WORLD HEALTH ORGANIZATION

Water Quality and Health Strategy
2013-2020

Table of Contents

1. Summary 1
2. The strategy 2
3. Background 6
    - Burden of disease 6
    - Global change 7
    - The risk-benefit approach, and its economic dimensions 7
    - The WHO policy framework 8
    - International agreements and relevant strategies 8
    - Guidelines and advocacy to promote effective policies and practices 9
4. Rationale for the strategy 12
    - Building upon and maintaining the success of the WHO water quality guidelines 12
    - A harmonized approach to water quality management 13
    - Harmonized risk assessment and management 14
    - Optimizing guidelines development 14
5. The management structure to support implementation of the strategy 15

1. Summary

1.1 The quality of water, whether used for drinking, domestic purposes, food production or recreational purposes has an important impact on health. Water of poor quality can cause disease outbreaks and it can contribute to background rates of disease manifesting themselves on different time scales. Initiatives to manage the safety of water do not only support public health, but often promote socioeconomic development and well-being as well. This document sets out the ***strategy*** adopted by the World Health Organization (WHO) to manage water quality with a view to protecting and promoting human health.

1.2 The water quality and health strategy is a framework for action by the WHO Secretariat. It was prepared through a consultative process, building on past World Health Assembly resolutions, in particular WHA64/24, expert consultations, and feedback from a wide range of stakeholders on WHO water quality guidelines and associated activities. It also builds upon the MDGs, the human rights to water and sanitation and the post 2015 MDG process, which give increased attention to water quality aspects. It defines strategic objectives and includes activities to guide the water quality work of WHO.

1.3 This strategy, centred on primary prevention of waterborne and water-related diseases, has the following five ***strategic objectives*** for the period 2013 to 2020:

1. Obtain the most rigorous and relevant evidence regarding water quality and health
2. Provide up-to-date, harmonized water quality management guidelines and supporting resources
3. Strengthen capacity of Member States to most effectively manage water quality to protect public health
4. Facilitate implementation of water quality and health activities through partnerships and support to Member States
5. Monitor the impact of these activities on policies and practice to more effectively inform decision making

1.4 For each strategic objective, WHO's broad responsibilities are defined and associated outputs are included. In meeting these strategic objectives, the following four ***strategic outcomes*** will be achieved:

1. Reliable, up-to-date technical and policy advice on water quality management, informed by research conducted on water quality and health
2. Increased number of countries with effective water quality policies and regulations that support preventive risk management of drinking-water, wastewater and recreational water and harmonized management of water-related hazards and risks
3. Improved risk management and risk communication practised by all stakeholders responsible for water safety
4. Effective networks and collaborations supported and strengthened to exchange resources, raise awareness and respond to specific water quality and health issues

1.5 The ***target audiences*** for the expected outputs of this strategy are: decision makers and their technical advisers in WHO Member States from all relevant ministries concerned with water and public health; the members and partners of UN-Water and other international organizations; bilateral and multilateral external support agencies; manufacturers of water treatment interventions (both at the household and community level), academics and implementing organizations, including associations of practitioners and NGOs.

2. The strategy

2.1 The ***vision*** is to attain the highest possible reduction in waterborne and water-related diseases by providing up-to-date, evidence-based guidance and coordination, and support for water, sanitation and hygiene interventions.

2.2 The ***mission*** is for WHO to be the authoritative source on health-based water quality information, for use by water and health regulators, policy-makers, their advisors and other stakeholders including practitioners and NGOs. This includes the provision of information and health-based assessments on the various microbial, chemical, radiological and physical human health hazards that may be present in the water cycle and the approaches to manage those associated risks.

2.3 To fulfil its mission and to ensure achievement of the recommendations in WHA64/24, the Water Quality and Health Strategy includes five ***strategic objectives*** and associated functions and ***outputs***:

1. Obtain the most rigorous and relevant evidence on water quality and health

WHO will

- Establish a research agenda to address major knowledge gaps and emerging issues on water quality and health
- Conduct health-based assessments of existing and emerging hazards in water for their potential risks
- Coherently present health-related evidence to inform water quality management decision-making in different settings and contexts throughout the water cycle
- Carry out revised assessments of the burden of disease attributable to unsafe drinking-water, wastewater and recreational water
- Examine the WASH contribution to health outcomes in integrated efforts addressing multiple conditions of ill-health (e.g. malnutrition, HIV, TB, non-communicable diseases)

Outputs

- By 2013, a prioritized work plan will have been developed identifying emerging issues and research priorities and reflecting needs of Member States
- By 2014, a systematic review of the evidence base on water quality and health will be published and additional priorities identified based on this evidence
- From 2014 on-wards, the work plan, including a research agenda, will be updated periodically and additions to the evidence base will be published and incorporated into the guidelines

2. Provide up-to-date, harmonized water quality management guidelines and supporting resources

WHO will

- Evaluate the guidelines development processes and establish a method of work to optimize these processes and support harmonized development
- Regularly review, update and disseminate the Guidelines for Drinking-water Quality, including Guidelines on Surveillance and Control of Small Community Supplies; the Guidelines for the Safe Use of Wastewater, Excreta and Greywater in Agriculture and Aquaculture and the Guidelines for Safe Recreational Water Environments
- Develop and disseminate tools, supporting documentation and other resources to assist in the interpretation and application of the guidelines based on needs identified from output 1

Outputs

- By 2014, a Sanitation Safety Plan manual to facilitate implementation of the Guideline on Safe Use of Wastewater, Excreta and Greywater will have been developed
- By 2014, an analysis of existing rapid microbial water quality test methods will have been conducted and recommendations developed to support development of risk-based microbial water quality monitoring programmes
- By 2015, recommendations will have been developed articulating how the Guidelines on drinking-water, wastewater and recreational water can be better harmonized at the policy level to most effectively protect public health from waterborne and water-related diseases
- By 2016, a new edition of the guidelines for surveillance and control of small community supplies will be published
- By 2019 the fourth edition of the guidelines for the safe use of wastewater, excreta and greywater in agriculture and aquaculture will be published
- By 2020, the fifth edition of the drinking-water quality guidelines and the next edition of the recreational water quality guidelines will be published such that all WHO water quality guidelines will have been updated and harmonized and based on the evidence obtained from output 1
- From 2014 on-wards, recommendations will have been developed for the provision of safe, water, sanitation and hygiene to vulnerable groups and in the settings that they are provided, working directly with other global disease efforts
- From 2014 on-wards, additional supporting resources will be developed based on the updated work plan

3. Strengthen the capacity of Member States to most effectively manage water quality to protect public health

WHO will

- Support the strengthening and harmonization of national policy frameworks and institutional arrangements
- Remain responsive to queries from Member States, including on technical issues and emergency situations
- Assist Member States in the selection and prioritization of water quality interventions by leveraging WHO's convening power of national and international experts
- Promote the establishment and sustainability of comprehensive, harmonized surveillance approaches to water quality parameters and locally relevant waterborne and water-related diseases, including establishing and strengthening of laboratory capacities and use of rapid water quality tests
- Provide technical assistance by facilitating training for stakeholders involved in managing the water cycle
- Encourage the strengthening of the financial and human resources bases on water quality management within Member States
- Continue economic evaluations of water quality management options and assist Member States to develop their own capacities for such economic analyses

Outputs

- By 2015, 30 countries will have established policies on HWTS within existing frameworks and by 2020, 50 countries will have established such policies
- By 2015 at least 30 countries will have established a policy or regulation on WSPs or an equivalent risk management approach
- By 2020, 20 additional countries will have established a drinking-water quality regulatory framework with associated implementation strategies, emphasizing preventive risk management, compared to the number of countries identified in the baseline assessment (to be conducted in 2015, as described in output 5)

- By 2020, at least 25 countries will have established policy and regulatory frameworks for managing safe use of wastewater and safe recreational water environments, using a preventive risk management approach
- All of these policy efforts will be informed by updated economic evaluations and financial and human resources needs assessments, with associated capacity building activities, and will be conducted in a coordinated manner to address risks within the entire water cycle

4. Facilitate implementation of water quality and health activities through partnerships and support to Member States

WHO will

- Assist in the development and implementation of national action plans for incremental, sustainable improvements in water quality management
- Collect, assess and make available a clearinghouse of best practices in order to promote safe and effective water quality management, in particular for the most vulnerable
- Strengthen partnerships with key stakeholders addressing water quality and health
- Facilitate coordination and cooperation between Member States
- Improve coordination and cooperation between the relevant authorities and stakeholders in establishing, implementing and maintaining efficient systems for assessing water quality and responding to water quality issues
- Set up instruments and methods to facilitate information exchange including utilizing existing WHO-hosted water quality networks, other partnerships and existing regional initiatives to better respond to country needs and priorities relating to water quality and health issues and to address water quality concerns in a harmonized way
- Foster collaborative actions at international, national, and local levels to promote a stewardship role for the health sector to foster policy coherence across other sectors impacting the safety of water

Outputs

- By 2015, updated strategies will have been developed for the WHO-hosted water quality networks which reflect needs of Member States
- By 2015, country-wide HWTS scale-up within specific health programmes will have been achieved in at least 30 countries
- By 2016, WSPs will have been implemented by water suppliers in at least 50 countries in various settings
- By 2016, 40 countries will have developed and implemented WSP scale-up strategies
- By 2016, 8 additional countries will have developed and implemented nationally relevant drinking-water quality surveillance monitoring programmes
- By 2020, SSPs will have been implemented in at least 15 countries with WHO support

All of these implementation efforts will be conducted in a harmonized manner to address risks within the entire water cycle, with support from WHO, WHO-hosted networks and other partners

5. Monitor the impact of these activities on policies and practice to more effectively inform decision making

WHO will

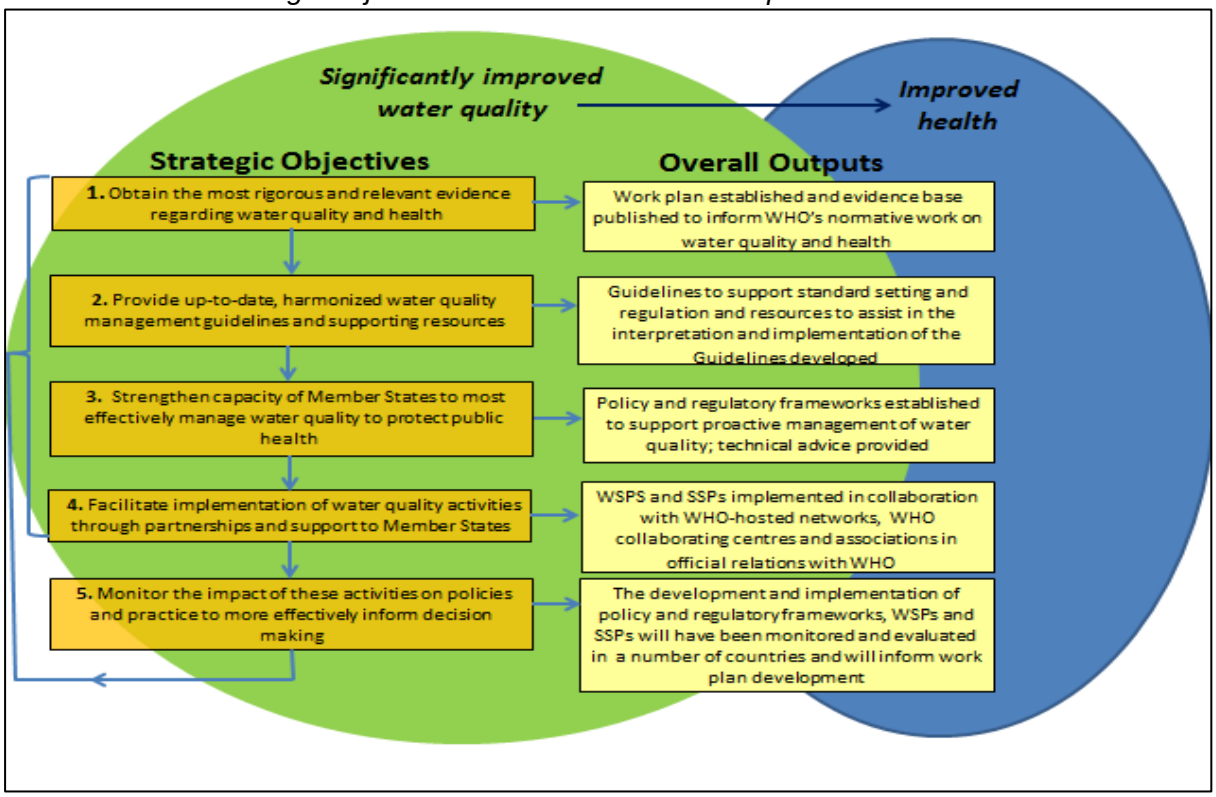
- Develop tools and processes to assess or verify the effectiveness of selected interventions
- Review the extent to which countries have used and implemented the various WHO Guidelines, including development of effective water quality policy frameworks

- Ensure findings inform development of guidelines and supporting resources and activities related to capacity building, implementation and partnerships
- Ensure findings inform the water quality monitoring work being led by the JMP

Outputs

- By 2015 the drinking-water quality regulatory frameworks will have been assessed in 50 countries to identify whether or not it includes health-based targets, WSPs and independent surveillance
- By 2015, the policy and institutional framework to support sanitation safety planning will have been assessed in at least 4 countries.
- By 2016, the policy and institutional framework will have been assessed in at least 4 countries for the coordinated management of drinking-water, wastewater and recreational water
- From 2016 on-wards, monitoring and evaluation activities will be periodically re-carried out with the aim of understanding outcomes and impacts of activities

Overview of the strategic objectives and the associated outputs



2.4 In achieving the strategic objectives and associated outputs, there are ***four strategic outcomes***

1. Reliable, up-to-date technical and policy advice on water quality management, informed by research conducted on water quality and health
2. Increased number of countries with effective water quality policies and regulations that support preventive risk management of drinking-water, wastewater and recreational water and harmonized management of water-related hazards and risks
3. Improved risk management and risk communication practised by all stakeholders responsible for water safety
4. Effective networks and collaborations supported and strengthened to exchange resources, raise awareness and respond to specific water quality and health issues

3. Background

Burden of disease

3.1 Contaminated water serves as a mechanism to transmit communicable diseases such as diarrhoea, cholera, dysentery, typhoid and guinea worm infection. WHO estimates that in 2008 diarrhoeal disease claimed the lives of 2.5 million people[1,2]. For children under five, this burden is greater than the combined burden of HIV/AIDS and malaria[3].

3.2 A total of 58 countries from all continents reported a cumulative total of 589 854 cholera cases in 2011, representing an increase of 85% from 2010[4]. The greatest proportion of cases was reported from the island of Hispaniola and the African continent. These trends reflect the need to shift from basic responsiveness to a comprehensive, multidisciplinary approach that works with communities to improve access to safe drinking-water and sanitation, encourages behavioural change and promotes the targeted use of oral cholera vaccines where the disease is endemic.

3.3 Millions of people are exposed to dangerous levels of biological contaminants and chemical pollutants in their drinking-water due to inadequate management of urban, industrial or agricultural wastewater. In addition, dangerously high concentrations of chemical hazards, such as arsenic and fluoride, originating from natural sources affect millions and cause conditions such as cancer and fluorosis. Inorganic arsenic is present at high levels in the groundwater of a number of countries, including Argentina, Chile, China, India (West Bengal), Mexico, the United States of America, and particularly Bangladesh where 20 million and 45 million people are at risk of being exposed to arsenic concentrations that are greater than the national standard of 50 µg/L and the WHO guideline value of 10 µg/L, respectively[5].

3.4 Although consumption of contaminated water represents the greatest risk, other routes of transmission can also lead to disease and contribute to the disease burden. For example, WHO estimates that more than 200 million people are affected by schistosomiasis and around 800 million more are at risk of infection[6].

3.5 The disease burden attributable to bathing water exposures is significant, largely due to the high exposed population at recreational beaches world-wide[7]. However, the quantification of this disease burden is unknown due to limited or non-existent data on the actual exposed population which is rarely surveyed as part of any regulatory programmes.

---

[1] WHO (2011a). *Cause-specific mortality: regional estimates for 2008.* Geneva, World Health Organization (http://www.who.int/healthinfo/global_burden_disease/estimates_regional/en/index.html).

[2] Burden of disease estimates are constantly updated and recalibrated based on the best available tools and additional studies that may be available. These new approaches and additional data have an impact on global estimates. WHO is currently reassessing these estimates, including the global burden of disease attributable to water, sanitation and hygiene. Based on the work conducted to date, the number of deaths due to diarrhoea will be substantially lower and likely less than 2 million. While this preliminary estimate shows a significant decline in diarrhoeal relate deaths compared to prior WHO estimates, diarrhoea is still a leading cause of mortality.

[3] Liu et al., 2012. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. *Lancet* 379: 2151–61. (http://www.who.int/quantifying_ehimpacts/publications/saferwater/en/index.html).

[4] WHO (2012). Cholera, 2011. Weekly Epidemiological Report (http://www.who.int/wer/2012/wer873132/en/index.html).

[5] Flanagan, SV, Johnston RB and Zheng Y (2012). Arsenic in tube well water in Bangladesh: health and economic impacts and implications for arsenic mitigation. *Bull World Health Organ* 90:839-846.

[6] Steinmann, P., Keise, Rr. J., Bos, R., Tanner, M. and Utzinger, J. (2006). Schistosomiasis and water resources development: systematic review, meta-analysis, and estimates of people at risk. *Lancet. Infect. Dis*., 2006; 6, 411–425.

[7] Shuval, H. (2003). Estimating the global burden of thalassogenic diseases: human infectious diseases caused by wastewater pollution of the marine environment, *Journal of Water and Health 01(2)*, 53-64.

3.6 In many parts of the world, insects that live or breed in water serve as vectors of disease. Water quality is not a major determinant, although anopheline vectors of malaria breed only in clean water and culicine vectors of lymphatic filariasis prefer organically polluted water. However, an immediate link exists between household water storage and vector breeding. Dengue fever outbreaks have increased fourfold since 1995, with 2.5 billion people at risk today. WHO estimates that 50-100 million dengue infections occur worldwide each year[8].

Global change

3.7 Global driving forces, including climate change, increasing water scarcity, population growth, demographic changes and urbanization are expected to affect the resilience of water supply and sanitation systems and services. As climate change scenarios become increasingly reliable, existing infrastructure will need to be adapted and planning of new systems and services will need to be updated. Extreme weather conditions are also reflected in the increased frequency and intensity of natural disasters. For example, in 2010, over 200 million people were victims of natural disasters, including floods, with important repercussions for waterborne and water-related disease transmission[9].

3.8 By 2025, half of the world population will be living in water stressed areas. Increasingly, countries are utilising wastewater as an important source of irrigation water and nutrients for crop production. In developing countries at least 20 million hectares are irrigated using wastewater, corresponding to 7% of all irrigated land[10]. The practice poses health risks from exposure to untreated and partially treated waste for workers, communities and consumers that need to be weighed against the potential benefits of increased food production in terms of improved nutrition and income. However, due to the relatively informal nature of waste reuse, accurate estimates of disease burden associated with the practice is unknown.

3.9 As the options for the types of water resources used for drinking-water and irrigation continue to evolve with changing circumstances, with an increasing reliance on groundwater and alternative water sources, including use of wastewater and, under the influence of climate change, greater fluctuations in harvested rainwater, it will be crucial to improve the management of all water resources ensuring their quality and set better defined quality criteria for the use of water fit for purpose.

The risk-benefit approach, and its economic dimensions

3.10 Assessing whether the health benefits resulting from the adoption of a guideline recommendation justify the cost is complex and depends on local circumstances. At the same time, certain actions may result in multiple benefits. For example, peri-urban use of wastewater for agricultural production can reduce the risks of drinking-water and recreational water contamination downstream, while contributing to food security and an improved nutritional status for the urban populations. Taking an integrated approach when dealing with water quality-related activities will ensure health, economic and environmental benefits are maximized. The “Stockholm Framework” provides a common conceptual framework to assess water quality hazards and manage associated risks. The “Annapolis protocol” applies the principles of this Framework to the management of recreational waters.

---

[8] WHO, 2011. *Action against dengue*. South-East Asia and Western Pacific Regions. http://www.wpro.who.int/NR/rdonlyres/50BA9A9C-9297-4A87-9717-2B0148CB45FE/0/ActionAgainstDengueFORUPLOAD.pdf

[9] Guha-Sapir D, Vos F, Below R, with Ponserre S. *Annual Disaster Statistical Review 2010: The Numbers and Trends*. Brussels: CRED; 2011. http://www.cred.be/sites/default/files/ADSR_2010.pdf

[10] WHO (2006). *Guidelines for the Safe Use of Wastewater, Excreta and Greywater, Volume 2: Wastewater Use in Agriculture*. Geneva, World Health Organization (http://www.who.int/water_sanitation_health/wastewater/gsuweg2/en/)

3.11 WHO estimates that the total global economic losses associated with inadequate water supply and sanitation are US$ 260 billion/year while the total economic benefit of meeting the MDG target amounts to US$ 60 billion/year. The benefit-cost ratio for achieving universal access to sanitation ranges from 2.8-8.0 while for drinking-water the range is lower; 0.6-3.7[11]. This illustrates the primary role of sanitation in preventing microbial contamination (and resulting disease) in drinking-water supplies.

The WHO policy framework

3.12 The World Health Assembly resolution WHA64.24 of May 2011 makes clear references to the issues of water quality and health. It reaffirmed the need to galvanize efforts to strengthen water supply and sanitation services, noting that rapid population growth, urbanization and climate change will impact their availability and quality of access. The Resolution calls on Member States and WHO to take actions to improve water quality management at the policy and institutional level, through partnerships and by supporting capacity building and implementation. Resolution 64.15 on cholera highlighted the role of water, sanitation and hygiene in cholera prevention and control while WHA45.31 on environmental health recognized that access to good-quality water and sanitation is essential to primary health care and fundamental to the prevention of waterborne diseases.

3.13 Improved management of water, sanitation and hygiene, is a critical component of the seven-point strategy agreed by WHO and UNICEF for comprehensive diarrhoea control, which includes promotion of hand washing with soap, household water treatment and safe storage and community-wide sanitation promotion[12].

3.14 The WHO/UNEP Libreville Declaration on Health and Environment (2008), the African Ministers' Council on Water and the various regional sanitation conferences support the harmonization of sectoral policies and strengthening of institutional arrangements, which are fundamental to reducing the incidence of cholera, typhus, dysentery and other diarrhoeal diseases.

International agreements and relevant strategies

3.15 Target 7C of the Millennium Development Goals (MDGs) calls for reducing by half the proportion of people without sustainable access to safe drinking-water and basic sanitation by 2015. There is an unequivocal recognition of the importance of this target for the achievement of other MDGs, particularly MDG 4 (reducing child mortality), MDG 5 (improving maternal health) and MDG 6 (combating HIV/AIDS, malaria and other diseases). Between 1990 and 2010 over 2 billion people gained access to improved sources of drinking-water and 1.8 billion gained access to improved sanitation. Yet by the end of 2010 783 million people still lacked access to improved water sources and over 2.5 billion people did not have access to basic sanitation. Furthermore, the safety of even improved drinking-water sources is highly variable and in a substantial number of cases does not protect health[13].

---

[11] WHO (2012) *Global costs and benefits of drinking-water supply and sanitation interventions to reach the MDG target and universal coverage*. Geneva, World Health Organization http://www.who.int/water_sanitation_health/publications/2012/global_costs/en/index.html

[12] UNICEF/WHO (2009). *Diarrhoea: why children are still dying and what can be done.* Geneva, Switzerland, World Health Organization, United Nation's Children's Fund, (http://www.who.int/maternal_child_adolescent/documents/9789241598415/en/index.html).

[13] UNICEF/WHO (2012). *Progress on Drinking Water and Sanitation: 2012 Update*. United Nation's Children's Fund and World Health Organization, New York. http://www.who.int/water_sanitation_health/publications/2012/jmp_report/en/.

3.16 The United Nations General Assembly Resolution A/RES/64/292 (2010) recognized the right to safe and clean drinking-water as a "human right that is essential for the full enjoyment of life and all human rights". Subsequently, the Human Rights Council Resolution (2010) recognized that the right to water and sanitation is derived from the right to an adequate standard of living (A/HRC/RES/15/9), which is contained in several international treaties with references, *inter alia*, to the WHO Guidelines for Drinking-water Quality.

3.17 The commitment to meet MDG Target 7C and the right to safe and affordable drinking-water and basic sanitation for all was reaffirmed in the outcome document, "The Future We Want" (A/CONF.216/L.1) of the Rio+20 United Nations Conference on Sustainable development. It recognized the central role of water in sustainable development as it is closely related to a number of critical global challenges, including the need to improve water quality and wastewater management, including water reuse. Accordingly, WHO is contributing to UN post-2015 Development Agenda with the development of drinking-water, sanitation and hygiene targets and indicators, a process which pays increased attention to water quality aspects.

Guidelines and advocacy to promote effective policies and practices

3.18 As the international authority on public health and water quality, WHO leads global efforts to prevent transmission of waterborne disease. WHO advises the governments of its Member States on the establishment of health-based regulations and works with partners to promote effective risk assessment and management practices among all stakeholders (including drinking-water suppliers, wastewater treatment facilities, farmers, communities and individual households) and in different settings (including ships, aircrafts, health care facilities, schools, work places and other public buildings, and situations of natural disasters and humanitarian crises).

3.19 To support these efforts, WHO produces a series of water quality-related guidelines: the Guidelines for Drinking-water Quality (GDWQ), including Guidelines on the Surveillance and Control of Small Community Supplies; the Guidelines for the Safe Use of Wastewater, Excreta, and Greywater in Agriculture and Aquaculture; and the Guidelines for Safe Recreational Water Environments. These normative documents provide an evidence-based point of departure for national standard setting and regulation. The most recent editions are structured in line with the Stockholm framework. A common key concern is the management of health hazards derived from poor disposal of human excreta.

3.20 WHO provides supporting documents, training manuals, and guidance notes as instruments to put the guidelines to work. These assist users to interpret and apply the guidelines, either when establishing national standards and regulations, setting policies, or promoting best practices on management, monitoring, surveillance and evaluation. At the regional and country level, WHO strives to build capacity through workshops, training-of trainers and implementation of water safety related activities. In addition, a series of WHO-led practitioner networks supports capacity building and implementation activities at regional and country level, described in the following five paragraphs.

3.21 The International Network of Drinking-water Regulators (RegNet) was established in 2008 in response to requests from Member States to establish a platform to address issues in regulating drinking-water supplies and in order to promote best practices in regulating water-quality management. It offers a forum for drinking-water regulators to exchange and share information on methods, procedures and good practices, and on experiences of the role and responsibilities of regulators in support of implementing water safety plans within a national regulatory framework.

3.22 Recognizing the importance of effective and well-resourced operation and maintenance to the sustainability of water and sanitation services, the Operation and Maintenance Network (OMN) was established in 1988. It provides an opportunity for water

suppliers, government agencies, international organizations and other stakeholders to collaboratively develop tools and share information to solve operation and maintenance challenges. The network is currently a collaborative effort between WHO, the International Water Association and the National Institute of Public Health, Japan (since 2008).

3.23 The Small Community Water Supply Management Network (SCWSMN) was established in 2005 in light of the challenges associated with the management, operation and maintenance of small water supplies, particularly in rural or remote settings. It is estimated that about half of the world population, in low-, medium- and high-income countries, relies on small community water supplies[14]. Since its inception, the SCWSMN has grown to include more than 150 members. The Network provides a platform for stimulating and sharing the results of innovative research, good practices and advocacy tools and is open to government agencies, non-government organizations, academic institutions and members of civil society at large that subscribe to the mission of supporting the mainstreaming and improved management of small community water supplies to achieve universal, sustainable access to safe drinking-water.

3.24 Household water treatment and safe storage (HWTS) are additional steps that can be taken immediately where and when "improved" water sources do not deliver consistently safe water or where safe water is available only intermittently. To advance efforts in scaling-up HWTS, WHO established the International Network on Household Water Treatment and Safe Storage in 2003; and in 2011, the United Nations Children Fund (UNICEF) joined WHO as a co-hosting agency[15]. The Network is composed of over 100 organizations, including international, governmental and non-governmental, as well as private sector entities and academia that subscribe to the mission which aims to contribute to a significant reduction in diarrhoeal disease especially among vulnerable populations. HWTS is one component of the UNICEF/WHO seven-point action plan in the fight against diarrhoeal diseases[16].

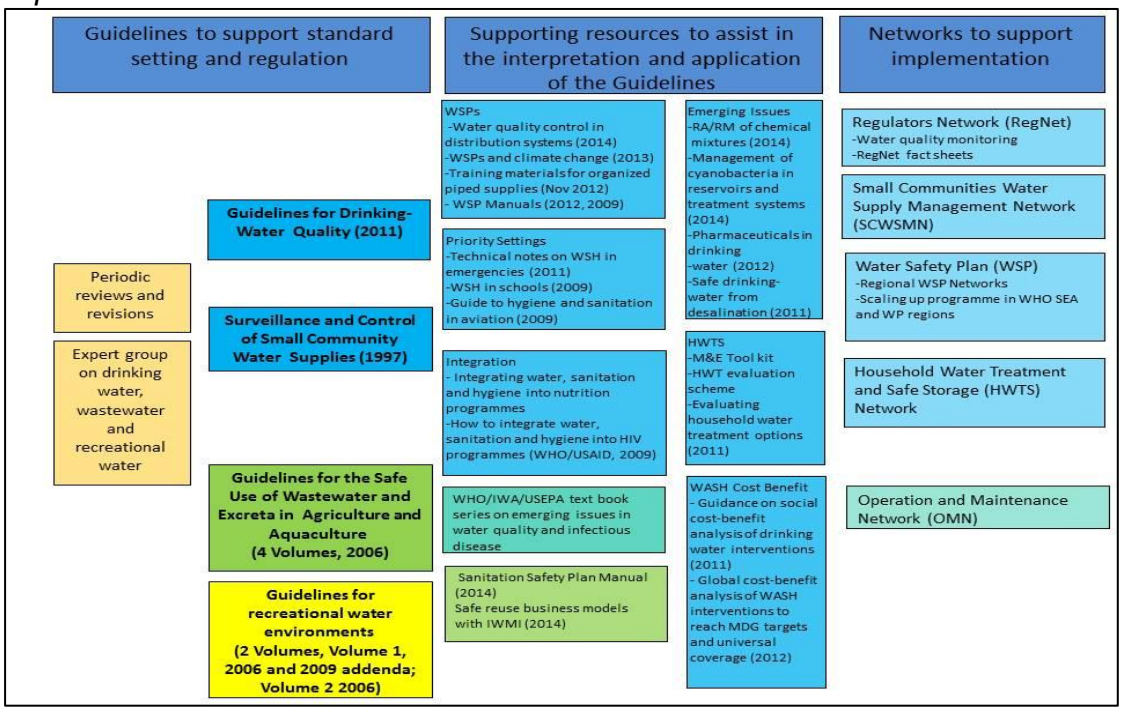
3.25 WHO, with other partners including the International Water Association, has established networks to support water safety planning in Latin American and the Caribbean, the Asia Pacific and Africa Regions. They were formed in 2008, 2011 and 2012, respectively. These networks provide an opportunity to exchange experiences and lessons learned and to showcase WSP best practices in the regions.

[14] UNICEF/WHO (2012). *Progress on Drinking Water and Sanitation: 2012 Update*. United Nations Children's Fund and World Health Organization, New York. http://www.who.int/water_sanitation_health/publications/2012/jmp_report/en/.

[15] WHO/UNICEF (2011). *International network on household water treatment and safe storage: Revised strategy and funding proposal.* Geneva, Switzerland, World Health Organization, United Nations Children's Fund, (http://www.who.int/household_water/resources/NetworkStrategyMar2011.pdf).

[16] UNICEF/WHO (2009). *Diarrhoea: why children are still dying and what can be done*. Geneva, Switzerland, World Health Organization, United Nation's Children's Fund, (http://www.who.int/maternal_child_adolescent/documents/9789241598415/en/index.html).

Overview of WHO water quality guidelines, supporting structures and instruments for implementation



4. Rationale for the strategy

Building upon and maintaining the success of the WHO water quality guidelines

4.1 The WHO Guidelines for Drinking-water Quality (GDWQ) is one of the WHO's most successful documents, as reflected in download statistics from the WHO website. It is used by many developed and developing countries in setting national standards and regulations. For example, the European Commission and Japan use the GDWQ as the scientific point of departure for their drinking-water directive and drinking-water quality standards, respectively, while it is the basis for the Australian Drinking Water Guidelines.

4.2 Recently, WHO commissioned an evaluation of values for microbiological, chemical, aesthetic and radiological parameters specified in national drinking-water quality regulations, standards or equivalent documents. Based on preliminary findings, the study found that more than half of the 100 countries surveyed, representing all WHO Regions, make reference to the GDWQ directly or indirectly. In most cases there was no evidence, however, that the parameters selected or the values determined were based on risk assessments. Thus, there is a need to assist Member States in developing risk-based monitoring programmes. Evidence also suggests that water suppliers and regulators in many countries need support in implementing monitoring requirements[17].

4.3 The impact of the GDWQ is further reflected by the uptake of WSPs in countries around the world since the introduction of the approach in the third edition of the GDWQ in 2004. The 2012 UN-Water GLAAS report shows that 81% (60 out of 74) of responding countries either encouraged or required WSPs in policies and regulations or reported pilot experiences. Of the countries encouraging WSPs in the WHO South East Asia and Western Pacific regions, 13 out of 24 had a policy or regulatory requirement on WSPs while an additional eight were planning to update their policies and regulations to incorporate WSPs[18]. This significant progress creates fertile grounds for intensified efforts to strengthen the capacity to implement WSPs and an in-depth analysis of selected WSPs in six countries in the same WHO regions revealed needs to provide such support. The needs identified included technically supporting WSP implementation, integrating WSPs into day-to-day operations and monitoring and evaluation of WSPs, including enhancing national assessment capacities. WHO is working with national partners to overcome these issues as part of the AusAID/WHO Water Quality Partnership which sets an example for similar partnerships in other regions.

4.4 To assess the status of national HWTS policies and regulations and progress towards the global policy targets established by the HWTS Network and adopted at the 6th World Water Forum, WHO conducted a brief survey among Member States. Based on unique responses from 46 countries representing all WHO regions, countries were categorized into three tiers of readiness to scale-up HWTS. Key needs identified include greater support for developing and implementing national HWTS policies, facilitating integration with other health interventions and diarrhoeal disease prevention efforts, and strengthen monitoring, evaluation and regulation. The HWTS Network is now working to address these challenges.

4.5 Implementation of the 2006 Guidelines on the Safe Use of Wastewater Excreta and Greywater is less well understood. The implementation of the wastewater guidelines has

[17] Rahman et al., (2011). A comparative assessment of institutional frameworks for managing drinking water quality. *J of Water, Sanitation and Hygiene for Development*, 01.4: 242-258.

[18] WHO (2012). *UN-water global annual assessment of sanitation and drinking-water (GLAAS) 2012: the challenge of extending and sustaining services*. Geneva, World Health Organization (http://www.who.int/water_sanitation_health/glaas/en/index.html)

been the subject of studies in Ghana, Senegal and Jordan. The need for context specific tools to assist Member States to implement the guidelines under a clear regulatory and institutional framework has been identified. WHO is working with the International Water Management Institute (IWMI), Swiss Tropical Public Health Institute (Swiss TPH) and Member States to develop the concept of Sanitation Safety Plans (SSPs) and support implementation following a similar path to WSPs, with a view to closing the risk management loop through the water-wastewater cycle.

4.6 The 2003 Guidelines for Safe Recreational Water Environments has been adopted directly by the EU to underpin the marine and transitional water criteria published in the 2006 Bathing Water Directive. The EU has also adopted the WHO recommendation for beach management, through real-time prediction of adverse water quality and associated real-time advisories to recreational water users. This legal framework facilitates health protection by delivery of 'informed choice' to recreational water users. New guidelines, which are considering the WHO approach are under preparation in several countries including the USA and Canada. There is a need for epidemiological data and real-time modeling tools to extend and further develop the guidelines and to support real-time prediction as most 'engineering' models tend to be protective rather that predictive.

4.7 All guidelines and their associated instruments and tools require periodic reviews and updates as new information becomes available. Such a process ensures that they continue to be an authoritative basis for water quality management in support of public health, and that they continue to reflect country needs and respond to emerging issues. Development of a new edition of the guidelines includes the formulation and initiation of a work plan for periodic updates. This is the most systematic for the GDWQ; the most recent work plan was developed at a meeting in December 2010 which resulted in the identification of over 50 issues. A more regular process to revise the other water quality guidelines needs to be established. There is an additional need to move beyond the provision of guidance in supporting the safe use of wastewater in agriculture and aquaculture, to wastewater management and human and animal waste management in general.

4.8 Based on experience to date, it is clear that more efforts should be targeted in supporting Member States to effectively establish and implement water quality standards and regulations, and risk management frameworks. Solely developing and disseminating guidelines and their supporting resources is not sufficient to ensuring their implementation in a meaningful way.

A harmonized approach to water quality management

4.9 The management of water resources is critical for the sustained supply of quality water for drinking, domestic use, irrigation, shellfish[19] production and recreational purposes. The value of integrated approaches at the catchment level in ensuring safe and reliable water resources cannot be overestimated. The harmonized approach to water resources management aims to ensure equitable distribution of limited water resources among user groups. In terms of quantity, agriculture is the biggest user of water world-wide, accounting for 70% of global fresh water withdrawals[20]. For drinking-water, quality should continue to be a top priority to safeguard public health and policies on integrated management should ensure that water resources earmarked for drinking-water are maintained at the highest level of quality. There are, in addition, important economic considerations to support the development of criteria for water "fit for purpose".

[19] Although the issue of safe management of water for shellfish production is not covered in the WHO water quality guidelines, it is addressed in the WHO publication, *Safe Management of Shellfish and Harvest Waters* (2010), http://www.who.int/water_sanitation_health/emerging/shellfish/en/index.html.
[20] Water uses (Aquastat): http://www.fao.org/nr/water/aquastat/water_use/index.stm

4.10 Addressing water quality concerns in a harmonized way will support better health protection by encouraging the application of interventions directed at sources of pollution, which may be otherwise undervalued. Cross-cutting approaches enable mainstreaming of health and environmental issues in national sectoral policies within the overall context of public health and increased integration of institutional mechanisms to reduce the prevalence of waterborne diseases.

4.11 Integrated planning of water resource systems at the river basin scale is a well-established concept which fosters the coordinated management of catchment activities and the achievement of multiple water quality objectives. In this context implementation of water and sanitation safety plans incorporating bathing water protection can be considered, both to reduce health risks at the basin scale and to act as a driver to generate new science and modelling tools.

Harmonized risk assessment and management

4.12 While the strategy considers all routes of exposure relevant to water-related disease, and the full spectra of microbial, chemical and radiological hazards, and of water-based disease risks, it recognizes that the fundamental driver of waterborne disease risk is exposure to excreta. Thus, hygiene and sanitation interventions are critical.

4.13 The Stockholm Framework provides a common conceptual framework to assess water quality hazards and manage the associated risks. It informs development of the WHO water quality guidelines. As hazards and risks are often interlinked within the water cycle, they can be more effectively managed in an integrated manner, as aspects of a whole, rather than in isolation, bringing about greater health, economic and environmental benefits and the optimal use of resources.

4.14 Preventive risk management plans (drinking-water, recreational water, or sanitation safety plans) are the instruments to make the guidelines operational. Protecting source water from pollution is key for all water-related management plans. They also focus on reducing contamination pro-actively, at the earliest stage. For example, water safety plans advocate for catchment initiatives for long-term, sustainable improvements in water quality based on multi-barrier approaches wherever possible, rather than for capital-intensive options for treatment with high recurrent costs and large carbon footprints. Such harmonized and integrated initiatives may require a longer time to improve quality, but ultimately they will be more effective and sustainable than a treatment-focused approach.

Optimizing guidelines development

4.15 Development of the guidelines is labour intensive and expensive, requiring hundreds of experts and numerous consultations. To date, each guideline document has relied on a separate expert group and development processes, with the GDWQ being the only effort with a formalized development process and permanent expert group. Thus, an added benefit of the harmonized approach to water quality management is that it provides an opportunity to optimize processes and share resources, resulting in efficiencies and cost savings. Harmonization also creates opportunities to streamline the process of periodic reviews and updates. Increased communications between specialists in drinking-water quality, safe use of wastewater and recreational water management will support cross-fertilization and lead to the further development of concepts and ideas.

5. The management structure to support implementation of the strategy

5.1 For WHO to perform the essential functions outlined in this strategy, it will need strengthening in terms of both financial and human resources. It will have to expand and further leverage its network of formally designated collaborating centres and engage in additional partnerships with NGOs in official relations with the WHO.

5.2 To implement the strategy, a small team within the Water, Sanitation, Hygiene and Health (WSH) unit of HQ, along with strong counterparts in WHO Regional and Country Offices , is needed. The WSH team manages the drinking-water quality normative work and WSPs; the HWTS Network and activities associated with environmental health at the household level; and activities related to wastewater and recreational water. Additional staff will be needed to support Water Quality and Health activities, including those undertaken as part of the SCWSMN, RegNet and the OMN as well as to manage the HWT Evaluation Scheme, at the Headquarters (WSH), Regional Office and Country Office levels.

5.3 WHO HQ will coordinate with counterparts in the WHO Regional Offices and Country Offices to ensure needs of Member States are being met. Regional and Country Offices will develop context specific capacity development and implementation initiatives in their respective regions and countries and provide input on emerging issues, key challenges and existing gaps.

5.4 In line with the recommendation of a Consultation in December 2010[21], the proposed management structure for guidelines development will comprise an overarching expert group, separate committees for each of the water quality areas (drinking-water, wastewater and recreational water), water quality networks, WHO Collaborating Centres (CCs) and NGOs in official relations. Cross-cutting issues will be taken up by task forces comprising experts from drinking-water, wastewater and recreational water.

5.5 The expert group will advise the Secretariat both on technical issues and on implementation and monitoring of this strategy, including the harmonized approach to water quality management. It will include members from the three water quality committees and other stakeholders. Members of the WHO-hosted networks can be co-opted into the expert group as deemed appropriate. Committees on drinking-water, wastewater and recreational water will oversee the development process of each Guideline and address specific issues related to each area. Task forces will address issues or tools common to drinking-water, wastewater and recreational water.

5.6 The networks and WHO CCs will identify emerging issues, to be incorporated into the research agenda. Except for the OMN, all other networks are solely linked to the drinking-water quality committee. The OMN is also linked to the committee on wastewater. Additional networks may therefore be established or the scope of the existing networks' missions may be expanded to better address wastewater and recreational water issues. Recommendations from WHO CCs will be reviewed by the expert group, water quality committees and task forces as relevant. The networks and CCs can also support the water quality committees and task forces in implementing the work plan.

[21] WHO, 2012. *Consultation on the Development of a Strategy on Water Quality and Health* http://www.who.int/water_sanitation_health/dwq/en/.