Nepal

Climate change, health & WASH

Weather and climate have a profound impact on public health. It is anticipated that climate change will exacerbate current water, sanitation and hygiene (WASH)-related health issues, particularly in the least developed countries (LDCs). The following case study describes activities undertaken in Nepal from 2013-2018 to implement the United Kingdom’s Department for International Development (DFID)-funded project on “Building adaptation to climate change in health in LDCs through resilient water sanitation and hygiene (WASH)”, whose aim 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

Nepal is a landlocked, mountainous country located in the Himalaya region of South-East Asia. The majority of the population (>75%) live in rural areas, with high resource-dependent livelihoods (e.g. subsistence farming). Due to a combination of rainfall, snow- and glacier-melt, Nepal currently has significant amounts of freshwater, which supplies up to 500 million inhabitants downstream in the Ganges basin.1,2 Nepal’s varied topography and socioeconomic circumstances make the country particularly vulnerable to climate variability and change. Based on the existing climate projections (Box 1), Nepal’s water resources are considered to be particularly vulnerable in terms of: 3,4,5

- Floods and landslides arising from heavy rainfall, snow- and glacier-melt events (including glacial lake outburst floods)
- Increase in freshwater flows in the shorter-term due to glacier-melt, with reduced flows projected in the longer-term
- Droughts during winter months (resulting in reduced surface-water flows and depleted groundwater levels), particularly in the western region
- Reduced water quality, resulting in waterborne disease outbreaks (such as cholera and diarrhoeal diseases).6

Box 1. Climate projections for Nepal3,3

- Mean annual temperature set to increase by 1.3 to 3.8°C by the 2060s
- Increase in mean average rainfall, largely due to increased Monsoonal rainfall (although uncertainties exist within the various models)
- Heavy rainfall events projected to increase during Monsoon season
- Drier winters, with potential for seasonal drought

Fig. 1: Annual exposure to inland river flooding. Widespread poverty, high levels of hunger and a lack of basic healthcare facilities and hygiene awareness (particularly in rural areas), renders Nepal vulnerable to climate impacts.7
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 £6.85m 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. Nepal was chosen based on its 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 health and WASH. An overview of the expected outputs from this project is presented in Figure 2.

In Nepal, the project was implemented by the Ministry of Health and the Ministry of Urban Development with the technical support of the World Health Organization (WHO). To oversee project implementation, a Project Coordination Committee on Climate Change and WASH was established in 2013, which included related stakeholders from government, health, NGO and water supply and sanitation sectors. The current case study focusses on Outputs 2 and 3 (i.e. from national through to facility/utility levels). 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”](image)

Climate resilient health and WASH activities implemented under the DFID project (2013-2018)

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

**Policy review (Output 2)**

A review of national policy is of paramount importance to identify key entry points for promoting climate adaptation in the health and WASH sector. A comprehensive review of national health sector, WASH and climate

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For a full list of publications relating to project Outputs 2, 3 and 4, see Annex 1.
policies was undertaken in Nepal 2015, to identify potential policy gaps and key focus areas to strengthen the resilience of relevant policies to climate change, with a particular consideration of gender issues. This review examined existing policies and acts (including Water Resource Act (1992), Water Supply Regulations (1998), Design Guidelines (2002), National Drinking Water Quality Standard and Directives (2005), Water Plan (2005), Rural Water Supply Policy (2005) and Urban Water Supply Policy (2009)) and identified opportunities for strengthening climate considerations within these policy instruments. This included the need to develop an umbrella act, policy and sector development plan, as well revising existing water supply system design guidelines and the national drinking-water standards, and initiating the development of separate regulatory instruments for climate change and the WASH sector. Further, the review panel recommended initiating a dedicated climate change-focussed division within the lead department (namely, the Department of Water Supply and Sewerage), which would have responsibility for coordination of efforts amongst the other key stakeholder (such as Ministry of Health and Population, and Ministry of Science, Technology and the Environment, as well as other related agencies both nationally and internationally).

Health and WASH vulnerability and adaption assessments for Nepal (Output 2)

Health is considered to be one of the most vulnerable sectors to climate change in Nepal. In 2015, a vulnerability and adaption assessment was undertaken by the Nepalese Ministry of Health and WHO to ascertain the current and future health vulnerability in Nepal to climate-related risks. The assessment examined vulnerable populations and geography along with the current capacity of the health system in Nepal to adapt to climate change and its effect on human health. The assessment also examined public health policies and programs that could increase resilience, considering the various determinants of climate-sensitive health outcomes. A number of key recommendations were made to strengthen the capacity of the health sector and reduce its vulnerability to the impacts of climate change. This included the need to build the capacity of national health professionals with regards to the health impacts of climate change, and provide technical support and training to assess and monitor vulnerability to climate change-related health risks, as well as ensuring the development of primary health care services at the local level to support the resilience of local communities to climate health risks.

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

Based on the outcomes from the vulnerability and adaptation assessment, the Government of Nepal approved the “Health National Adaptation Plan (H-NAP): Climate Change Health Adaptation Strategies and Action Plans of Nepal (2016-2020)” which outlined the national strategy to reduce vulnerability and enhance adaptation measures to protect public health from the impacts of climate variability and change. The proposed strategy prompted strong intersectoral collaboration, and included a commitment to strengthen national surveillance systems and build national capacity to protect health from the adverse effects of climate change.

Building capacity to climate change in the health and water supply sectors (Output 2)

To address the need for national capacity building as identified in the H-NAP (2015), a comprehensive training package on “Climate Change and WASH” was developed to strengthen knowledge and skills across the sector. Primarily aimed at District Engineers within the Department of Water Supply and Sewerage to integrate climate-related risk management within national water supply and sanitation schemes, the training package was designed to be also applicable to national trainers and facilitators, as well as non-governmental organizations and professional/private sectors representatives involved in climate change and WASH in Nepal.

Further, a training package on “Climate Change and Health” was prepared, which includes tailored training materials targeting health sector representatives at the policy-, managerial- and community-levels.

During the course of the project, these climate change and WASH/health training programs were delivered to approx. 250 individuals spanning diverse ranging institutions/agencies at central and district levels.

In 2016, an expert technical team was assembled to develop the guidance document “Technical design guidelines for climate resilient water supply systems”. Set to be published in 2018, these guidelines outline key design and technical requirements for adaptable water supply system infrastructure to support water suppliers to deliver climate resilient water supply services in Nepal.
Climate resilient water safety planning (Output 3)

The water safety plan (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. This generates what is commonly referred to as a “climate resilient” WSP (or CR-WSP); which, in addition to water quality and safety risks, will also consider aspects such as quantity, availability, reliability. However, it should be noted that, an effective WSP will consider and prioritize all risks holistically as part of the overall system risk assessment (i.e. both climate- and non-climate related risks).

Climate change impacts are affecting water quality and quantity across Nepal. Runoff and ingress of contamination from heavy rain and flooding events (including landslides) adversely affects source water quality and damages asset/infrastructure. Extended dry periods and drought impacts both surface and groundwater water availability/accessibility, as well as bringing water quality/infrastructure damage risks from wildfires. Increased temperatures may increase the risk profiles associated with the proliferation and survival of microbial pathogens in drinking-water storage and distribution systems. Further, inadequate (and climate vulnerable) sanitation represents a significant and increasing threat to water quality. The challenges are expected to intensify in-line with climate projections.

In Nepal, the Department of Water Supply and Sewerage has been implementing WSPs in all 75 districts of Nepal since 2008. For the current project, climate considerations were integrated into these existing WSPs in four pilot locations in 2015, namely, in the districts of Dhanusha, Kathmandu, Mustang and Nawalparasi (Fig. 2). This work leveraged on existing water safety planning foundations laid by the Water Quality Partnership/AusAid, leveraging on the existing WSP awareness and support, capacity, tools and regulatory drivers, further strengthening the nascent CR-WSP implementation and monitoring practices.

Existing WSPs were reviewed through a climate lens, with special consideration given to identifying, assessing and managing climate-related risks within these existing WSPs mainly due to extreme weather events (e.g. flooding, landslides, droughts etc.). Key system improvements were identified and prioritized to strengthen the resilience of the water supplies to current and projected climate impacts. Currently, over 35,000 people in communities across these four districts are being served by CR-WSPs, with plans to scale-up these activities further beyond 2018. Highlights of some of the key outcomes from the climate resilient WSP piloting program are presented in Box 2. From this piloting work, Nepal has developed a comprehensive training package on CR-water safety planning, and developed corresponding CR-WSP implementation guidelines to support the process in both urban and rural settings (see Annex 1). During the project, CR-WSP training has been delivered to approx. 240 individuals at regional and district level (including 34 engineers from the Department of Water Supply and Sewerage), with plans to roll-out additional trainings in the future.

WATER SAFETY PLANS are a comprehensive risk assessment and management approach, considered to be the “most effective means of consistently ensuring the safety of drinking-water supply” from catchment to consumer. The principles are fully adaptable to all system types, sizes and socioeconomic settings.

Fig. 3: Location of the climate resilient WSP pilot programs in Nepal
Box 2. Piloting of climate resilient water safety plans in Nepal

Climate variability and change is currently impacting surface and groundwater security in Nepal, with the situation expected to intensify in the future based on climate change projections.

To facilitate consideration of climate-related impacts within the pilot water supply systems, a number of modifications to the existing WSP approach were made, including:

- Broadening the traditional WSP scope of quality, to include a greater focus on access to adequate quantities of safe drinking-water
- Inclusion of climate-related expertise on the existing WSP team
- Broadening the focus of the system-specific risk assessments to consider climatic hazards/hazardous events and extreme weather events
- Development of improvement plans incorporating climate-related mitigation (or control) measures
- Development and implementation of climate-related emergency response and management plans.

Through the piloting process, key climate-related hazards/hazardous events were identified, including:

- Increased precipitation resulting in increased contaminant loading to source waters and overloading of water treatment and sanitation containment/treatment systems
- Drought periods contributing to reduced surface-water flows and depletion of groundwater sources, as well as wildfires in vulnerable regions
- Extreme weather events e.g. flash flooding, landslides, and its impacts such as infrastructure damage etc.

Through a process of systematic risk assessment, significant climate-related risks were identified and prioritized, and corresponding incremental improvement plans were drawn up. Climate-proof mitigation measures ranged from catchment management/source protection, through treatment/storage, to household level interventions. Some examples of these are presented below.

![Fig. 4: Examples of climate-related hazards and improvements identified during the Mustang pilot program; (a) raising of water transfer pipelines required due to the impacts from increased sediment deposition in the river bed; and (b) relocation of spring box required due to groundwater depletion.](image)

During the piloting program, WSP teams were encouraged to avail of the local resources within the pilot area, and to engage with key local stakeholders such as health offices and local experts to identify locally-appropriate risk mitigation measures, and to support the overall implementation of their climate resilient WSPs. Such an approach greatly contributed to the sustainability of CR-WSP implementation within these communities.

Overall, the pilot program demonstrated that the existing WSPs could be successfully adapted to assess and manage climate-related risks in the context of Nepal. Following the pilot program, national WSP implementation guidelines and training materials were updated to include climate considerations, and to reflect the valuable lessons learned during the piloting process.
3. Key project outcomes

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

- Integration of health considerations into associated health sector programs and national climate adaption plan (or NAP, which is currently under development)
- Greater intersectoral collaboration on climate resilient WASH between the health ministries and other relevant sectors
- Enhanced mobilization of funds to support climate resilient WASH initiatives. (Two additional projects, namely, DFID II and Global Environment Facility funded “Building resilience of health systems in Asian LDCs to Climate Change” have been approved)
- Inclusion of a climate resilient WASH investment strategy within the WASH Sector Development Plan.
- Inclusion of climate consideration into the Nepal Water Supply, Sanitation and Hygiene Sector Development Plan (2016-2030)
- Development of capacity at national through to local levels on climate change and health, WASH and water safety planning
- Broadened evidence-base with respect to the health effects of climate variability and change at national and sub-national levels
- Greater public awareness in urban and rural settings on the health implications of a changing climate
- Improved management of climate-related risks within urban and rural water supply systems, including greater emergency preparedness and response.

Key lessons learned...

- The impacts of climate variability and change on WASH sector are profound, and hence climate risks require careful assessment and management from design stage to implementation
- Climate resilient WSPs, integrating catchment management and disaster management, should be considered when developing future water supply projects to ensure water security is assured
- Adequate funding is required to support the provision of climate resilient infrastructure
- More research and documented evidence is required on the impacts of climate change on WASH and the health sector.

4. Next steps and future directions

- Conduct capacity building activities based on developed training manuals on climate change and WASH, health and water safety planning
- Scale-up climate resilient water safety planning activities in additional areas
- Conduct additional research on impacts of climate change on health sector (research on diarrhoeal diseases is completed, but vector borne diseases are highly climate sensitive)
- Integrate the findings from this project in regular government programs
- Plan, develop and implement future projects based on these achievements/lessons learned
- Seek funding from Green Climate Fund for the provision of climate resilient infrastructure (WASH and climate resilient health facilities).
Appendix I

NEPAL: Roadmap of climate resilient health & WASH resources

The following resources have been developed to strengthen the climate resilience of health and WASH activities in Nepal 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 & HEALTH POLICIES, STRATEGIES & PLANS

**Review of Policy Documents on Climate Change, WASH and Public Health in Nepal**
April, 2015
World Health Organization, Country Health Organization for Nepal

This document presents the outcomes from a review of existing national-level policies in relation to climate change, WASH and health. Based on the findings of this comprehensive review, recommendations are made to minimize policy gaps and improve the integration of climate change considerations into existing/new health and WASH sector policy.

*Languages: English.*

**Health National Adaptation Plan (H-NAP)**

*Climate Change Health Adaptation Strategies and Action Plans of Nepal (2016-2020)*
2015
Government of Nepal, Ministry of Health

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

The document describes the specific objectives of the action plan and its implementation strategy, which aims to overall reduce vulnerability and enhance adaptation measures to minimize health impacts from climate change and variability in Nepal by 2020.

*Languages: English.*

VULNERABILITY & ADAPTATION ASSESSMENTS (V&A)

**Protecting Health from Climate Change**

*Vulnerability and Adaption Assessment of the Health Impacts of Climate Variability and Change in Nepal*
December, 2016

This report describes the outcomes of a vulnerability and adaptation assessment of the health impacts of climate variability and change in Nepal.

The study assessed: health- and climate-related public health policies and programs; risks of climate-sensitive health outcomes (including the most vulnerable populations and regions); and the relationship between climate conditions and health outcomes. From this assessment, recommendations are made as to how Nepal may improve the capacity of health sector to reduce the overall health impacts from climate variability and change.

*Languages: English.*
Final Report on Assessment of Effects of Climate Factors on Diarrheal Diseases at National and Sub-national Levels in Nepal

December, 2016
Nepal Health Research Council; World Health Organization, Country Office for Nepal

This study examines the impact of climate-related factors on the incidence of diarrheal disease in children under five years of age in Nepal. Adaptions to diarrhoea control programs in the face of a changing climate are considered to reduce the burden of diarrheal diseases among this vulnerable population.

Languages: English.

Climate Resilient Water Safety Plans Guideline
Urban Water Supply System
October, 2017
Government of Nepal, Ministry of Water Supply and Sanitation

These guidelines have been developed to support urban water supply schemes to development and implement climate resilient WSPs.

Intended for water suppliers who have already developed climate resilient WSPs using the “basic” rural water supply guidelines (see above), these “advance” guidelines aim to support water suppliers incrementally improve their climate resilient WSPs, once their WSP has matured and WSP team gains confidence, and/or following a water supply system upgrade.

Languages: English.

CLIMATE RESILIENT WASH

Climate Resilient Water Safety Plans Guideline
Rural Water Supply System
October, 2017
Government of Nepal, Ministry of Water Supply and Sanitation

Based on international best practice and Department of Water Supply & Sanitation experiences, these guidelines have been developed to support rural water supply schemes to develop and implement an effective climate resilient WSP in rural settings.

These “basic” guidelines are intended as the first step to support rural water suppliers in developing an effective climate resilient WSP, before progressing to the more “advanced” guidelines, detailed below.

Languages: English.

Review of Water Safety Plan Implementation Process in Nepal

December, 2016
World Health Organization, Country Office for Nepal

This report assesses progress on climate resilient WSP implementation in Nepal to document lessons learned and share good practices amongst WSP practitioners across the country. The review examines and documents progress in relation to climate resilient WSP implementation by the various regional agencies across the country, and recommends opportunities for harmonizing the climate resilient WSP process nationwide.

Languages: English.
Technical Design Guidelines for Climate Resilient Water Supply Systems

In preparation
Government of Nepal,
Ministry of Water Supply and Sanitation

Prepared to supersede the current “Design guidelines for community based gravity flow rural water supply schemes” (2002), these guidelines provide comprehensive technical advice on the design and construction of climate-proof water supply systems.

These revised guidelines now include consideration of urban settings, climate aspects (including quantity considerations) and disaster preparedness, and are due to be launched in 2018.

Languages: English.

Study on Adaptation to Impacts of Climate Change for the Climate Resilient Water Safety Plan

December, 2015
Government of Nepal,
Ministry of Water Supply and Sanitation and World Health Organization, Country Office for Nepal

This technical study examined appropriate water supply system improvements for adaptation to the impacts of climate variability and change, through the WSP framework. Various technologies and practices were assessed, from catchment level through to the point of consumption, to identify system specific adaption strategies to improve the resilience of water supply systems to a changing climate.

Languages: English.

CLIMATE RESILIENT HEALTH AND WASH TRAINING PACKAGES

Study of Potentiality of Rainwater Harvesting System as a Climate Change Adaptation Option in Arghamaidan, Arghakhanchi District

November, 2016
Government of Nepal,
Ministry of Water Supply and Sanitation

This study report examines the feasibility of rainwater harvesting as a means to supplement community access to water for domestic and agricultural purposes in the Arghakhanchi district of Nepal. The study examines a holistic, integrated watershed management approach to improve surface water storage and aquifer recharge, thereby improving the reliability and access to water in these communities.

Languages: English.

This comprehensive training package aims to strengthen the capacity of the District Engineers (within Department of Water Supply and Sanitation) to integrate climate considerations into the management of national water supply and sanitation schemes.

The package includes training presentations, a “Participants handbook” and “Facilitators guide”, which offers practical advice for prospective trainers/facilitators on how to successfully plan, prepare and deliver the Climate Change and WASH training program.

Languages: Nepali, English.
This series of tailored training manuals aim to provide audience appropriate guidance on the impacts of climate change and variability on health.

The package targets personnel at the policy level (decision makers), managerial level (both at regional and central levels) and community level (including authorities of local bodies, village municipalities, provincial managers, local level decision makers).

Languages: Nepali, English.

References