World Health Organization | Government of Ethiopia | DFID Department for International Development

Ethiopia

Climate change, health & WASH

Currently, weather extremes in Ethiopia are severely impacting human health, livelihood and development. The following case study describes activities undertaken in Ethiopia to develop climate resilient water sanitation and hygiene (WASH) initiatives from 2013-2018 as part of the United Kingdom's Department for International Development (DFID)-funded project on "*Building adaptation to climate change in health in least developed countries (LDCs) through resilient WASH*", the aim of which was to assist countries to respond to changes in health risks as a consequence of climate variability and change, through improved and more resilient health and WASH adaptation practices.

1. Country profile & climate vulnerabilities

Ethiopia is ranked globally as one of the most vulnerable countries with respect to climate change. The situation is exacerbated, in part, due to the developmental challenges that the country experiences, including widespread poverty, limited health services and institutional capacity, environmental degradation, food insecurity and conflict.[1,2] Without urgently addressing Ethiopia's resilience to both current and projected climate change impacts, future development in these key areas will be impeded.

Climate projections for Ethiopia are presented in Box 1. Ethiopia's Climate Resilient Green Economy (CRGE) report identified that the health and water sectors are among the most vulnerable sectors to climate change in Ethiopia, alongside the agricultural sector.[3]

Box 1. Climate projections for Ethiopia[2,5]

- Mean annual temperature set to increase by 1-3 ^{O}C by 2060
- More erratic rainfall and increased unpredictability of seasonal rains (although uncertainties exist within the various models)
- Increased incidence of drought, heatwaves, as well as more intense precipitation events

Fig. 1. Flooded village in the Silti wordea. Climate projections indicate that severe flood events will become more commonplace, which will have a worsening impact on the safety of water supplies unless appropriate adaptation measures are prioritized (Credit: O. Yiha/WHO).

Currently, altered weather patterns are resulting in changes in morbidity and mortality profiles associated with vector-borne diseases such as malaria, schistosomiasis and leishmaniosis, which is adding further pressures on the healthcare sector.

In addition, the country's water resources are particularly vulnerable in terms of:

- ***Drought***, and corresponding over extraction, which may impact water availability, and
- ***Floods***, including flash flooding and seasonal river floods, which may increase the spread waterborne disease and damage/overwhelm water and sanitation infrastructure (Fig. 1).[4,5]

Climate projections for Ethiopia indicate that the existing high variability in the frequency and spatial distribution of extreme weather events is expected to intensify (Box 1). Increasing the country's adaptive capacity to climate variability and change is urgently required to reduce Ethiopia's climate vulnerability both now, and into the future.

2. Building adaptation to climate change in health in least developed countries through resilient water, sanitation and hygiene

In the above context, DFID supported a £6.85 m project (via the International Climate Fund) to support the development of effective strategies for climate adaptation in the health sector in low and low-middle income countries. The project aimed at improving policy and practice on health adaptation to climate change through robust evidence from field testing in Bangladesh, Nepal, Ethiopia and the United Republic of Tanzania. Countries were chosen to participate based on their exiting high burden of climate-sensitive diseases, including WASH-related disease, and the extent through which climate variability and change is expected to adversely impact WASH, and therefore, public health. An overview of the expected outputs from this project is presented in Fig. 2. The current case study focusses on Outputs 2 and 3 (i.e. from national to facility/utility level, respectively). Activities and outputs related to implementation of Output 4 (i.e. research) are included in a separate synthesis report.

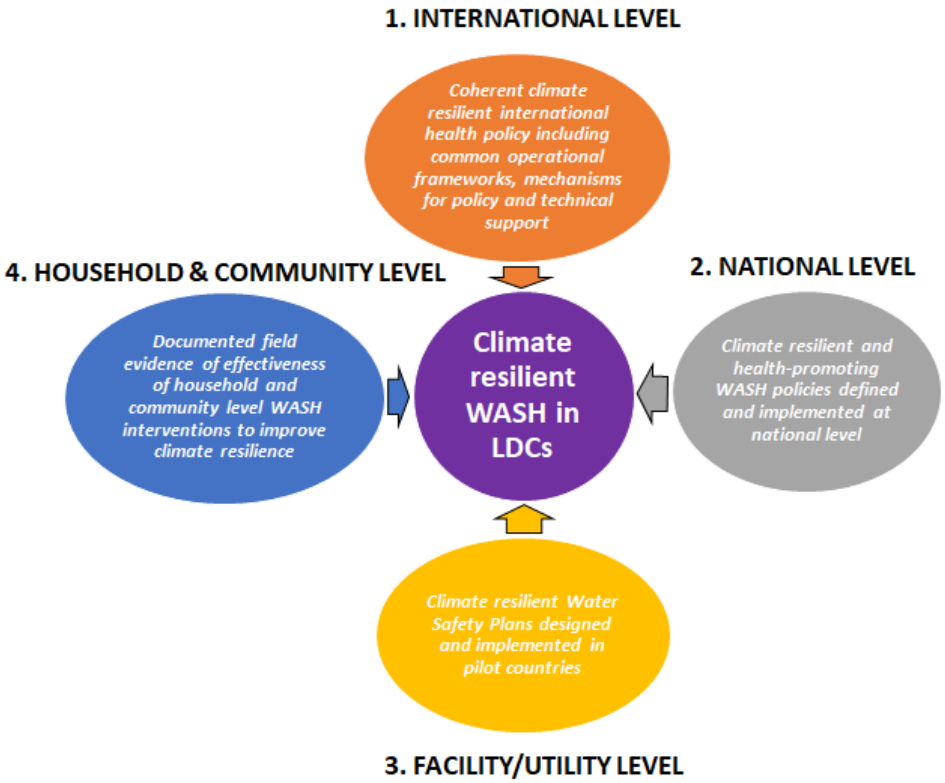


Fig. 2: Key outputs from the DFID-funded project "Building adaptation to climate change in health in LDCs through resilient WASH".

Climate resilient WASH activities in Ethiopia under the DFID project (2013-2018)

The following section summarises some of the key outputs from the DFID project on climate resilient WASH in Ethiopia. For more information and a full list of project outputs, refer to Appendix I.

Establishment of a national working groups on climate resilient health and water resources

To support the implementation of the climate resilient WASH project, a national working group was established in 2013, representing key government stakeholders from relevant ministries, as well as UN agencies (including WHO, UNICEF and UNDP). The working group provided technical guidance to the Federal Ministry of Health and other stakeholders for planning and implementation of key national initiatives on climate resilient health adaptation, including this project.

In additional, a national expert group on climate resilient water safety planning was established in 2014. This group was tasked to drive the development and implementation of climate resilient water safety plans (WSPs) in pilot urban and rural pilot locations, and to support the development of a national framework for climate resilient water safety and the supporting guidelines for its implementation. (For further information, see below.)

Policy review (Output 2)

In order to identify the optimal entry points for promoting the integration of climate change, water and health considerations in the health and WASH sectors in Ethiopia, a review of relevant national policies and strategies on climate change, WASH and public health was undertaken in 2015, with input from the national working group on climate resilient health. The review aimed to assess (i) if existing WASH and public health policy documents appropriately consider climate change, and (ii) if the WASH and health sectors are adequately prioritized as vulnerable sectors within existing climate change policies and programmes. Through this programme of review, it was identified that, although the health and WASH sectors have robust institutional arrangement with regards to implementation of climate resilient strategies, significant gaps existed with regards to the inclusion of climate resilience within existing policies and programmes. Key recommendations were made to ensure the inclusion of climate resilience into future policy instruments, including the relevant water, health and education sector policy goals, strategies and targets, and to address the urgent need for targeted research and improved monitoring of climate sensitive health risks nationally.

Development of a national framework for a climate resilient health sector (Output 2)

A national framework for a climate resilient health sector was developed in 2014 under the guidance of the national working group for climate resilient health. This framework provided policy guidance and a concrete roadmap to support the development of a formal Health National Adaptation Plan (see below for further information) to outline the national climate adaptation strategies to protect public health in Ethiopia.

Vulnerability and adaptation assessments (Output 2)

Vulnerability and adaptation assessments were carried out in both the health and water resources sectors to determine the impact of climate change on the respective sectors in Ethiopia, and to provide strategic direction on adaptation strategies to reduce these vulnerabilities.

Health vulnerability and adaptation assessment (2015): To assess the impacts of climate change on health, and to develop national adaptation strategies, a health vulnerability and adaptation assessment for Ethiopia was conducted in 2015. It identified that increased malnutrition, diarrhoea, and malaria were considered to be most the most significant threats in the face of a changing climate, with the re-emergence of dengue and yellow fever also of concern. From the identified health threats, a number of adaptation strategies were recommended, including the improvement of early warning systems, the need for technical capacity building and improved health services, requirement for enhanced inter-sectoral communication and collaboration, and improved public awareness raising and education. The outcomes from this report identified the priority areas for Health National Adaptation Plan (see below) to reduce vulnerability by implementing climate resilient public health measures.

Water resources vulnerability and adaptation assessment (in preparation): In addition to the above, a vulnerability and adaptation assessment for the water resources sector in Ethiopia was drafted in 2017 to determine the key vulnerabilities of the sector to climate change. A mapping of the vulnerability for water quality and quantity was presented for various regions within Ethiopia, alongside recommended adaptation options for water supplies, including, for example, increased pre-treatment of water source supplies, groundwater protection strategies, and increasing capacity for water storage. Although a useful resource for all stakeholders in the water resources sector, this document was developed to inform primarily WASH investments at national level and secondly the development of climate resilient water safety plans by water suppliers in urban and rural settings.

Development of the health component of the National Adaptation Plan (Output 2)

In line with the national framework, and based on the outcomes of the health vulnerability and adaptation assessment, a national climate adaptation plan for health was published in 2018 to outline the priority adaptation strategies for the health sector. The key strategic objectives for the plan included building the capacity of health sector to achieve climate resilience; enhance the resilience of health sector through the provision of universal health coverage; enhance early warning and surveillance systems in the context of health emergency risk management; and create enabling environment for health adaptation to climate change implementation. To achieve this, a number of key interventions were identified, including expanding climate resilient health infrastructure, strengthening existing early warning and surveillance programming, adoption of climate resilient water safety planning, raising awareness on climate resilience and health across all relevant sectors and advocating for targeted research and monitoring on climate resilient health. This information will ultimately feed into the development of the National Adaptation Plan for Ethiopia.

Climate resilient water safety planning (Output 3)

The WSP process offers a systematic framework to manage climate-related risks by considering the implications of climate variability and change at each step of the water supply system, from catchment to consumer. This generates what is commonly referred to as a "climate resilient" WSP, which, in addition to considering water quality and safety risks, will also consider aspects such as quantity and availability, as well as climate-related emergency response planning.[a]

"WSPs offers a systematic framework to manage climate-related risks by considering the implications of climate variability and change at each step of the water supply system."

The current project aimed to use WSPs as a framework for building resilience to climate impacts in both large-scale urban water supplies, as well as their smaller rural counterparts. To support this, the national expert working group on climate resilient water safety planning guided the development of a national framework for climate resilient water safety, to raise awareness on the need for systematic approach to assess and manage climate-related risks, to ensure the safe and reliable supply of drinking-water both now, and into the future. The framework describes the enabling environment, institutional arrangements, roles and responsibilities of key stakeholders, and capacity building needs to deliver climate resilient water supplies (Fig. 3). From this, guidelines for the implementation of climate resilient WSPs were developed for both the urban and rural sub-sectors. These practical guidelines are tailored to the Ethiopian context, and outline the key elements of WSP development, implementation and monitoring, to ensure the assessment, prioritization and management of current and projected climate-related risks to water supplies (Fig. 3).

[a] It should be noted that an effective WSP should consider and prioritize *all* risks as part of the overall system risk assessment (i.e. considering both climate- and non-climate related risks to the water supply).

To support roll-out of the implementation guidelines, customized urban and rural training programmes were developed, as well as a rural climate resilient water safety plan training manual (See Appendix I).

Figure 3. National policy and guideline documents on climate-resilient WSPs in Ethiopia.

For more information on climate resilient water safety planning activities conducted under this project, please refer to Box 1.

Box 1. Climate resilient water safety planning in Ethiopia

Development of a national approach for climate resilient water safety planning

To address the current and projected impacts from climate change on water security (i.e. quality and quantity) in Ethiopia, a national approach was developed for climate resilient water safety planning in both urban and rural settings.

A customized national framework for CR-WSP development and implementation was prepared following a national training of trainers workshop in Addis Ababa in December 2014, which paid special attention to adoption of the WSP approach to assess and manage climate risks that may impact drinking-water security. From this, a core group of national climate resilient WSP trainers was developed, who were responsible for subsequent cascade training in strategic pilot locations across the country.

In total, 25 pilots were initiated, representing both urban and rural water supply systems of differing climate vulnerabilities in diverse geographic regions encompassing low- to high-land areas.

During these training events, participants conducted a catchment to consumer assessment of the target water supply, identifying and prioritizing risks to the water supply system, included those posed by current and future climate change (see examples in Figures 4 and 5).

Fig. 4. Exposed main supply pipelines as a result of heavy rainfall/flooding were commonly found in piped water supply systems, representing a significant risk to water safety and availability.

Fig. 5. Unsafe consumer drinking-water collection, treatment, storage and handling practices were identified in many of the pilot locations, identifying the urgent need for enhanced consumer awareness raising and education initiatives.

From this, detailed system improvement plans were developed to prioritize system upgrades to ensure the reliable supply of safe drinking-water into the future. Many of the improvements identified to enhance the resilience of the water supply systems were found to be often simple, low-cost interventions, e.g. basic drainage improvements and consumer education campaigns. Some examples of system improvements to protect water security in the pilot sites are presented in Figures 6 and 7 below.

Benefits of climate resilient water safety planning

Some of the key benefits from the development and implementation of climate resilient WSPs thus far have included:

- Greater understanding and appreciation on how water supplies may become contaminated at each step of the supply chain, from catchment to consumer, and how climate change may affect this
- Improved operations and maintenance, including operational monitoring of critical control measures
- Improved treatment capacity (through establishment of water treatment at many new sites)
- More flood resilient water supply infrastructure
- Greater management of water quantity issues, including protection and diversification of water sources and reduced wastage and leakage during distribution to consumers
- Improved engagement with key stakeholders, including catchment representatives and consumers
- Greater resource mobilization from local/national government and donors to support system improvements.

Challenges identified during the piloting programme included difficulty in communicating information and concepts to lay people with no technical background, particularly in rural settings where capacity for water security risk management linked to climate change was low. To support capacity building efforts for rural water supplies, a tailored rural climate resilient training package and supporting manual was developed, based on lessons learned from the initial rural piloting programmes (see Appendix I).

As part of this project, a formal assessment of the impact of climate resilient WSPs has been undertaken. Base-line impact assessment surveys were collected in certain pilot locations, and end-line assessments will ultimately be performed, to generate evidence on the impacts of WSPs on key water supply indicators.

Fig. 6. Retaining wall constructed to minimize contamination and ensure safe water is available during flooding.

Fig. 7. Diversion ditch constructed to protect the source water for a community of over 6000 inhabitants from the Ellie kebele. Indigenous tree planting complimented this activity to protect and maintain the water table.

Strategic training of institutions, development partners and inter-country collaboration with project partners

The project team worked with development partners to ensure a multiplicative effect and enhanced roll-out of WSPs through partnership programmes. Training events (including training of trainers) were held targeting key development partners active in the country, including approx. 100 experts from UNICEF, Water Aid, COWASH, Drop of Water, German Agro Action, Finnish and Dutch development organizations, amongst others, who are now piloting the development and implementation of climate resilient WSPs through their programmes in urban and rural communities nationwide. Further, inter-country collaboration was promoted with other countries participating in the climate resilient WASH project, whereby the Ethiopian team extended invitations to Tanzanian colleagues to key training events.

In addition, training to technical and academic institutions was provided, including lecturers and researches working at Arbaminchi University, Adama Science and Technology University, Addis Ababa University, Mekele University and Bahir Dar University and Bahir Dar, Maichew and Woliso Polytechnic colleges. This approach ensured that climate considerations are now included into relevant course work and research programmes, and will support a greater awareness of climate resilient water safety concepts into the future workforce, thereby enhancing the overall sustainability of the programme.

By the conclusion of this project, CR-WSPs had been developed for 31 water supply systems (14 urban and 17 rural), with a population served of over 1.2 million people. In addition, over 60 districts have included climate resilient WSPs in their annual WASH programs. For the detailed assessment on CR-WSP development and implementation in Ethiopia under the DFID project, refer to the evaluation report in Appendix I.

3. Project outcomes

Overall, the following are the key outcomes from the climate resilient WASH project in Ethiopia:

- ☑ Strategic review of national policy settings and instruments to enhance the integration of climate change, health and WASH considerations within WASH and health policies, strategies and implementation plans.
- ☑ Development of enhanced capacity at national through to local levels on climate resilient WASH and water safety planning (reaching >700 health and water sector staff)
- ☑ Driver for development of adaptation plans for other relevant sectors (including for example, agriculture)
- ☑ Development for a robust framework and implementation guidelines to support national roll-out of climate resilient water safety planning
- ☑ Establishment of climate resilient water safety plans in 14 pilot urban and 17 rural locations (totalling over 1.2. million people, and an estimated 0.6 million women), with improved preparedness for, and management of, climate-related risks and emergency response within these water supplies
- ☑ Beneficial outcomes observed in relation to water supply system management and operation of water supply systems
- ☑ Greater awareness/uptake of climate resilient water safety planning by WASH development partners and NGOs
- ☑ Development of greater capacity for water quality testing and monitoring (for example, through the development of "mini-laboratories")
- ☑ Awareness for future water supply developments to consider climate resilience at the planning/design stage
- ☑ Greater interest in climate resilient WASH monitoring and evaluation and research by training institutions and academia
- ☑ Inclusion of climate considerations in national WASH programmes (e.g. ONE WASH) as well as the Health Transformation Plan of Ethiopia (2015/16-2020), the Ethiopia Growth and Transformation Plan II (2015-2020) as well as the annual sector business plans for WASH.

Key lessons learned…

- 〉 **High-level advocacy, coordination and strategic partnerships are important for initiation and sustainability of climate resilient WASH initiatives**
- 〉 **Development of enabling policy instruments (e.g. strategic frameworks, implementation guidelines) is important to guide integration of climate considerations into the national health and WASH agendas**
- 〉 **Development of a vulnerability and adaptation assessment as a first step can help to deliver a more focussed and strategic national adaptation plan for health**
- 〉 **Development of national capacity on climate change, health and WASH is critical across all relevant sectors**
- 〉 **Community engagement and outreach is essential to ensure a sense of ownership for the sustainability of climate resilient WASH programmes; however, challenges may existing when communicating climate resilient messages to non-specialists**
- 〉 **Significant infrastructure improvements require adequate integration into planning and funding/budgetary cycles; CR-WSPs should be planned, budgeted for, implemented, monitored and reported as other WASH sector activities**
- 〉 **Advocacy and capacity building at all levels (i.e. from national to local) should be an on-going priortiv**

4. Next steps and future directions

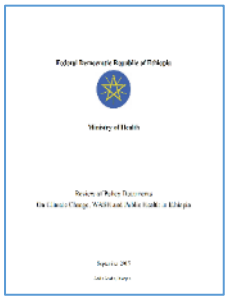
- Complete endline impact assessment of climate resilient WSPs in select pilot sites to document tangible gains in water security
- Using the outcomes from the impact assessment, continue advocacy at all government levels, alongside targeted grassroots community engagement and awareness raising activities
- Review (audit) pilot WSPs to identify capacity building needs and opportunities for strengthening existing climate resilient WSPs
- Based on the outcomes of this review, revise, as necessary, the national WSP framework and implementation guidelines for urban and rural systems
- Finalize vulnerability and adaptation assessment for water resources sector to support climate resilient WSP development nationally
- Leverage funding for the implementation of climate-related improvements (including operations and maintenance) identified through the WSP pilot programmes
- Continue cascade training and capacity building activities nationwide to support national roll-out and scale-up of climate resilient water safety planning.

Appendix 1

Ethiopia: Roadmap of climate resilient WASH resources

The following resources have been developed to strengthen the climate resilience of health and WASH activities in Ethiopia as part of the DFID-funded project on "*Building adaptation to climate change in health in LDCs through resilient WASH*", which aimed to provide target countries with a clear framework for protecting health and reducing the risk of disease as a consequence of climate change.

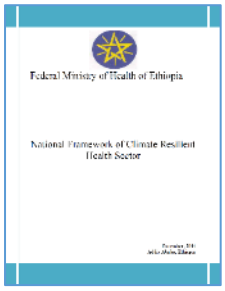
NATIONAL CLIMATE CHANGE AND HEALTH POLICIES, STRATEGIES & PLANS



Review of Policy Documents on Climate Change, WASH and Public Health in Ethiopia
September, 2015
World Health Organization, Country Office for Ethiopia

This report presents the findings from a review of national policies, strategies and programmes in relation to climate change, WASH and health. It examines if existing WASH and public health policy instruments adequately address climate impacts, and identifies key policy gaps.

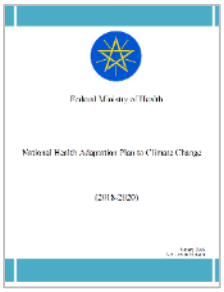
Recommendations are made to address current policy deficiencies towards the development of robust policy instruments to support climate resilient health and WASH sectors.



National Framework for Climate Resilient Health Sector
December, 2014
Federal Ministry of Health, Ethiopia

Recognizing the vulnerability of the Ethiopian health sector to current and future climate change impacts, this document provides the basis for strengthening the resilience of the of national health system.

A national framework for a climate resilient health sector is presented, which provides policy guidance and the blueprint towards development of a comprehensive national health adaptation plan, to meet the healthcare needs of Ethiopian citizens in the face of a changing climate.



National Health Adaptation Plan to Climate Change
2018-2020
January, 2018
Federal Ministry of Health, Ethiopia

This document details the national climate adaptation strategies to mitigate the projected adverse effects of climate change and variability in the Ethiopian health system.

The plan outlines key areas of intervention, alongside the implementation strategy, to support realization of the overall goal of a climate resilient national health system.

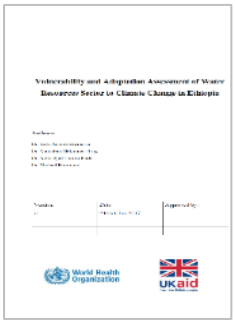
VULNERABILITY & ADAPTATION ASSESSMENTS

Vulnerability and Adaptation Assessment of Health to Climate Change in Ethiopia
Final Report
September, 2015
Federal Ministry of Health, Ethiopia

This report assess the key current and predicted vulnerabilities of the Ethiopian health sector to climate change.

This assessment determined the vulnerability for each state though the systematic identification of climate-related hazards, exposures and adaptive capacities, including consideration of the social and environmental determinants of health.

The outcomes and recommendations from the report support evidence-based decision making on appropriate mitigation strategies to ensure resilience of the health system to climate variability and change.

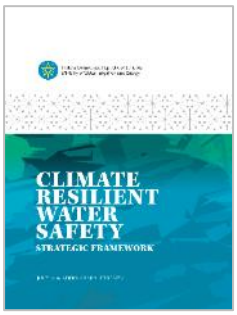


Vulnerability and Adaptation Assessment of Water Resources Sector to Climate Change in Ethiopia
In preparation
Federal Ministry of Water, Irrigation and Energy, Ethiopia

This assessments determines the key areas of vulnerability of the water sector to current and projected climate change, and identifies how these vulnerabilities may be reduced via appropriate adaptive strategies.

Although primarily developed to inform national WASH investments, the information presented in this assessment is relevant to water utilities and other stakeholder involved in the development of climate resilient water safety plans, whereby the information presented may be used to systematically identity, prioritize and manage climate-related risks to water supplies.

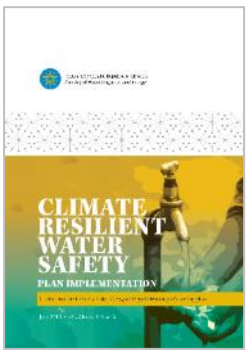
CLIMATE RESILIENT WASH



Climate Resilient Water Safety
Strategic Framework
July, 2015
Federal Ministry of Water, Irrigation and Energy, Ethiopia.

This framework provides the strategic blueprint to develop a climate orientated risk assessment and management approach for drinking-water supplies, from catchment to consumer.

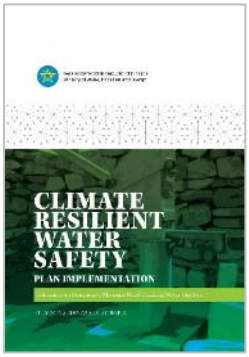
Considered global best practice, WHO advocates for the WSP approach as the most consistent means to ensure the safe and reliable supply of safe drinking-water. Adapted to the Ethiopian context, this document outlines a roadmap for the national scale-up of climate resilient WSPs.



Climate Resilient Water Safety Plan Implementation
Guidelines for Urban Utility Managed Piped Drinking Water Supplies
July, 2015
Federal Ministry of Water, Irrigation and Energy, Ethiopia.

These guidelines provide stepwise information for urban water suppliers to develop, implement, monitor and review water safety plans. Special consideration is given to the identification and assessment of climate-related risks (both current and future), including those relating to water quantity and availability, as well as the traditional water quality considerations.

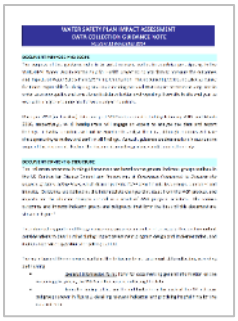
The comprehensive and practical guidance targets water supply managers and operators and is applicable to large cities as well as small towns and peri-urban areas.



Climate Resilient Water Safety Plan Implementation
Guidelines for Community Managed Rural Drinking Water Supplies
July, 2015
Federal Ministry of Water, Irrigation and Energy, Ethiopia.

The partner publication to the urban guidelines, this rural guidance supports the sustainable implementation of climate resilient WSPs in community-managed water supplies.

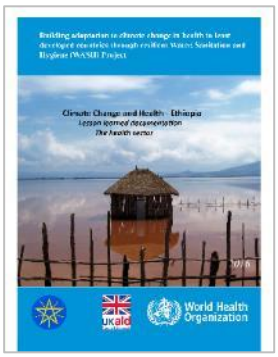
Tailored to rural settings, with a particular focus on incremental improvement within available resources, practical guidance and tools are provided to support communities to identify and prioritize risk threatening water security, considering current and future impacts of climate change.



Water Safety Plan Impact Assessment
Data Collection and Guidance Note: Oromia Region
November, 2014
World Health Organization, Country Office for Ethiopia

This note outlines an approach to measure the outcomes (i.e. the intermediate changes that result from the WSP process) and impacts (i.e. the ultimate changes desired as a result of WSP programme activities) of WSP implementation.

Taking an example from the Oromia Region, the process of base-line and end-line data collection is presented, which may generate information on the impacts of WSPs on key water supply indicators.



Climate Change and Health - Ethiopia
Lesson learned documentation
October, 2016
Health Sector
WASH Sector
Federal Ministry of Health and Ministry of Water, Irrigation and Energy, Ethiopia.

These mid-term status reports highlight the progress made in the health and WASH sectors on implementation of the DFID-funded project on "*Building adaptation to climate change in health in LDCs through resilient WASH*".

The status of key mid-term outputs is presented, alongside lessons learned through the implementation of the project, and the barriers and enablers encountered.

Climate Resilient Water Safety Planning Capacity Development
Training Reports
2015-2017
Various authors

National training of trainers, Addis Ababa, Dec. 2014
Regional training, SNNP Region, Feb. 2015
Regional training, Tigray Region, Dec. 2015
Regional training, Oromia Region, Apr. 2015
Regional training, Amhara Region, May 2017

To support national roll-out of climate resilient water safety planning, a number of national and regional training events were held to build capacity and support the development of pilot climate resilient WSPs, which may serve as models for future scale-up.

The reports outline the training approach, alongside the system assessments, risk assessment/management, monitoring and communication considerations when developing climate resilient WSPs in urban and rural settings.

Progress Evaluation Workshop Report on Climate-Resilient Water Safety Plan on Building adaptation to Climate Change in Health in Least Developed Countries through Resilient WASH Assessment

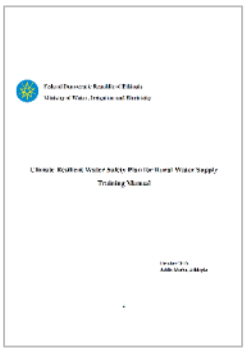
May, 2018

World Health Organization, Country Office for Ethiopia

This report summarizes the progress made from implementation of CR-WSPs in 31 water supply systems under the DFID climate resilient WASH project from 2013 to 2018.

The workshop reviewed progress on CR-WSPs, implementation, overall status and key system improvements. The lessons learned were identified to support future national CR-WSP scale-up efforts in both urban and rural settings.

CLIMATE RESILIENT HEALTH AND WASH TRAINING PACKAGES



Climate Resilient Water Safety Plan for Rural Water Supply

Training Manual

In preparation

Federal Ministry of Water, Irrigation and Energy, Ethiopia.

This comprehensive training package aims to support national roll-out of rural WSPs by building the capacity of rural community/board managers and operators on climate resilient WSP development and implementation.

Practical and accessible guidance is provided to engage, empower and guide rural communities in Ethiopia to develop sustainable WSPs that adequately address current and projected climate-related risks.

[1] USAID (2016). Climate change risk profile: Ethiopia. https://www.climatelinks.org/sites/default/files/asset/document/2016%20CRM%20Factsheet%20-%20Ethiopia_use%20this.pdf, accessed February 2018.

[2] USAID (2012). Climate change adaptation in Ethiopia. https://www.climatelinks.org/resources/climate-change-adaptation-ethiopia-fact-sheet, accessed February 2018.

[3] Government of Federal Democratic Rep. of Ethiopia (2011). Ethiopia's Climate-Resilient Green Economy: Green economy strategy, Addis Abba, Ethiopia. http://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Ethiopia%E2%80%99s_Climate%E2%80%90Resilient_Green_Economy_Ethiopia.pdf, accessed April 2018.

[4] World Bank (2011). Vulnerability, risk reduction, and adaptation to Climate Change - Climate Risk and Adaptation Country Profile: Ethiopia. https://www.gfdrr.org/sites/default/files/publication/climate-change-country-profile-2011-ethiopia.pdf, accessed March 2018.

[5] WHO (2015). Climate and health country profile: Ethiopia. http://apps.who.int/iris/bitstream/handle/10665/208861/WHO_FWC_PHE_EPE_15.07_eng.pdf;jsessionid=83DEA016305E40A2EC9DB08A3DF6276F?sequence=1, accessed February 2018.