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Climate change and rural water in Nepal: taking stock

Climate hazards, such as floods, drought, and landslides, impact rural water services in Nepal. As climate change continues to evolve, it is likely that climate hazards will become a greater barrier to equitable and sustainable rural water services. It is time to take stock of what we have learned so far to inform immediate climate action.

This learning brief describes the ways that climate change affects rural water services in Sarlahi and Dailekh districts in Nepal, existing response mechanisms, and actions to incrementally address climate change in the near future. It draws on experiences of the Beyond the Finish Line – Inclusive and Sustainable Rural Water Supply Services project supported by the Australian Government’s Water for Women Fund. Reflecting on these experiences can help to lay a foundation for more focused climate action in the rural water sector in Nepal.

Key messages

Average temperature and the frequency and intensity of extreme rainfall events, droughts, and glacial lake outburst floods (GLOFs) have increased in recent decades in Nepal. Climate projections suggest such events will continue to worsen.

Climate hazards are already creating issues for the functionality of and access to rural water services. A number of formal and informal response mechanisms that can be leveraged to address these issues currently exist at the national, rural municipality, and community/household level.

Actions for addressing climate impacts on rural water do not need a separate programme. Instead, rural municipalities in Nepal can integrate activities into existing efforts to support sustainable and equitable water service outcomes.

Figure 1: The location of Dailekh and Sarlahi districts within Nepal



From May to June 2021, the SNV Nepal team were facilitated by the University of Technology Sydney to reflect on their collective knowledge about climate change impacts on rural water and responses in Nepal. The team focused on their experiences working in Sarlahi and Dailekh districts (Figure 1) and relevant policies at the national level.

Climate context in Nepal

The climate in Nepal varies considerably according to sub-geographic region within the country. Average annual temperature ranges from 25°C in the lowlands to -1°C at high altitudes.¹ Precipitation varies greatly across the country with some central and northerly areas receiving more than 3,000mm per year, central and southern plans receiving 1,500–2,000mm, and high-altitude areas receiving less than 1,000mm.² Furthermore, 75–80% of rainfall in Nepal occurs during the monsoon season from June to September.³

Historical climate and disaster trends show that the average temperature in Nepal has risen 1.0–1.3°C since 1900, and that the intensity and frequency of extreme rainfall events in western Nepal, and of droughts and incidences of glacial lake outburst floods (GLOFs) elsewhere in the country have increased significantly since 1960.^{4,5}

Climate projections for Nepal suggest a significant increase in temperature, greater mean annual rainfall, and great variation in surface water flow between wet and dry seasons. Under a high global greenhouse gas emissions scenario (RCP8.5), the average annual temperature in Nepal may increase by 2.4°C over pre-industrial levels in the 2040–2059 period.⁶

Under a lower emissions scenario (RCP4.5), the annual average temperature may rise 1.7°C in the 2040–2059 period.⁷ In both scenarios, Nepal is projected to experience an increase in extreme rainfall events and less rainfall in the dry winter season.^{8,9} However, there is significant uncertainty in the projections of long-term precipitation trends.¹⁰

¹ USAID, 'Climate risk profile: Nepal', *climatelinks*, WA DC, United States Agency for International Development, 2017, <https://www.climatelinks.org/resources/climate-risk-profile-nepal> (accessed 18 October 2021).

² World Bank Group and Asian Development Bank (ADB), 'Climate risk country profile: Nepal', *OKR - Open Knowledge Repository*, 2021, <https://openknowledge.worldbank.org/handle/10986/36374> (accessed 18 October 2021).

³ USAID, 'Climate risk profile', 2017.

⁴ USAID, 2017.

⁵ P. Bohlinger and A. Sorteberg, 'A comprehensive view on trends in extreme precipitation in Nepal and their spatial distribution', *International Journal of Climatology*, 38(4), 2018, pp.1833-1845.

⁶ World Bank Group and ADB, 2021, 'Climate risk country profile', 2021.

⁷ World Bank Group and ADB, 2021.

⁸ USAID, 2017.

⁹ World Bank Group and ADB, 2021.

¹⁰ World Bank Group and ADB, 2021.



WASH context in Nepal¹¹

Nepal has made significant progress in improving rural access to water, sanitation and hygiene (WASH) services in recent years.

In 2020, 90% of the rural population in Nepal had access to at least a basic water service. However, this coverage is increasing by about only 0.5% per year, which is too slow to meet the target of universal basic water coverage by 2030 set out in Sustainable Development Goal 6 (SDG6). Additionally, the proportion of the rural population with access to a safely managed water service has decreased from 24% in 2015 to 16% in 2020, primarily due to a drop in water sources free from contamination.

Access to sanitation and hygiene in rural areas has improved relatively more in recent years, reflecting strong commitment and leadership in the sector. Since 2015, Nepal has achieved the third largest decrease in open defecation in the world (14%). Over the same period, coverage of safely managed sanitation in rural areas has increased from 37% to 50%. Meanwhile, coverage of handwashing facilities on premises with soap has increased from 51% to 59% in rural areas.

Climate impacts on rural water services

Reflections from staff at Nepal's Department of Water Supply and Sewerage Management point to noticeable changes in the regional climate that are affecting rural WASH services in Nepal:

Increased spatial and temporal variation in rainfall events and extreme weather conditions such as droughts, floods [and] cloudbursts are being witnessed frequently in recent years and are adversely affecting the functionality of WASH services. Such consequences of climate change are threatening the availability of safe drinking water and sanitation service.

Reflections on the impacts of climate hazards on rural water services in Sarlahi and Dailekh were gathered from local government officials and rural communities during recent focus group discussions (and are documented further in a forthcoming publication). Such impacts are already felt in Nepal and are expected to intensify under future climate change. The impacts are summarised in Table 1.

¹¹ WHO/UNICEF Joint Monitoring Programme, 'Data: households', *WHO/UNICEF JMP*, Geneva: World Health Organization and New York, United Nations Children's Fund, 2021, <https://washdata.org/data/household#!/> (accessed 5 July 2021).

Table 1: The impact of climate hazards on rural water services, access, and outcomes in Sarlahi and Dailekh districts

Impact	
Physical impacts on infrastructure	<ul style="list-style-type: none"> • Destruction of tubewells by flooding • Damage to water supply intakes for piped schemes during heavy rainfall • Pipeline damage due to heavy rainfall • Blockage of reservoir tanks due to heavy rainfall • Landslides sweep away portions of or entire water supply schemes
Impacts on water resources	<ul style="list-style-type: none"> • Springwater sources become turbid after heavy rainfall • Water source depletion due to prolonged dry spells • The water table gets higher in the Terai during the wet season, but the quality of the groundwater worsens • The water table draws down during droughts
Impacts on access	<ul style="list-style-type: none"> • Waterpoints become inaccessible while submerged under floodwater • Some waterpoints stop running during droughts and consequently people must travel further to collect water from distant sources • Water availability is often poor in areas to which people evacuate during climate disasters • Footpaths to waterpoints become slippery during heavy rain, causing risk of injury
Impacts on gender and social inclusion outcomes	<ul style="list-style-type: none"> • Access to waterpoints becomes difficult during floods or landslides because footpaths are unsafe or slippery; this is especially difficult and hazardous for people with disabilities and pregnant women • Tubewells of poorer families are more frequently submerged by floodwater than those of relatively wealthier families. Sometimes wealthier neighbours do not allow other families to use their waterpoint • Wealthier families are more likely to have raised handpumps, which are more resilient to floods but difficult to use for people with disabilities • Women and girls are especially overburdened in the dry season due to the time needed to collect water for their family
Impacts on WASH-related health outcomes	<ul style="list-style-type: none"> • Increases in diarrhoeal diseases, fever, vomiting, stomach pain, and infections • Women and girls feel greater physical and mental burden when climate hazards occur because they are usually responsible for finding and treating water for their family under extreme conditions • Women and adolescent girls experience stress and health issues during their menstrual period due to limited access to clean water for washing and personal hygiene

Experiences of climate impacts on water among community members in Sarlahi and Dailekh

In the summer season, we wish there are no guests at home. It is quite difficult to manage water for the toilet and cleaning and even drinking. From March to June, one jug water is valuable for us. Sometimes we cannot give a glass of water to people who ask to drink. We face very difficult situation. – 27-year-old woman

Landslides and heavy rainfall cause the water source to stop flowing. Sometimes it stops for 20 days or two to three months. Our water source is very far. During the rainy season, it is very dangerous to go to resolve the problem if the water source damaged. – Water user committee member

On hot days, we have to get water from another hand pump. We usually send the female members of our family to fetch water. The owner of the hand pump scolds them, so sometimes [female household members] refuse to fetch water, which creates family conflict. – 62-year-old man

Climate response mechanisms

There are several national policies that are relevant to the climate change and WASH nexus in Nepal. These shed light on current priorities of the national government in addressing climate impacts on rural water services.

The Climate Change Policy 2019: Calls for watershed management; development of technologies for storage and efficient use of water; construction of rainwater harvesting ponds; standards for sustainable groundwater use; water source protection; and expansion of rainwater harvesting technologies.

Guidelines for Disaster Risk Management and Climate Change Adaptation on Water, Sanitation and Hygiene 2017: Contextualises the impacts of natural disasters and climate change on WASH systems in Nepal; and provides guidelines for managing climate change and disaster risks and building the capacity of communities to respond to impacts.

National Adaptation Programme of Action (NAPA) 2010: Combines considerations of water resources and energy; and calls for more accessible information and technology, stronger and more adaptable institutions, and improved infrastructure for storage, transportation, and treatment of water.

The National Policy and Strategic Plan of Action for Disaster Reduction 2018: Plans for the assessment and mapping of disaster risks to water supplies; participation of local users and community organisations in the formation of disaster risk reduction plans for water and sanitation; implementation of master plans for watershed conservation and river management;

and institution of a mandatory disaster insurance system for water supplies.

Climate Resilient Water Safety Plan

Guidelines 2017: Provides technical guidelines on assessing public health risks to water supplies caused by climate hazards.

The Second Nationally Determined

Contribution 2020: Commits to increasing the proportion of the national population with access to at least basic drinking water services and upgrading watershed health in 20 districts by 2030.

The Vulnerability and Risk Assessment and Identifying Adaptation Options Summary for Policy Makers 2021:

Outlines impacts of climate change on WASH services; maps the most at-risk districts in terms of climate impacts on WASH; and calls for guidance on the protection and conservation of water sources and incentives for rainwater harvesting.

The Draft WASH Sector Development Plan

2016–2030: Plans for defining climate risks and addressing them in the planning, implementation, and monitoring of sanitation services; protection of water resources; inclusion of climate change adaptation in new water and sanitation policies; and building community resilience in response to climate change impacts.

Staff at the Department of Water Supply and Sewerage Management remarked on what is needed to operationalise national policies at local levels:

The major gaps identified in local government are the gaps in the 3 I's: information, investment, and institutional capacity. To make the policies operationalised at the local government level, sound management

information systems should be established and investment opportunities should be explored and linked to a performance-based aid mechanism. The capacity strengthening program also needs to be executed effectively. In the WASH sector, many efforts to fill the 3I gap have already been initiated.

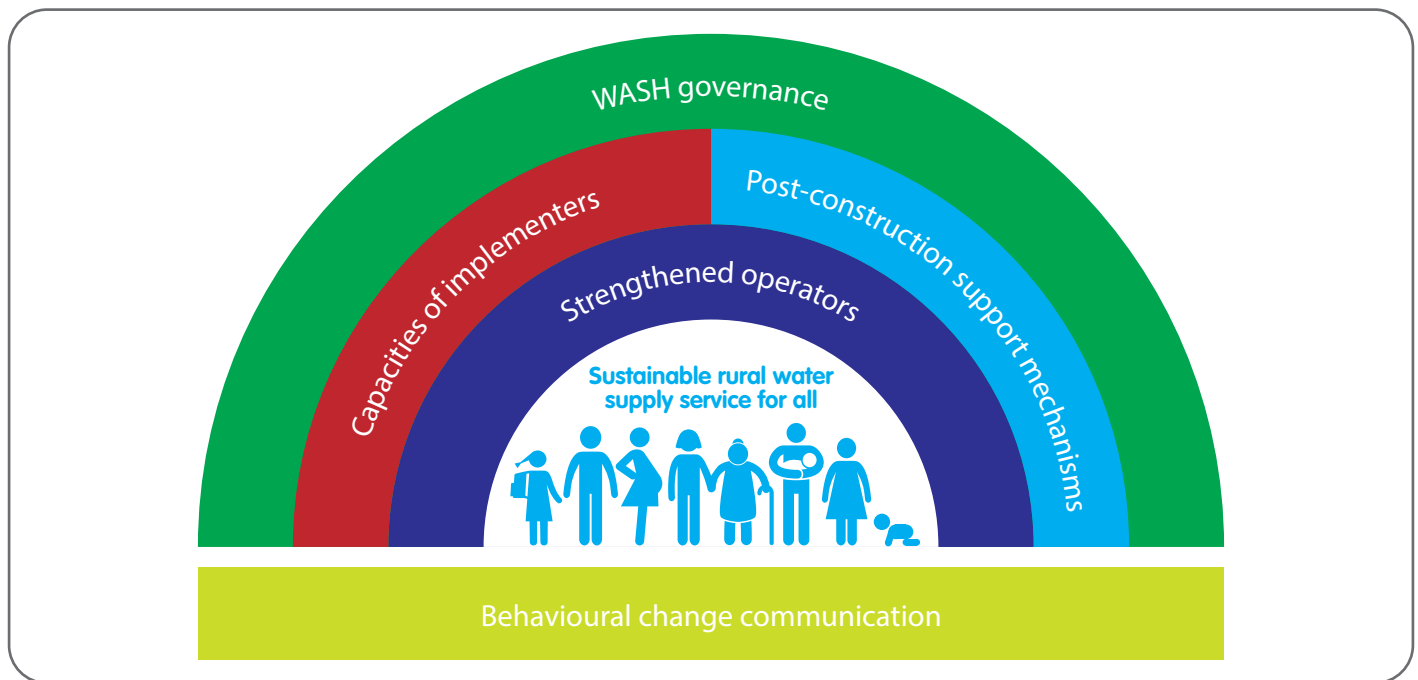
Responses to climate risks already exist at the rural municipality and household/community levels in Sarlahi and Dailekh districts also. These are summarised in Table 2.

Incrementally addressing climate impacts on rural water

The local governments of Sarlahi and Dailekh districts and their partners can take many actions in the near-term to incrementally address existing and future climate impacts on rural water services. Examples of these actions are listed here in reference to the critical sustainability outcomes that occur at the sub-national level (Figure 2, excluding the national stakeholder learning and harmonisation outcome).

Table 2: Existing responses for managing climate risks at the rural municipality and household/community levels in Sarlahi and Dailekh districts

Impact	
<p>Disaster and climate risk reduction mechanisms at the rural municipality level</p>	<ul style="list-style-type: none"> • Disaster risk reduction management committees and task forces are in place at the rural municipality level • Rural municipalities have emergency work plans. Preparedness is weak but they do focus on responding to families affected by disasters • Rural municipalities allocate budget for emergency response (food, tools, shelter). In Ramnagar rural municipality (Sarlahi) there is a team of seven members for emergency response • A data collection system is in place for households affected by climate disasters • Rural municipalities provide packaged water and water collected from tubewells installed at higher levels to areas affected by disaster • Supporting agencies like UNICEF and civil society organisations (CSOs) provide disaster recovery support • Some rural municipalities facilitate bamboo plantation for water source protection and preservation • Mahabu rural municipality (Dailekh) has prepared its own disaster risk reduction guidelines for providing support to disaster-affected households
<p>Local actions and adaptations by communities</p>	<ul style="list-style-type: none"> • People are experienced with hazards, so they know to pack food and clothes and use tarpaulin for shelter when needed. However, not much preparation is made in terms of securing water • People affected by floods move to schools, temples, public buildings, and neighbouring houses • Communities usually know of safer locations at higher elevations that they can go to if flooding affects their neighbourhood • Water user committees usually clean water sources and repair damage to water supply schemes (as per the availability of funds and resources)

Figure 2: Intermediate outcomes for achieving sustainable rural water supply services for all¹²

WASH governance and regulation

- Integrate climate resilience objectives into strategic rural water development plans.
- Determine budget needs for funding climate resilient activities, including preparing for climate hazards and funding disaster recovery.
- Ensure national policies and strategies relating to climate change, water, and gender and social inclusion are disseminated and familiar to rural municipality staff.

Performance of implementers

- Support implementers to install protection measures like trenches for diverting surface runoff or bamboo plantations upstream of water sources.
- Work with implementers to identify climate risks to the technologies they are installing, and ensure that standards for materials and installation techniques account for severe climate hazards.
- Consider implementing technologies, like rainwater harvesting systems and conservation ponds, to augment primary water supplies to help with water scarcity in the dry season.

Performance of operators

- Provide training to water supply operators on climate resilient water safety planning.
- Develop training guidelines for water user committees on what to do before, during and after a climate hazard occurs to ensure the continued functionality of water supplies.

Post-construction support mechanisms

- Provide early warning systems – and the means for operators and users of water services to access them –so people know when to prepare for incoming extreme weather.

Behavioural change communication

- Advise households on what they should do before, during, and after climate hazards to secure safe water for their families.

¹² SNV's integrated rural water approach, Area-wide Rural Water Supply Services (ARWSS), ensures sustainable access to water supply that is responsive to the needs of changing communities, across districts. In pursuit of this, SNV contributes to the creation of economies of scale to increase the financial viability of water supply delivery. Read more about ARWSS here: <https://snv.org/cms/sites/default/files/explore/download/arwss-capability-statement.pdf>

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Beyond the Finish Line – Inclusive and Sustainable Rural Water Supply Services

BFL – Inclusive and Sustainable Rural Water Supply Services in Nepal aims to improve the health, gender equality and social inclusion, and well-being of 40,000 people in the rural districts of Dailekh and Sarlahi by supporting inclusive, sustainable and resilient rural water supply services and hygiene promotion.

The Beyond the Finish Line programme in Nepal is funded by the Australian Government's Water for Women Fund.

SNV

SNV is a not-for-profit international development organisation that makes a lasting difference in the lives of people living in poverty by helping them raise incomes and access basic services. Focusing on three sectors – Agriculture, Energy and WASH – SNV has a long-term, local presence in over 25 countries in Asia, Africa and Latin America.

ISF-UTS

The Institute for Sustainable Futures at the University of Technology Sydney (ISF-UTS) works with industry, government and the community to develop sustainable futures through research and consultancy. ISF-UTS seeks to adopt an inter-disciplinary approach to its work and engage partner organisations in a collaborative process emphasizing strategic decision-making.

Photos

P1: Climate change-related FGD with women groups representing households living in poverty (Sangita Adhikar)

P2: Climate change-related FGD with the Tunigaira Water User Committee of Mahabu Dailekh (Sangita Adhikar)



ISF-UTS and SNV, 'Climate change and rural sanitation in Nepal: taking stock', *Learning brief*, The Hague, SNV, 2021.

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