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# Proposed water and sanitation sector targets

## For Nepal's enhanced nationally determined contribution 2020

November 2020



**Government of Nepal**

**Ministry of Water Supply**

**PROPOSED WATER AND SANITATION SECTOR TARGETS  
FOR  
NEPAL'S ENHANCED NATIONALLY DETERMINED CONTRIBUTION 2020**

Submitted to

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by

Ministry of Water Supply leading to inclusion of Sanitation Targets in the Nationally Determined Contribution for  
Nepal in December 2020

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# LIST OF ACRONYMS AND ABBREVIATIONS

BAU	Business As Usual
DWSSM	Department of Water Supply and Sewerage Management
Gg	Giga gram
GHG	Green House Gas
IPCC	Intergovernmental Panel on Climate Change
MLD	Million Liter per Day
MOFE	Ministry of Forests and Environment
MOWS	Ministry of Water Supply
NDC	Nationally Determined Contribution
NDC+	Enhanced Nationally Determined Contribution
WASH	Water, Sanitation and Hygiene

1 USD = 113.65 NPR (February 2020)

## 1. Background and Context

Water and sanitation services, both in Nepal and globally, are vulnerable to the impacts of climate change. Water borne disease is identified as one of the climate sensitive diseases <sup>1</sup>. In addition, sanitation services, when incorrectly managed, increases the emission of greenhouse gases from the sector. As such, managers and agencies in the water, sanitation and health (WASH) sector need to adequately consider climate change responsibilities. Similarly, climate change policy and planning needs to duly integrate water and sanitation sector issues and projects.

In particular, the increased vulnerability of the water and sanitation sector to climate change is the result of:

- Increased variability in the water cycle, inducing extreme weather events such as floods, storms, draughts, and heavy rainfall
- Reduced predictability of water availability, undermining the functionality of water and sanitation systems
- Decreasing water quality, threatening the availability of safe drinking water and sanitation<sup>2</sup>

On this last point, water resource quality is deteriorating globally. Over 1.8 billion people currently consume fecal contaminated water. In Nepal, water sources of 75.3 % population have been tested positive with *E. coli* contamination; and 85.1% population have been consuming drinking water contaminated with *E. coli* <sup>3</sup>. Poor sanitation compounded by rising temperatures and receding levels of receiving waters to dilute fecal contaminated wastewater will increase public health risks with increasing temperatures due to climate change<sup>4</sup>. These trends are observable globally, as well as in Nepal.

## 2. Connections Between Climate Change and WASH

### *Adaptation and WASH*

According to the Stockholm Environment Institute, “climate change will strike water resources hard. By 2050, many countries simply will not have enough water to meet their basic needs, and some are already struggling. Global climate change has made water sources vulnerable to deplete or dry out rendering water services inadequate or defunct. As per the survey done by Department of Water Supply and Sewerage Management (DWSSM), one third of the water supply projects in Nepal is not functional and climate change is identified as one the critical reason behind this. <sup>5</sup> In other cases, disasters like floods and landslides triggered by heavy rains will lead to contaminated drinking water and public health crises like cholera or typhoid outbreaks”<sup>6</sup>.

The intensity and duration of floods in Nepal, especially in the Terai during the monsoon, have increased drastically over recently years. These affect several districts and provinces, resulting in yearly cases of cholera, especially in urban areas,

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<sup>1</sup> Enhancing NDCs: A Guide to Strengthening National Climate Plans by 2020 <https://www.ndcs.undp.org/content/ndc-support-programme/en/home/impact-and-learning/library/ndc-enhancement-guide0.html>

<sup>2</sup> Climate Change and Water UN-Water Policy Brief, 2019 <https://www.unwater.org/publications/un-water-policy-brief-on-climate-change-and-water/>

<sup>3</sup> UNICEF, MICS, 2019

<sup>4</sup> Climate Change and Water and Sanitation: Likely Impacts and Emerging Trends for Action

Guy Howard, Roger Calow, Alan Macdonald, and Jamie Bartram

<sup>5</sup> National WASH Management of Information System (NMIP) 2918

<sup>6</sup> <https://www.sei.org/featured/sanitation-stepping-stone-climate/>

including the Kathmandu Valley. In 2015 and 2016, the incidence of cholera cases in Kathmandu Valley reached 150 cases<sup>7</sup>.

Cost-effective adaptation measures are available in the sanitation sector. A report by the World Health Organization and the Department for International Development<sup>8</sup> notes that waste and sanitation systems that use less water can be well adapted to climate change and demonstrate higher resilience. The Ministry of Water Supply (MOWS) and the Department of Water Supply and Sewerage Management (DWSSM) have adopted water source conservation, rain water harvesting, ground water recharge, water optimization and multiple use of water, as part of a principle of integrated water resource management in the core working strategy. DWSSM has also drafted guidelines for addressing disaster risk management (DRM) and climate change within the water and sanitation sector.

### *Mitigation and WASH*

Processes by which wastewater, fecal sludge and solid waste are managed all contribute to the emission of greenhouse gases. Since the 1990s, greenhouse gas emissions have been increasing by a rate of around 4% per year, according to Nepal's Second National Communications.

Estimates of greenhouse gas emissions from sanitation are included in the waste sector in the Second National Communication Report of Nepal. For example, in the baseline year 2000/01, the estimated total methane emissions from the waste sector were comprised as follows:

- 73% of the waste sector's total emissions were from solid waste,
- 20% of the waste sector's total emissions were from domestic and commercial wastewater handling
- 7% of the waste sector's total emissions were from industrial wastewater

Beyond methane, which is the principle greenhouse gas emitted from the waste sector, the processing of human sewage also releases nitrous oxide (N<sub>2</sub>O), a gas that is particularly deleterious. In the base year 2000/01, the estimated amount of N<sub>2</sub>O emission from human sewage was 1.19 Gg.

Septic tanks that are not regularly emptied tend to release an increased quantity of methane, according to the IPCC. Furthermore, using fecal sludge as a feedstock for compost, can reduce the need for Nepal to import chemical fertilizer, which reduces transport-related greenhouse gas emissions. As such, mitigation measures to reduce greenhouse gas emissions from Nepal's current sanitation system, involve proper septic tanks and containment design, proper treatment of wastewater and fecal sludge, together with frequent emptying of the septic tanks.

### *Policy Connections*

The Government of Nepal has put in place a range of policies, plans and guidelines related to the water and sanitation sector. Many of these mention the need to protect water resources in order to support climate change adaptation. The policies, plans and guidelines outlined in Table 1 all include important climate change considerations.

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<sup>7</sup> <https://wedc-knowledge.lboro.ac.uk/resources/conference/40/Kansakar-2740.pdf>

<sup>8</sup> WHO. 2018. Guidelines on Sanitation and Health.

**Table 1. Water and Sanitation Policy and Climate Change Connection**

WASH Sector Policies, Plans and Guidelines	Linkage with Climate Change
National Sanitation and Hygiene Master Plan, 2011	<ul style="list-style-type: none"> <li>• It addresses the importance to promote water conserving sanitation technologies and awareness campaigns linked as an adaptation to climate change</li> <li>• Highlights that the regular research and development activities will provide proper guidance for selection of mitigation/adaptation measures to cope with the climate change impacts in the sanitation and hygiene sector</li> </ul>
WASH Sector Development Plan (Draft)	<ul style="list-style-type: none"> <li>• The document views the sector from the adaptation and resilience perspective and emphasize that WASH sector is on the sector with huge impact from climate change.</li> <li>• It recommends strategic actions to enhance the adaptation against climate change (source conservation, enhancing use of solar pumps, rainwater harvesting, etc.) and also emphasize the exploration of innovative ways to address it.</li> <li>• It indicates the need of defining climate risk and addressing them in planning, implementation and monitoring of WASH program.</li> <li>• The documents high lights the investments from Climate finance as one of the potential funding schemes for WASH Sector</li> </ul>
Total Sanitation Guideline 2017	<ul style="list-style-type: none"> <li>• Climate change has been mentioned as one of the cross-cutting elements in the document. It recommends the sector to plan the water and sanitation programs from the perspective of climate change and also focuses on more research and development to establish the clear linkages.</li> <li>• It also recommends the sector to reform any existing policies if required to address from the aspects of climate change.</li> </ul>
WASH Bill (submitted to the cabinet)	<ul style="list-style-type: none"> <li>• Source conservation is prioritized in the document</li> </ul>
Disaster Risk Management Guidelines (submitted to MOWS for finalization) (Draft)	<ul style="list-style-type: none"> <li>• Guiding document on WASH sector's resilience to disaster risk and climate change</li> </ul>

In Nepal, the WASH sector is one of the sectors which is highly impacted by climate change. Thus, many of the existing WASH documents have addressed the building up of WASH sector towards being more climate resilient. WASH sector development plan mentions strategies and ideas to make the sector more climate adaptive. However, it also needs to be well noted that good practices of WASH especially sanitation can also reduce greenhouse gases. At present context, due to data gap in the sector, the actual quantification is a bit challenged.

### 3. WASH Targets for Nepal's Enhanced NDC

#### Current National WASH Targets

The water, sanitation and health (WASH) sector has prioritized climate change as an integral element of its process for implementing sectoral targets. WASH sector targets are based on Sustainable Development Goals (SDG) targets and 15<sup>th</sup> Five-Year National Socioeconomic Development Plan.

**Table 2. WASH Sector Targets**

Target Base Document	Targets	Climate Chance Linkage
<b>Sustainable Development Goals Nepal</b>	Under SDG 6, to be achieved by 2030 <ul style="list-style-type: none"> <li>• 99 percent household access to basic water supplies.</li> <li>• 95 percent of households have access to a piped water supply and improved sanitation.</li> <li>• All communities are open defecation free (ODF).</li> <li>• All urban households are connected to a sewerage system.</li> <li>• 90 % of industrial wastewater treated</li> </ul>	Prioritizes WASH sector's implementations to climate resilience and supports the emission reduction through wastewater and fecal sludge management
<b>15<sup>th</sup> Year Plan Approach Paper</b>	To be achieved by 2022/23 <ul style="list-style-type: none"> <li>• Increase population with access to basic water supply 88% to 99%; and increase population with access to improved water supply from 20% to 40%.</li> <li>• All the ODF declared areas to move forwards towards total sanitation; 20% of wastewater generated being treated before discharge</li> </ul>	

#### The Contribution of WASH Programs to Climate Change

Given the above national targets, the WASH sector is increasingly implementing projects and programs that deliver significant climate change mitigation and adaptation benefits. In particular, many of the programs of the sector are focused on improving climate resilience.

Climate resilient water safety plans have already been rolled out as integral part of new and existing water supply systems, as an initiative to enhance water quality to meet national standards as well as enhance the functionality and sustainability of the water supply system over the long term. The WASH sector has initiated programs on climate change and natural hazard insurance in a range of larger water supply schemes in order to make these systems and the communities depending on them more resilient. The MOWS has also prioritized wastewater, fecal sludge and solid waste management (as integrated component of water supply and sanitation) within the 15<sup>th</sup> Five Year Plan period, and this will be continued through 16<sup>th</sup> Five Year Plan period. Some of these programs specifically prioritize the re-use of treated waste and build linkages with the cleaner renewable energy sector (like biogas) and agriculture sector (organic fertilizer), in order to valorize sanitation wastes and markets. This initiative will not only support the reduction of greenhouse gas emissions from the waste sector but also support in the reduction of emission that comes from the transportation from import of liquified petroleum gas (LPG) and chemical fertilizers into the Nepal. In addition, the fostering of products such as biogas reduce in biomass consumption, and associated emissions. The WASH sector's prioritization on climate agenda is presented in Table 3 below.



**Table 3 WASH Sector’s prioritization on Climate Agenda**

<p><b>Adaptation</b></p> <ul style="list-style-type: none"> <li>• Source protection, conservation and Water Optimization (Groundwater Recharge, Rainwater harvesting)</li> <li>• Prioritization of water stressed areas</li> <li>• Prioritization of multiple use of water source</li> <li>• Natural disaster and climate Insurance of some water supply systems</li> <li>• Consideration of climate resilience as key component during the design of the water supply system</li> <li>• Better and sustainable excess to the quality water</li> <li>• Better water quality prevents disease outbreak</li> <li>• Prevention of pollution and disease outbreak</li> <li>• Climate resilience Sanitation Safety Plans</li> </ul>
<p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Support in reduction on GHG emission from otherwise haphazard disposal of fecal sludge, solid waste and wastewater</li> <li>• Support in production of cleaner energy from sanitation product (biogas, briquettes, etc.)</li> <li>• Support in climate resilient agriculture by producing organic fertilizer, reduction of transportation related GHG emission with locally produced organic fertilizer.</li> <li>• Support in reduction on GHG emission that is otherwise generated from the import of liquified petroleum gas (LPG) and chemical fertilizers</li> </ul>

*WASH Activity Targets for the Enhanced NDC and Associated Costs*

Given the above contributions of WASH sector projects to climate change mitigation and adaptation, Table 4 outlines key targets which the Ministry of Water Supply proposes to have included in the enhanced NDC. In line with emerging good practice, these targets are structured as ‘NDC’ and ‘NDC+’. The former are targets which the Government of Nepal expects to deliver as part of its current plans and objectives, using internal resources. ‘NDC+’ refers to conditional targets for which the Government of Nepal would seek additional international climate financing in order to implement.

Table 4. WASH Sector NDC Targets Through to 2025

	2021-2025				
	Total Installed Units*	Investment Cost (NPR)	Investment Cost (USD)	Target for NDC	Target for NDC+
Climate resilient water supply project	55	38 billion	0.3 billion	Yes	Yes
Water supply through bulk distribution and impounding modality for the sustainable regular access to water	2	42 billion	0.4 billion	Yes	
Sustainable water supply project through utility upgradation	36	2.2 billion	19 million	Yes	Yes
Water supply and sanitation project through co-financing mechanism in targeted municipalities	95	23 billion	0.2 billion	Yes	Yes
Small town water supply and sanitation project – Third phase program	20	2.3 billion	20 million	Yes	
Urban water supply and sanitation project in targeted municipalities	20	23 billion	0.2 billion	Yes	
Wastewater and fecal sludge management linking with promotion of by-product like biogas and/or organic fertilizer	85	55 billion	0.4 billion	Yes	Yes
Integrated water supply project (water, sanitation and solid waste)	18	55 billion	0.5 billion	Yes	Yes
Kathmandu valley wastewater management project	5**	25 billion	0.1 billion	Yes	
Bagmati River Basin Improvement Project-Additional Fund (BRBIP-AF) (Integration of Tukuca river)	1	3.5 billion		Yes	

\*Total new units installed or procured during the five-year period. This figure does not include units installed during earlier periods.

\*\* These are expected to be conventional wastewater treatment plants

	Targets contributing to Adaptation
	Targets contributing to Adaptation and Mitigation

**Table 5. Total Investment Required for NDC and NDC+ (FY 2021 – 2025)**

	Investment Required for NDC (NPR)	Investment Required for NDC+ (NPR)	Total Investment (NPR)
Mitigation Investment Costing	89 billion	76 billion	165 billion
Adaptation Investment Costing	103 billion	4 billion	107 billion
Total	192 billion	80 billion	272 billion

As per the tentative estimates for the WASH sector plan for the 16<sup>th</sup> period plan period, the budget requirement is around NRR 440 billion and the funding sources is yet to be ascertained.

#### *WASH Activity Targets and GHG Emissions Estimates*

Based on the population that would be benefitted from the NDC and NDC+ target projects on wastewater treatment and fecal sludge management, tentative GHG emission reduction have been calculated.

- By 2025, 20 % of wastewater generated (380 MLD) will be treated before discharge that will be generated by 6.6 million people.
- By 2025, 60 cubic meter per year of fecal sludge will be managed safely which will be generated by 1.5 million of people.

Estimates in GHG emission reductions, following the latest IPCC methodology and guidelines (UNFCCC 2019 Refinement to the 2006 IPCC Guidelines) and using the 2019 UNFCCC tool for waste are summarized in Table 6. The same standard variables were used as those indicated in in the third communication for Nepal where applicable. The variables used were: I) per capita protein consumption is 24.09 II) the removal fraction of 0.8 was applied to populations with “Tertiary treatment” populations as suggested by the UNFCCC 2019 Refinement to the 2006 IPCC Guidelines - Chapter 6 Table 6.10c III) Population projections from the official Go Nepal figures<sup>9</sup> The emission reduction effect of the proposed NDC and NDC+ targets can be seen in figure 1.

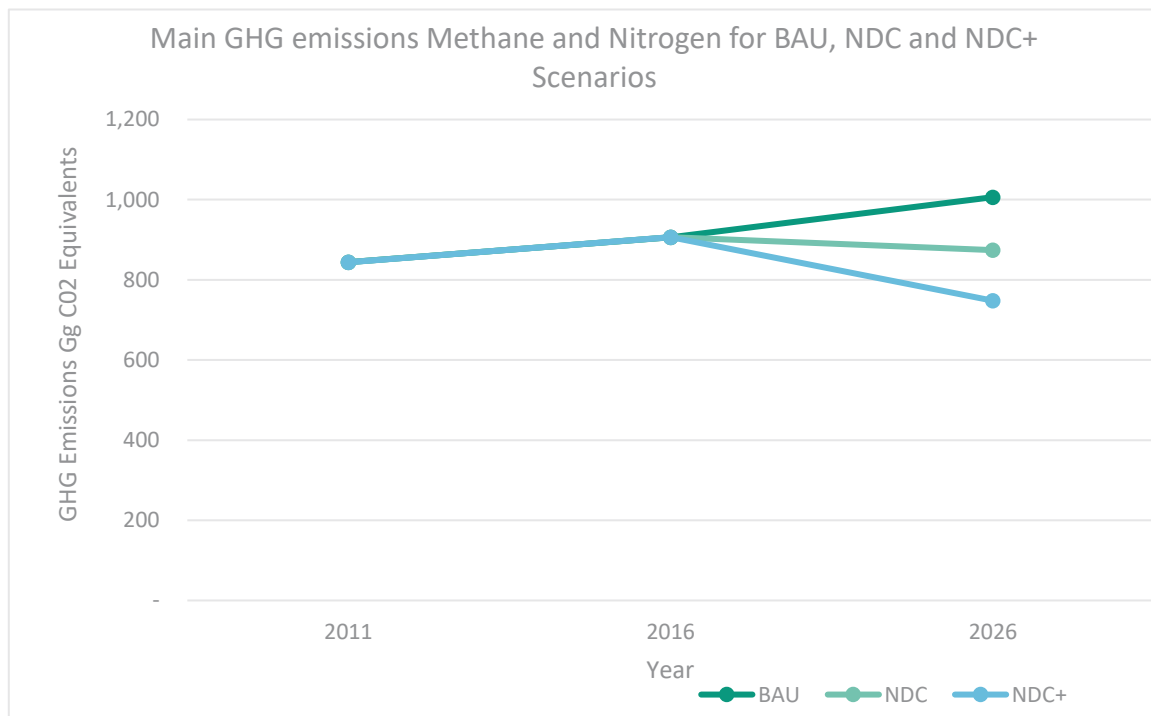
**Table 6: Main GHG Emissions for Domestic Wastewater**

Main GHG Emissions (Methane and Nitrous Oxide) for Domestic Wastewater			
	2011	2016	2026
BAU	844.16	906.45	1006.30
NDC	844.16	906.45	874.00
NDC+	844.16	906.45	748.00
GHG Emission reductions for NDC and NDC + scenarios			
	2011	2016	2026
NDC	0.0%	0.0%	13.1%

<sup>9</sup> Population source : <https://cbs.gov.np/wp-content/uploads/2018/12/PopulationProjection2011-2031.pdf>

NDC +	0.0%	0.0%	25.7%
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**Figure 1: Main GHG emissions methane and nitrogen for BAU, NDC and NDC+ scenarios**



The calculation shows that based on the sanitation projects planned by the WASH sector, the sector could foresee the reduction in the GHG emission of 13.1% (132 Gg CO2 Equivalent) with the achievement of NDC targets and around 25.7% (258 Gg CO2 equivalent) reduction in emission with the achievement of NDC+ targets.

WASH policy targets for Enhanced NDC:

To enhance these linkages, following interventions identified in Table 7 below are recommended.

**Table 7: Climate Change Arguments/Gaps and Interventions**

Climate Change Argument	Gaps and Interventions
Climate Change Adaptation	<ol style="list-style-type: none"> <li>1. Sector needs to increase the adaptation through integration of climate risk assessment mechanisms into the WASH (especially Sanitation) program planning and implementation cycles</li> <li>2. Presently sector do not monitor WASH sector from the climate perspective. Thus, mainstreaming indicators related to climate change into WASH sector's planning and monitoring framework will institutionalize the collection of climate related data.</li> <li>3. At present there is data generation gap in WASH sector to show outright evidence on climate issues and impacts. Enhancing data readiness of WASH sector with respect to climate change adaptation impacts will support the WASH sector in generating such data.</li> </ol>

<b>Climate Change Mitigation</b>	1. Mitigation from WASH could be taken as co-benefit to address the climate issues. WASH sector brings about reduction of greenhouse gases if green sustainable sanitation management is practiced. There is data generation gap in WASH sector to show outright evidence on climate issues and impacts. Enhancing data readiness of WASH sector with respect to climate change mitigation impacts will support the WASH sector in generating such data.
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*WASH policy targets with respect to Climate Change:*

1. Integration of climate risk assessment mechanisms into the WASH program planning and implementation cycle.
2. By 2025, mainstreaming indicators related to climate change into WASH sector’s planning and monitoring framework to make it climate resilient
3. Ensuring multisectoral coordination in activities to amplify adaptation/mitigation benefits
4. Enhance data readiness of WASH sector with respect to climate change issues and impacts. For e.g.:
  - From adaptation aspect:
    - a. Establish water quality monitoring data as indicator to capture climate change impact
    - b. Establish water borne disease prevalence data as indicator to capture climate change impact
  - From mitigation aspect:
    - a. Mainstream the system to calculate GHG emission as one of the criteria to be for all sanitation related projects (Fecal sludge Management and Wastewater Management)

These policy targets could be integrated into new WASH policy documents, Sector Development Plan (SDP) review, National WASH MIS (Management of Information System).

Report prepared as a deliverable of the project “Promoting city-wide inclusive sanitation through the Climate Resilience and Green Growth agenda” with financial support of the Bill and Melinda Gates Foundation