Climate and Disaster Risk Screening Report for Edo State Water Supply Scheme in nigeria

Table 1: Project Information

Project Title:	Edo State Water Supply Scheme
Project Number:	003
Assessment completed by:	Ngozi
Estimated timeline for PCN Year:	2023
Screening Tool Used:	Rapid Screening Assessment

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 as an aggregate.

Exposure Rating

High

Climate and geophysical hazards that are likely to be relevant to the project location both in present and in the future

- Extreme Temperature
- Extreme Precipitation and Flooding

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

Impact Rating

Moderate

Relevant project subsectors

- Dams and Reservoirs
- Water Supply

3. Modulation of risks by the project's 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 risks by the project's soft components

Reduce Risk

Selected soft components

- Policy Development
- Long-term Strategic Planning
- Capacity Building, Training and Outreach
- Emergency Planning
- Maintenance and Operations
- Data Gathering, Monitoring and Information Management Systems

Modulation of risks by the project's development context

Reduce Risk

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

Yes

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

Yes

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.

Moderate

Notes from the Screening Process

1. Exposure of the project location

Exposure Rating	High

This step provides information on exposure to climate and geophysical hazards at the project location. **The Exposure rating is High.The project location has experienced climate and geophysical hazards in the past and is expected to experience these in the future with high intensity, frequency, or duration.** The rating is based on climate information drawing on global, quality controlled data sets from the Climate Change Knowledge Portal. 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 project components/subsectors.

TThe following guiding questions were used to assess exposure:

- What have been the historical trends in temperature, precipitation and drought conditions?
- How are these trends projected to change in the future in terms of intensity, frequency and duration?
- Has the location experienced strong winds, seal level rise, storm surge, and/or geophysical hazards in the past that may occur again in the future?

User Notes: According to ThinkHazard!, Edo State is at “High” exposure to risks associated with Extreme Precipitation & Floods and Extreme Heat. This means that potentially damaging and life-threatening urban floods are expected to occur at least once in the next 10 years. Mean annual precipitation has decreased in recent decades but the southern regions experience strong rainfall events during the rainy season from March to October with annual rainfall amounts above 2,000 mm and that can reach 4,000 mm and more in the Niger Delta. The proportion of precipitation that falls in heavy events is projected to increase by over 20% in the coming decades. In the project location, annual maximum monthly rainfall (10- yr return level) is expected to increase by 8.5mm by mid-century, while the rainfall on very wet days is projected to increase by almost 90%. Mean annual temperature in Nigeria is projected to increase by 0.77 (SSP1-2.6) to 1.19°C (SSP5-8.5) by 2050. All projections also indicate substantial increases in the frequency of ‘hot’ days and nights. ‘Hot’ days are projected to increase by 40 days (SSP5-8.5) by 2050 (days with Tmax greater than 35°C). The risk is rated as High since projections clearly indicate an increase in extreme temperature and precipitation as well as intensified flooding in future decades.

2. Impacts on the project's physical infrastructure and assets

Impact Rating	Moderate

This step provides an indication of the potential impacts of climate and geophysical hazards on the project's physical infrastructure and assets as currently designed under relevant subsectors. **The Impact rating is Moderate.Climate and geophysical hazards are likely to impact the structural integrity, materials, siting, longevity and overall effectiveness of your investments..** The impact rating is based on the exposure rating and the understanding of the project's sensitivity by the user. 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 physical infrastructures and assets under a changing climate. Understanding where risks may exist and identifying where further work may be required to reduce or manage these risks can help inform the process of dialogue, consultation and analysis during project design.

The following guiding questions were used to assess impact:

- Does the project design take into account recent trends and future projected changes in identified climate and geophysical hazards?
- Does the project design consider how the structural integrity, materials, siting, longevity and overall effectiveness of health infrastructure, if applicable, may be impacted?
- In particular, does the design “lock in” certain decisions for the future?

User Notes: The water scheme project activities include (a) rehabilitation of production facilities (b) construction and rehabilitation of treatment plants (c) three retention dams (d) building new/replacement of transmission lines (e) installation of water meters for a pre-paid system (f) rehabilitation and replacement of distribution infrastructure.

Extreme precipitation and floods put the projects’-built infrastructure at risk and may disrupt wastewater flows, leading

to contamination of the water supply source. The river water supply schemes may face further challenges due to climate change, such as increased variability and unpredictability of flow, which can damage or destroy dam infrastructure, more frequent and intense floods, higher water temperatures, and higher water demand resulting from extreme heat. These factors can reduce the availability, reliability, and safety of river water supply for human consumption and other uses. Extreme precipitation and floods also cause surface runoff and soil erosion, which can reduce the percolation of water into the ground and can damage or destroy spring catchments, pipelines, pumps, and storage tanks.

Extreme temperature can increase evaporation and transpiration thereby lowering the water table and reducing groundwater recharge and storage. This will affect the performance of spring and groundwater-fed projects. Extreme temperature can affect the temperature of spring water, which can affect the physical, chemical, and biological properties of spring and surface water. Increased water temperature can reduce the dissolved oxygen content, increase the solubility of minerals and gases, and enhance the growth of microorganisms affecting taste, odour, turbidity, pH, hardness, and microbial quality of the water sources. Extreme temperature can also cause thermal expansion and contraction of dam and groundwater infrastructure materials, resulting in cracks, leaks, or structural failures.

Despite a high level of exposure and possible impacts to project infrastructure and project beneficiaries, project activities, for example in respect of flood management, may help to reduce the risks posed by climate and disasters. The project's risk rating as currently designed is thus "Moderate"

3. Modulation of risks by the project's soft components and development context

This step provides information on how the potential impact on key components/subsectors due to exposure from hazards is modulated by the project's soft components and broader development context. In doing this, this step also takes into account particularly vulnerable groups including women, migrants and displaced populations

Modulation of risks by the project's soft components

Reduce Risk

This rating reflects how the project's soft components (enabling and capacity building activities) can modulate risks. The right kind of capacity building measures could increase preparedness and long-term resilience and reduce risk.

User Notes: Modulation of risks by the project's soft components

Non-physical components that increase preparedness and build management can boost resilience can help to reduce risk and include support for:

a. project management support to aid safeguard monitoring;
b. water resource, flood information, and early warning systems;
c. training, development of operation manuals, and provision of necessary equipment; and
d. institutional development for integrated management of river basins and water-related sectors.

Training programmes can also target female participation. Taken together, these components help to reduce identified risks.

Modulation of risks by the project's development context

Reduce Risk

This rating reflects how the larger development context, including sector context and other social, economic and political factors can modulate risks.

User Notes: Modulation of risks using the project's development context

Key relevant development that will further reduce risks posed by climate change include:

a. developing new sources of water as planned for the Auchi, Ewohimi, and Ugbalo Water Supply Schemes supplementing the current water sources;
b. use of economic incentives including metering and pricing to encourage water conservation;
c. evaluation of treatment options to improve water quality;
d. back-up power systems for treatment and pumping facilities;
e. increasing inspection frequency to ensure structures are enduring climate change pressures;
f. designing flood risk-management plans with both ecosystem- and construction-based adaptation options.

4. Risk to the outcome/service delivery of the

Outcome/Service Delivery Rating	Moderate

project

This step provides an indication of the level of risk to the outcome/service delivery that the project is aiming to provide. **The risk to the outcome/service delivery of your project is Moderate.** This rating is derived from hazard information, subject matter expertise, contextual understanding of the project, and modulated on the basis of the project's soft components and broader development context. Keep in mind that in considering resilience measures for risk management, each element of risk should be taken into account, not just the collective risk rating at the outcome/service delivery level.

User Notes: Overall, the project location is highly exposed to climate and disaster risks – particularly extreme heat, flooding and heavy precipitation (identified in Step 1). However, project activities for flood management, (see Step 2) non-physical project components that support capacity building, early warning systems, and greater institutional development for integrated river basin management will help to reduce risks posed by climate and disasters. Given the resilience measures included in the project through physical and nonphysical project components, the “High” exposure risk from the project location (Step 1) is lowered to an overall project risk rating at " Moderate."

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