Climate and Disaster Risk Screening Report for Hypothetical Water Supply and Sanitation Services Project in Bolivia

Table 1: Project Information

Project Title:	Hypothetical Water Supply and Sanitation Services Project
Project Number:	P12345
Assessment completed by:	Cristina
Estimated timeline for PCN Year:	2017
Estimated timeline for PCN Quarter:	Q3
Screening Tool Used:	In-depth screening

The Climate and Disaster Risk Screening Tool provides high-level screening to help consider short- and long-term climate and disaster risks at an early stage of project design. The tool applies an Exposure–Impact–Adaptive capacity framework to characterize risks (Annex 1). Potential risks are identified by connecting information on climate and geophysical hazards with users' subject matter expertise of project components (both physical and non-physical) and understanding of the broader sector and development context.

The tool does not provide a detailed risk analysis. Rather, it is intended to help inform the need for further consultations, dialogue with local and other experts and analytical work at the project location to strengthen resilience measures in the course of project design.

[1] This is the output report from applying the World Bank Group's Climate and Disaster Risk Screening Project Level Tool (Global website:climatescreeningtools.worldbank.org; World Bank users: wbclimatescreeningtools.worldbank.org). The findings, interpretations, and conclusions expressed from applying this tool are those of the individual that applied the tool and should be in no way attributed to the World Bank, to its affiliated institutions, to the Executive Directors of The World Bank or the governments they represent. The World Bank does not guarantee the accuracy of the information included in the screening and this associated output report and accepts no liability for any consequence of its use.

Summary Climate and Disaster Risk Screening Report

1. Exposure of the project location : This step assesses the current and future exposure of the project location to relevant climate and geophysical hazards.

Exposure ratings for climate and geophysical hazards that are likely to be relevant to the project location both in the present and in the future:

	Climate Change Hazards			Geophysical Hazards
	Extreme Temperature	Extreme Precipitation and Flooding	Drought	Earthquake
Current				
Future				

2. Impacts on the project's physical components: This step assesses the current and future impacts of identified climate and geophysical hazards on the project's physical components as currently designed under relevant subsectors.

	Impact	
	Water Supply	**Wastewater**
Current		
Future		

3. Adaptive Capacity: modulating effect of the project's non-physical components and development context : This step assesses how the project's soft components as currently designed, together with the project's broader development context, modulate potential impacts from climate and geophysical hazards. This step also considers particularly vulnerable groups, namely women, migrants and displaced populations.

Modulation of impacts by the project's soft components

Reduce Risk

Capacity Building, Training and Outreach
Emergency Planning
Maintenance and Operations
Data Gathering, Monitoring and Information Management Systems

Modulation of impacts by the project's water sector context

Increase Risk

Modulation of impacts by the project's social, economic and political factors

Increase Risk

Women identified as particularly vulnerable to impacts from climate and geophysical hazards

Components designed to help alleviate the risks to women from climate and geophysical hazards

4. Risk to the outcome/service delivery of the project : This step assesses the level of risk to the outcome/service delivery that the project is aiming to provide based on previous ratings.

Outcome/Service Delivery

	Water Supply	Wastewater
Current		
Future		

Key for risk ratings:

Insufficient Understanding	No Exposure No Potential Impact No Risk	Low Exposure Low Potential Impact Low Risk	Moderate Exposure Moderate Potential Impact Moderate Risk	High Exposure High Potential Impact High Risk

Guidance on Managing Climate Risks through Enhanced Project Design

By understanding which of your project components are most at risk from climate change and other natural hazards through initial screening, you can begin to take measures to avoid impacts by:

- Enhancing the consideration of climate and disaster risks early in project design.
- Using your risk screening analysis to inform follow-up feasibility studies and technical assessments.
- Encouraging local stakeholder consultations and dialogue to enhance resilience measures and overall success of the project.

Table 1 provides some general guidance based on the risk ratings for Outcome/Service Delivery, and Table 2 lists some climate risk management measures for your consideration. Visit the “Screening Resources" page of the tool for additional guidance and a list of useful resources.

Note: Please recall that that this is a high-level screening tool, and that the characterization of risks should be complemented with more detailed work.

Table 1: General Guidance Based on Risk Ratings for Exposure, Impact and Outcome/Service Delivery

Insufficient Understanding	Gather more information to improve your understanding of climate and geophysical hazards and their relationship to your project.
No/Low Risk	If you are confident that climate and geophysical hazards pose no or low risk to the project, continue with project development. However, keep in mind that this is a high-level risk screening at an early stage of project development. Therefore, you are encouraged to monitor the level of climate and geophysical risks to the project as it is developed and implemented.
Moderate Risk	For areas of Moderate Risk, you are encouraged to build on this screening through additional studies, consultation, and dialogue. This initial screening may be supplemented with a more detailed risk assessment to better understand the nature of the risk to the project.
High Risk	For areas of High Risk, you are strongly encouraged to conduct a more detailed risk assessment and to explore measures to manage or reduce those risks.

Table 2: Types of Climate Risk Management Measures for Typical Water Projects

OBJECTIVE	EXAMPLES
Increase water availability	• Develop redundant services to increase water capture and storage options, including rainwater harvesting and storage • Explore natural resource management approaches to increase storage in the watershed or break waves, such as establishment of mangroves • Develop new sources of water including reclaimed water • Integrate infrastructure for multiple uses at the household level to improve resilience to decreased rainfall from climate change and variability • Improve water-use efficiency by recycling water • Develop water conservation programs • Expand use of economic incentives including metering and pricing to encourage water conservation • Expand use of water markets to reallocate water to highly valued uses
Secure water quality	• Develop a source water protection strategy/plan that accounts for the impacts of low flow on the ability of natural systems to dilute and absorb pollutants • Investigate land use and waste management policies to improve source water quality • Develop a coastal aquifer protection strategy • Evaluate treatment options to improve water quality
Accommodate/Manage	• Develop redundant structures or services that can be relied upon if structures fail • Plan back-up power systems for treatment and pumping facilities • Increase inspection frequency to ensure structures are enduring climate change pressures • Design food risk-management plans with both ecosystem- and construction-based adaptation options

Protect/Harden	• Update design standards to integrate projected sea level rise and storm surge • Improve distribution system infrastructure • Update zoning codes for coastal land to establish natural buffer zones
Retreat/Relocate	• Evaluate improving, elevating, or moving treatment facilities to prevent overflows and inundation • Plan for community relocation
Build information collection and management systems	• Strengthen climate information systems, building on existing regional and national networks • Build capacity of national governments to harmonize data across regions • Build relevant national and/or regional research programs on the links between climate and water supply and sanitation (e.g. vulnerability index)
Strengthen policies, planning and systems	• Integrate climate information into system planning • Improve coordination of policies and programs across government agencies to address the additional pressures imposed by climate change • Foster integrated resource management with agriculture and energy • Improve finance for water systems that are more adaptive and better designed for a changing climate, including through private sector investment and incentives; ensure consideration of climate risk in financing approaches • Strengthen disaster planning and response for water infrastructure and water services • Improve training, education and outreach efforts and programs related to watershed protection, water demand, water sanitation, and other factors relevant to water-related climate impacts and adaptation

Sources: USAID Climate Risk Screening and Management Tools: Water Supply and Sanitation Annex; USAID Addressing Climate Impacts on Infrastructure; IPCC Technical Paper on Climate Change and Water

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1. Introduction

Building resilience to climate and geophysical hazards is a vital step in the fight against poverty and for sustainable development. Screening for risks from these hazards improves the likelihood and longevity of a project's success. The project level **Climate and Disaster Risks In-depth screening** provides early stage screening for climate and disaster risks at the concept stage of project development. The tool uses an **exposure - impact - adaptive capacity** framework to consider and characterize risks from climate and geophysical hazards, based on key components of a project and its broader development context.

This report summarizes the results of the screening process for Hypothetical Water Supply and Sanitation Services Project in Bolivia, which was applied to the following selected subsectors:

- ✔ Water Supply
- ✔ Wastewater

The potential risks flagged in this report were identified by connecting information on climate and geophysical hazards exposure with the user's subject matter expertise and understanding of the project components and sensitivity to rate the impacts. The In-depth screening does not provide detailed risk assessments, rather it flags risks to inform consultations, enhance dialogue with local and other experts, and define further analytical work at the project location.

This early stage screening can be used to strengthen the consideration of climate and disaster considerations in key components of the project design, including the physical aspects (e.g., dams and reservoirs, wastewater treatment plants, etc.) and soft components (e.g., capacity building of water managers, water resource planning and institutional strengthening at community level, hygiene promotion and education campaigns, etc.). The broader sectoral (e.g., appropriate water policies, emergency protocols are in place that enable the water authority to respond to natural disasters, etc.) and development context conditions (e.g., strong legal enforcement of water pricing policies, climate related early warning systems, etc.) could help modulate the risks to the delivery of the outcome/service level. The results of the screening are presented below, with supporting narrative to guide their interpretation.

2. Exposure of the Project Location to Climate and Geophysical Hazards

The table below presents a summary description of exposure to climate and geophysical hazards at the project location for the Current and Future time frames. Exposure to climate hazards is evaluated in two time frames, because past records are not necessarily indicative of future conditions.

The descriptions provide a summary of the key characteristics and some indication of the trends in exposure from each hazard, drawing on global, quality controlled data sets from the Climate Change Knowledge Portal (CCKP). It is useful, for example to understand the temperature range and the rate of annual or decadal increase in a region; or precipitation patterns for historical and future time frames and seasonality shifts. Understanding the trends of hazards is important as they act individually and collectively on components/subsectors of the project. Because geophysical hazards (such as earthquakes, tsunamis, landslides, and volcano eruptions) do not have associated future projections, exposure for those hazards is assessed only in the Historical/Current time frame.

Summary of Exposure to Climate and Geophysical Hazards at Project Location

Hazard	Time frame	Description of hazards for the project location
Extreme Temperature		
		Extreme temperatures are projected to increase by approximately 2C by 2060, especially during the dry months of may, June and July. The annual mean precipitation shows an increase of 22%. Winters are projected to be drier and summers wetter, which could result in increased floods and droughts. The risk is rated as High since projections clearly indicate an increase in extreme temperature and precipitation as well as intensified droughts for future decades.
Extreme Precipitation and Flooding		
		The annual mean precipitation shows an increase of 22%. Annual and monthly projected changes in days with rainfall higher than 20mm is projected to increase in the next decades leading to an increase in frequency of extreme precipitation. Thus the Future risk is set as High.
Drought		
		Extreme temperatures are set to increase in the future leading to projections for more intense and frequent drought period. The Future rating for drought is set as High.
Earthquake		Earthquake hazard is classified as high according to the information that is currently available. This means that there is more than a 20% chance of potentially-damaging earthquake shaking in the project area in the next 50 years.

Insufficient Understanding	Not Exposure	Slightly Exposed	Moderately Exposed	Highly Exposed

3. Impacts on the Project's Physical Components Under Relevant Subsectors

This section presents the detailed results of screening for relevant subsectors to the water project, including the project's investments in physical structures. The impact ratings are based on the exposure ratings and the understanding of the project's sensitivity by the user. Understanding the contribution of risks from the subsectors, both individually and collectively can help inform the process of dialogue, consultation, and analysis during project design.

Water Supply

The potential impact of climate and geophysical hazards on the project's water supply investments is rated based on exposure ratings for the location, and an understanding of the project's historical and future sensitivity to these risks. Please note that for this step, the tool is helping judge the effect these impacts may have on the investment, and the ability of the project to sustain and enhance water supply under a changing climate. Projected increases in temperature and the related increases in evapotranspiration make risks to water supply a significant concern in many countries. Even in areas where precipitation is expected to increase, water supply is often times still expected to decrease due to increases in evapotranspiration and greater runoff. Improved management of water resources, combined with better supply and demand management, is one approach to building resilience to these anticipated risks.
The ratings are based on expert judgment and an understanding of the local development context.

	Potential Impact	
	Current	**Future**
Water Supply		
Description of impacts		The starting point for this is the Current rating of low potential impact. Projections for extreme temperatures and rainfall are set to increase. There are also indications for future and more intense drought in the project location. Because of projected increases in heavy downpours, the potential impact in terms of physical damage increases to Moderate.

Insufficient Understanding	No Potential Impact	Low Potential Impact	Moderate Potential Impact	High Potential Impact

Wastewater

The potential impact of climate and geophysical hazards on the project's wastewater investments is rated based on exposure ratings for the location, and an understanding of the project's historical and future sensitivity to these risks. Please note that for this step, the tool is helping judge the effect these impacts may have on the investment, and the ability of the project to sustain and enhance wastewater systems under a changing climate. For example, many wastewater systems serving coastal populations will be at risk to sea level rise. Taking sea level rise (and storm surge) projections into consideration when planning new treatment plants and/or updating existing plants will help reduce the risk of flooding to this critical infrastructure.
The ratings are based on expert judgment and an understanding of the local development context.

	Potential Impact	
	Current	**Future**

Wastewater		
Description of impacts		The starting point for this is the Current rating of low potential impact. Projections for future and more intense droughts and heavy downpours will affect wastewater quality. The Future rating is set for Moderate.

Insufficient Understanding	No Potential Impact	Low Potential Impact	Moderate Potential Impact	High Potential Impact

4. Adaptive Capacity: modulating effect of the project's soft components and development context

The potential impact on key components/subsectors due to exposure from hazards is modulated by the project's non-physical components (enabling and capacity building activities). The right kind of capacity building measures could increase preparedness and longer-term resilience and reduced the risks. An understanding of larger sector and development context with respect to key modulating factors helps to assess the climate risks in terms of adaptive capacity. For example, in the water sector, access to water use monitoring technology and information may help reduce risks; while weak legal enforcement of water pricing policies may aggravate the risks.

In addition, vulnerable groups, namely women, migrants and displaced populations may be particularly affected by climate and disaster risks. Non-physical components can be designed to help alleviate the risks to women from climate and geophysical hazards.

The table below resents a summary description of the modulating effect the project's non-physical components and broader development context, which includes the water sector context and other social, economic and political factors.

Summary of Adaptive Capacity: modulating effect of the project's non-physical components and development context

Adaptive Capacity		
Modulation of impacts by the project's soft components ↓ Reduce Risk Capacity Building, Training and Outreach Emergency Planning Maintenance and Operations Data Gathering, Monitoring and Information Management Systems	**Modulation of impacts by the project's water sector context** ↑ Increase Risk **Modulation of impacts by the project's social, economic and political factors** ↑ Increase Risk	**Women identified as particularly vulnerable to impacts from climate and geophysical hazards** ✓ **Components designed to help alleviate the risks to women from climate and geophysical hazards** ✗

Description of modulating effects of non-physical components: The project has a significant focus on capacity enhancement, institutional strengthening, emergency preparedness for extreme weather events amongst other contingency plans and early warning systems. The project also includes the introduction and improvement of information management systems, hydraulic and hydrological models to assist in making utilities more climate resilient. Combined, these features will reduce the anticipated risks from climate and geophysical hazards.

Description of modulating effects of the water sector context: In the project country's water sector, the spatial distribution of water resources does not match population distribution throughout the country, resulting in significant water scarcity in the Altiplano and inter-Andean valley where two thirds of the country's population resides. In addition, water quality has deteriorated significantly in recent years. Even though the access to municipal water services has increased over the past decade, the quality of water service delivery remains a challenge, especially in areas facing water scarcity as measured in intermittent supplies. Combined, these factors increase the risks posed by climate and geophysical hazards.

Description of modulating effects of social, economic and political factors in the project country: Existing consumer tariffs cover in general the operation and maintenance cost of water and wastewater services, where the average water and wastewater tariff is higher than the operating cost per cubic meter of water sold. Yet, there is a large variation in tariffs and operating costs and the typical utility only collects about 82% of tis billed revenue. This combined increases the risk

5. Risk to the Outcome/Service Delivery of the Project

This section provides information on the level of risk to the outcome/service delivery that the project is aiming to provide based on previous ratings.

The actual ratings themselves, while instructive, should inform further consultations, dialogue, and future planning processes. Keep in mind that the greatest value of the tool is that it provides structured and systematic process for understanding climate and disaster risks.

5.1 Level of Risk by Subsector

Table a. below highlights the impact ratings on the project's components/subsectors, and the overall risk to the outcome/service level for both Current and Future time frames.

The ratings are derived on the basis of the hazard information, subject matter expertise, contextual understanding of the project, and modulated on the basis of adaptive capacity and the large development context of the water sector and country. The results indicate what components are most at risk. The results indicate where risks may exist within one or multiple components and where further work may be required to reduce or manage these risks. An ongoing process of monitoring risks, refining climate and other information, and regular impact assessment may also be appropriate.

Table a. Summary of Risk to Outcome/Service Delivery by Subsector

Sub-sector	Potential Impact		Non-Physical Components		Devlopment Context				Outcome/Service Delivery	
					Water-sector		Broader Context			
Time Frame	Current	future	Current	future	Current	future	Current	future	Current	future
Water Supply			↓ Reduce Risk		↑ Increase Risk		↑ Increase Risk			
Wastewater										

Insufficient Understanding	No Risk	Low Risk	Moderate Risk	High Risk

5.2 Level of Risk by Time Frame

Table b. below highlights draws attention to how climate impacts and risks shift from the Current to the Future time frame. Potential impacts to the subsectors are evaluated separately for the Current and Future time frames to capture changes in the exposure from climate hazards over time. For example, projections might indicate that temperature are likely to increase significantly, and the dry season may become longer. Both of these changes would affect wastewater quality concerns.

For investments with long operational lifetimes, such as physical infrastructure, considering future climate variability and change is critical to avoid “locking in” designs and features that are only suited to current climate. For example, treatment facilities can be inundated from sea level rise and storm surge or experience damage from earthquakes. Treatment plants might be more easily flooded, distribution pipes corroded and cracked, and pumping stations can fail from loss of pressure. These impacts may influence the success of the water supply investments.

Table b. Summary of Risk to Outcome/Service Delivery by Time Frame

	Current					future				
Sub-sector	Potential Impact	Non-Physical Components	Devlopment Context		Outcome/ Service Delivery	Potential Impact	Non-Physical Components	Devlopment Context		Outcome/ Service Delivery
			Water-sector	Broader Context				Water-sector	Broader Context	
Water Supply		↓ Reduce Risk	↑ Increase Risk	↑ Increase Risk			↓ Reduce Risk	↑ Increase Risk	↑ Increase Risk	
Wastewater										

Insufficient Understanding | No Risk | Low Risk | Moderate Risk | High Risk

5.3 Key Drivers of Risk

Table c. below highlights the key drivers of risk for each project subsector ratings, in terms of hazards that are likely to pose the greatest challenge.

The ratings for the potential impact for each subsector reflect the aggregate rating across multiple hazards, drawing on all of the exposure information and their own expert judgment. For example, high temperatures and drought can increase the demand for water, while greater rainfall may reduce demand from a dam or reservoir but also increase risk of flooding for downstream communities.

Table C. Key Drivers of Risk

	Historical/Current Drivers	Future Drivers
Hazards & Location	Extreme Temperature Extreme Precipitation and Flooding Drought Earthquake	Extreme Temperature Extreme Precipitation and Flooding Drought
Physical Components		Water Supply Wastewater
Outcome/Servicedelivery		Water Supply Wastewater

Key High Risk Moderate Risk

* If a cell is blank it implies there is 'No high or moderate risks 'identified for this aspects of the project.

Specific consideration should be given to those hazards which have high ratings, or are moving from moderate to high ratings over time. For example, sea-level rise may not be a key risk driver in the Historical/Current time frame; but may emerge as a key driver across multiple sectors in the future time frame. Understanding which hazards are key drivers may help flag follow-on work to manage climate risks within the design and delivery of the project.