among the most effective ways of boosting economies and reducing poverty.

1 Relevance of WASH for water, energy and food security

It has been shown that access to WASH is strongly correlated with household energy and food security. Although this paper will focus on the latter, sanitation systems allowing for reuse of treated water, nutrients and energy (e.g. biogas from anaerobic wastewater treatment) facilitate important energy savings compared to drinking water treatment and reticulation, artificial fertilizer production and electricity for cooking. The positive effects directly linked to food security on especially health and nutrition but also economy, education and gender appear to derive from multiple interactions among improvements in household sanitation and hygiene practice, improvements in water quality and increasing the quantity of water consumed (refer to graph below).



The impact of WASH on Food Security

¹ The German WASH Network is a network of German non-governmental, non-profit organizations actively engaged in WASH with focus on emergency relief, rehabilitation or development cooperation. For further information see www.washnet.de

² UNSGAB is the United Nations Secretary General's Advisory Board on Water and Sanitation

³ RUAF Foundation is an international network of 7 regional resource centres and 1 global resource centre on Urban Agriculture and Food Security

⁴ Water refers to domestic/household water supply, large scale irrigation is not subject of the term WASH

⁵ Sanitation refers to the safe management of human excreta, including collection, treatment, and reuse/disposal of urine and faeces or wastewater

1.1 Impact on Health

Water-related diseases reduce food absorption. Intestinal worms rob their host of calories and nutrients; diarrhoeal diseases prevent food from properly nourishing its consumers. Several systematic reviews have assessed the impact on health of a range of WASH interventions:

- The WHO – based on good evidence – estimates that approximately 2.4 million deaths and 7% of the total disease burden could be prevented annually with safe WASH. [13]
- It is estimated that diarrhoea diseases are now the leading cause of child deaths in Africa and the second leading cause of child deaths globally. There is good evidence that inadequate WASH contributes substantially to this mortality burden. [13]
- There is good evidence that health impacts of WASH extend far beyond diarrhoea and include many other important diseases including: acute respiratory infections, malnutrition, soil-transmitted intestinal helminth infection (ascaris, trichuris and hookworm), schistosomiasis, Guinea worm, trachoma and certain non-infectious diseases associated with chemical water quality (arsenicosis and fluorosis). [13]
- Approximately one half of the population of the developing world is infected with intestinal worms. These Parasites can lead to malnutrition, anaemia, retarded growth and cognitive disabilities. [17] [13]

WASH is essential for a better nutritional, and therefore health status of communities, and directly contributes to achieving a higher level of food security. WASH contributes especially to the third pillar of food security⁶, through enabling the hygienic handling of food by the use of sufficient clean water during its preparation, and through hygiene promotion and proper sanitation to avoid food contamination.

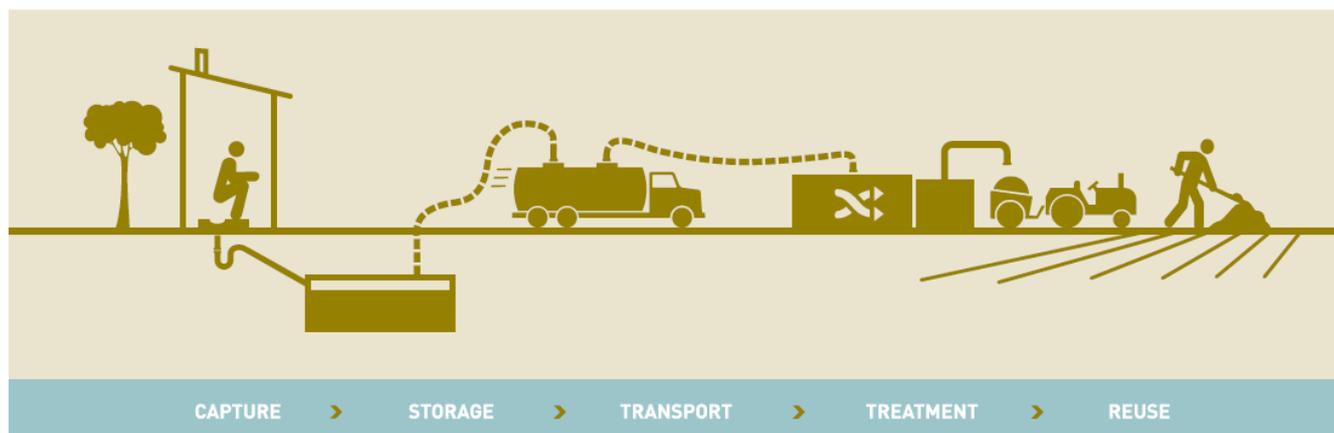
1.2 Impact on Economy

A continuously growing body of evidence shows that the impact of poor WASH services and practices goes beyond health. Poor WASH is a financial drain on families and on national economies, it compromises gains made in education, and it impedes progress towards the goal of gender equality.

Household livelihood security rests on the health of its members; adults who are ill themselves or who must care for sick children are less productive. Illnesses caused by unsafe drinking water and inadequate sanitation generate health costs that can claim a large share of poor households income. A high percentage of the populations in areas affected by the WASH crisis carry out subsistence farming, gain their income from farming activities and are struggling to maintain an income for feeding their families. Work days and income won through improved WASH services are thereby a contribution to food security.⁷

A cost-benefit analysis by the World Health Organization found that achieving the global Millennium Development target on water and sanitation would bring substantial economic gains: each \$1 invested would yield an economic return of between \$3 and \$34, depending on the region. The benefits would include an average global reduction of 10 percent in diarrhoeal episodes. If the global water and sanitation target is met, the health-related costs avoided would reach \$7.3 billion per year, and the annual global value of adult working days gained due to less illness would rise to almost \$750 million. [9]

1.3 Impact on Environment



Sanitation Service Chain [14]

⁶ WHO identifies three pillars of food security: 1) The availability of food, 2) The access to food, 3) The use and utilization of food: appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation

⁷ According to the USAID Global Waters newsletter, "On average, women and girls in developing countries walk 6 kilometers a day, carrying 20 liters of water." A recent study determined that people living farther away from their water source were at a significantly increased risk of illness and emphasized the urgent need for better designed studies to determine the health impacts of carrying water far distances.

The safe treatment and re-use of domestic wastewater and human excreta (urine and faeces) are major issues for protection of the environment and water resources. Human excreta, similarly to animal manure, contain all relevant nutrients, organic matter and water needed for plant growth and can serve as important sources for soil amelioration and higher yields. Growing food and achieving food security are historically strongly linked with the idea of reusing liquid and solid waste from households in agriculture. The idea that human residues including excreta are wastes with no useful purpose can be seen as a modern misconception.

At present farmers worldwide use around 164 million tons of synthetically produced nutrients (N; P₂O₅; K₂O) annually (IFA 2011), while at the same time conventional sanitation systems dump a considerable share of this fertilizer equivalent into water bodies through the often uncontrolled discharge of human excreta and wastewater.

For phosphorus, researchers have raised serious concern about 'Peak Phosphorus' since the known supply of cheap phosphorus resources is becoming increasingly limited while the demand continues to increase. Food security could be threatened in countries that are highly dependent on phosphorus imports and the recent fertilizer price peaks and the looming phosphorus crisis stress the need for resource recovery. [22] [28]

Although conventionally the loss of the most important macronutrients has been partly compensated through application with synthetic fertilizers, a negative nutrient balance in most soils is observed since fertilizer cannot replace the loss of organic matter, microorganisms and many micronutrients equally at stake in degraded topsoils. Soil degradation costs an estimated US\$40 billion annually, without taking into account hidden costs of increased fertilizer use, loss of biodiversity and loss of unique landscapes. [29] The re-use of organic matter from human and animal excreta instead of chemical fertilizer sustains the fertile humus structure of the soil.

A paradigm shift in sanitation towards a recycling-oriented productive sanitation approach is imperatively needed to bring severely limited nutrient and organic matter resources back to the fields, particularly when one considers that the composition of nutrients (incl. micronutrients that are usually not replaced in conventional agricultural production) in human excreta parallels the nutrient compositions withdrawn from the soil by agriculture: it is a close-to-ideal mix. This paradigm shift requires a new alliance between the agricultural and sanitation sectors, fostering resource recovery as a key requirement for sustainable sanitation concepts.

1.4 Impact on gender

The impacts associated with WASH and linked to Food Security extend beyond health and economy:

Globally, excess female mortality after birth and "missing" girls at birth account for an estimated 3.9 million women each year in low- and middle-income countries. To reduce excess deaths of girls and women in infancy, early childhood, and the reproductive years, improved services especially of clean water, sanitation, and maternal care are of primary importance. [30]

There is good evidence that lack of access to water continues to impact women significantly through the burden of water collection. Women carry two-thirds of the burden for water collection [13]. Significant time savings are associated with WASH - time that can be used to work in the fields to improve household food security. Reducing women's time and energy in domestic chores will further on free up time for adequate childcare and nutrition.

The health risks of water related diseases affects women and girls more than men and boys as it is in most societies their task to care for sick family members.

2 How does the water, energy, food security nexus perspective help to address the issue?

Viewing the issue from a nexus perspective helps to identify drivers and enabling factors that would otherwise be overlooked. It helps professionals to act beyond their standard sectoral responsibilities and understand that there are "drivers" outside their conventional work-silo that can create synergies for their own, but also for other sectors. Such enabling factors can be created, if funding opportunities, research efforts, capacity building initiatives, etc. begin to focus on areas of intersection between prior separately treated fields of work.

Helping those currently living without water, sanitation and hygiene services to gain access can be stimulated by taking an external factor, like the limited global availability of certain resources (phosphorus, water, etc.), into account. Creating an enabling environment for harnessing the nutrients and energy contained in human excreta or nutrient rich wastewater, for example, can generate new impulses for the provision of WASH services while contributing to food production, energy generation and environmental protection by fostering a green economy.

At the same time, improvements in health will result in larger financial and time budgets at household level to be invested in food production and food purchasing on the one hand, while a decrease in waterborne disease allows consumers to retain more of valuable calorie and nutrient intake.

3 Key approaches/solutions

3.1 Service orientation

The proper management of WASH services requires the responsibility of local communities, households and users of public sanitation units. A distinction has to be made between the maintenance of just the toilet-seat and building, and the system to evacuate and treat excreta safely. In cities where water-based sewage systems are

the norm, the investments in the sewage system and waste water treatment plants are very high, and in most cases can only be afforded if long-term, low-interest funding (e.g. government loans) is available from the state. End-users (e.g. households, public institutions) usually don't pay their share of the capital costs at one go, but rather pay a monthly service fee including a small percentage only to cover repairs and payment of interests.

In areas not connected to a sewage system, the assumption is often that the end-user should pay both the capital cost and the maintenance cost at once, for both the toilet and its enclosure, but also for the evacuation and treatment of the excreta. It appears that it is impossible to expect end-users investing in excreta treatment, which benefits neighbours and the community more than the household directly. At most households will invest in a system to capture the excreta (pit latrine, septic tank), which normally does not allow safe reuse, and in some cases does not facilitate hygienic maintenance.

Donors, partner governments and NGOs have thus often overestimated the capacity of local communities to manage and maintain their own WASH-systems including the collection of user fees from consumers to cover operation and maintenance costs. One focus area is to create the demand for WASH services by the population, by demonstrating systems which are easy to maintain, whilst allowing safe reuse of nutrients (e.g. dry or low-flush urine diversion systems). The CLTS approach is often a successful start for own initiatives and private investments into own toilets but the communities do need to take their responsibility for operation and maintenance of the sanitation system as well. The WASH service by the communities must be combined with services people really have a demand for such as drinking water provision or solid waste collection. Good practice in many developing countries include water user associations that are democratically run by local citizens and that have expertise in maintenance and reuse of nutrients from their decentralized sanitation systems, as part of a broader service provision. [31] Another example comes from France, where a change of regulations allows municipal utilities to offer maintenance for household on-site septic tanks and other on-site sanitation systems.

The provision of services must go far beyond simply providing a toilet or drilling a borehole. Services are not time- and location-specific 'projects' that close after an infrastructure construction or rehabilitation phase. Therefore community or private services are needed for operation, maintenance and sustainable re-use.

3.2 The concept of multiple-use services – re-use of water

Agriculture-based livelihoods depend on water in many ways. Water is needed for drinking, sanitation, cooking, personal hygiene, laundry and general cleaning. On household level it is also needed in many small-scale or domestic enterprises including livestock watering, horticulture, crop irrigation, tree growing, fisheries, pottery, brickmaking, arts, butchery, and for ceremonial purposes. The concept of multiple-use services promotes household use of water for domestic and productive purposes to improve health, alleviate domestic burdens, and improve food security and income. The approach takes people's multiple water needs as a starting point for providing integrated services, moving beyond conventional sectoral barriers of domestic and productive sectors.

Most water resources in societies are used in agriculture. Treated domestic wastewater is an excellent source for irrigation because of its constant flow all year round and its contents of various plant nutrients. Wastewater is already re-used worldwide, however, in most cases re-use is practiced out of necessity and without safe regulations, due to the lack of other water sources.

3.3 Productive Sanitation: linking the sanitation value chain with agriculture

The aspect of growing food and achieving food security is historically strongly linked with the idea of reusing liquid and solid waste from households in agriculture. Through the years human and animal excreta played a crucial role in maintaining soil fertility and providing essential plant nutrients for food production.

Productive sanitation is a general term used for the variety of sanitation system solutions that aim at making productive use of the nutrient, organic matter, water or energy content of human excreta and wastewater in agricultural production and aquaculture. It should allow for the recovery of nutrients and/or energy in household wastewater, minimize the consumption and pollution of water resources and support the conservation of soil structure as well as agricultural productivity and thereby contribute to food security. Productive sanitation solutions can be considered sustainable, if technical, institutional, social and economical aspects are appropriately addressed.

3.4 Urban Agriculture: turning urban waste into productive resources

From the sanitation point of view, urban agriculture as well as wastewater aquaculture offer opportunities for win-win situations by turning urban waste products into productive resources. Cities serve as both giant markets and a reliable and constant source of nutrients through the huge amount of urban wastewater. The sustainable sanitation approach can be seen as a promising integrated attempt to assure urban food security through the safe reuse of water and nutrient resources in urban wastewater.

Urban agriculture is an important component in the Brazil Hunger Zero policy and programme. A study by IWMI of 53 cities in the developing world revealed that in 4 out of every 5 cities, wastewater is used in urban and peri-urban agriculture on approximately 0.4 million ha involving a farmer population of 1.1 million with 4.5 million family dependants. The WHO expects that "urban agriculture, with urban wastewater as a common resource, will play a

more important role in supplying food for the cities". Multi-stakeholder platforms on urban and peri-urban agriculture (UPA) have been established in various cities in the last few years that have developed policies and programmes on urban food security.

3.5 Linking WASH interventions with climate change adaption and Disaster Risk Reduction (DRR)

The impacts of climate change – including predicted increases in extremes – will lead to additional pressure on water availability, accessibility, supply and demand. The experience of drought and seasonal stress in Sub Sahara Africa demonstrates the importance of combining water and food interventions to improve water security, prevent the migration caused by hardship, and support income and production.

4 Creating and enabling environment for change

Such solutions as described above can only materialise if the following framework conditions are facilitated.

- Raising awareness about WASH at all levels, among the societies and on decision-making level.
- WASH education starting already at pre-school and primary school level
- Giving incentives for communities to set up sustainable sanitation services
- Setting WASH higher on the political agenda

4.1 Sector governance

The MDG target for sanitation has failed to mobilise the necessary political will. Political neglect characterises the sanitation sector at the national and international level. Low political priority leads to chronic under-investment and weak institutional capacity (16). Elements of an enabling environment especially for sanitation governance consists of:

- One national coordinating body for the sector which is able to manage its multiple facets and dimensions
- A clear and efficient allocation of roles and functions among government agencies, civil society organizations and private sector at different territorial levels,
- Strengthening the role of: local and community level service providers and agencies and utilities in providing network-based sanitation
- Synergies with water supply to close the water cycle and also link sanitation to other services (health, education) and sectors (agriculture, energy, tourism, industry) and
- Including water, sanitation and hygiene promotion within broader poverty alleviation strategies.

4.2 Making the case for productive and sustainable sanitation

The need to provide sanitation has been overshadowed in national and international policy making by a focus on providing clean water. There is a deliberate recognition that basic sanitation in particular requires an approach that centres on community mobilization and actions that support and encourage that mobilization.

4.3 Revise funding strategies

Pronounced and increasing coverage disparities are due in part to the fact that the sector as a whole is still under-funded: when there is not enough to go around, groups that are already marginalized are even less likely to receive the necessary support. But it is also increasingly clear that coverage disparities are the result of inequitable targeting of resources.[15]

4.4 More focussed research and capacity building needed

As with most areas of health and development, there are a number of gaps in our understanding of the magnitude and mechanisms of the impact of WASH interventions on health and development. Research on new technologies is not needed in the first place but rather research on achieving a better understanding of the social implications through rigorous research that harnesses a range of research methods and approaches that will build stronger policy and programmes.[13]

The traditional ladder of sanitation and end of the pipe technologies need to be replaced by new holistic thinking of sustainable sanitation as part of the curricula in universities. The lack of capacities at individual, organization and system level is a key barrier for effective and sustainable WASH interventions. Qualified and skilled individuals are needed to construct, maintain and operate water and productive sanitation systems at community level. The right policy and institutional arrangements should be in place to allow the organisations working on water and productive sanitation to operate effectively. A capacity needs assessment would always be advisable as the starting point for any intervention.

5 Policy recommendations and suggested initiatives

5.1 Concentrate on simple and affordable approaches to scale-up WASH access which will lead to increased food and nutrition security.

As it is unrealistic to cover large sections of populations with piped water at the household level in a short period of time. Combining a community water supply with proper **Household Water Treatment & Safe Storage (HWTS)** is an effective, sustainable and cost-efficient approach to achieve access to safe water.[23]

For scaling up access to safe sanitation, it is necessary to create demand for sanitation and promote affordable safe sanitation facilities. **Community Led Total Sanitation (CLTS)** combined with **sanitation marketing** has shown encouraging results as an effective tool in improving sanitation coverage.[24], [25]

Hygiene promotion is a crucial factor in achieving a good nutritional status of the community, mainly through reduced levels of diarrhoea and worm infections. **Hand washing with soap** has proven to be a very effective approach to achieve a high impact. Hygiene training should be integrated into curricula and should already be considered at primary education level. [26],[27]

Simple dry toilet technologies like arborloo or urine diverting dry toilets (UDDT) are sustainable hygienic sanitation options, which are well accepted in areas of moderate population density without water supply.

5.2 Allocate clear national and municipal roles and responsibilities within the sanitation sector, not only for implementing hardware solutions but more importantly for software aspects like operation & maintenance, promotion, facilitation, and awareness raising.

In many countries the sanitation sector is split between various ministries, authorities and local governments. Whereas legislation could be adequate, enforcement is unpopular. Often both water and sanitation are classified together, with water mostly receiving more support and funding and sanitation lagging behind. Unclear responsibilities and lack of coordination hinder cooperation with other sectors like city planning, agriculture and energy.

5.3 Activate the private sector and motivate entrepreneurs in partnership with public stakeholders to transfer WASH challenges into business opportunities.

Population growth, urbanisation, rapid industrialisation, expanding food and goods production and climate change are all putting pressure on water resources. Despite of an increasing need for referring actions, there is a lack of business interest and capacity to respond on the related challenges. Activating the private sector and motivating entrepreneurs is a promising strategy to add more development and implementation capacity to the field. Linking water, sanitation and hygiene interventions with income generation bears huge potentials anywhere to alleviate poverty.

5.4 Facilitate a shift from treatment for disposal to treatment for reuse as the latter offers options for cost recovery

There are increasingly innovative models emerging in the reuse market addressing agricultural and household needs ranging from biogas production to aquaculture, urine markets, compost blending and sludge fertilization. [32] The focus should entirely be on the demand side, on market creation and on the enabling environment. Governments and civil society should work together to promote markets for small-scale entrepreneurs and supply chains for sanitation and hygiene facilities.

5.5 Create an enabling environment for urban agriculture as a strategy for food security, environmental management, and job creation through integrated and comprehensive city planning, which emphasises treatment of wastes for reuse and cost recovery.

Rapid urban growth and growing urban poverty raise concerns, particularly about urban food security, supply and distribution systems. It is also in this context that the UN High Level Task Force on the Global Food Security Crisis (2008) explicitly recommends that: "A paradigm shift in design and urban planning is needed that aims at: ...Reducing the distance for transporting food by encouraging local food production, where feasible, within city boundaries and especially in immediate surroundings". Urban agriculture is creating green jobs and increasing the city's resilience to climate change, by reducing vulnerability of the urban poor; greening areas and reducing urban energy use. Urban, peri-urban and rural producers need low priced nutrients and irrigation water for their crops and animals. Treated excreta, wastewater and organic waste are low cost and continuous sources of nutrients and water. On its turn, this reuse offers options for cost recovery through private sector participation.

The authors consider this document work in progress. We will continue our work to refine it until the beginning of the conference on November 16th, 2011.

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