# Climate and Disaster Risk Screening Report for Water Project in Vietnam: Hypothetical Water Project for Vietnam[1]

[1] This is the output report from applying the World Bank Group's Climate and Disaster Risk Screening Project Level Tool. 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.

# 1. Introduction

The project level **Climate and Disaster Risks Screening Tool** provides due diligence on climate and disaster risks at an early concept stage. The tool uses an **exposure - sensitivity - 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 (Annex 1). The tool helps inform consultation, dialogue, and further work to be done in the course of project design.

The results of applying the project level tool to screen for climate and disaster risks for "Hypothetical Water Project" in Vietnam are summarized below.

# 2. Climate and Disaster Risk Screening Results Summary

## 2.1 Project Information Summary

Table 1 below provides key project information.

**Table 1: Project information**

| Project Information | |
|---|---|
| **Title** | Hypothetical Water Project |
| **Number** | Hypothetical |
| **Region** | East Asia and Pacific |
| **Country** | Vietnam |
| **Type of Assessment** | Water Projects |
| **Purpose of Screening** | Screen a Project at the Concept Stage |
| **Current Project Phase** | Concept (Identification) |
| **Funding Source** | IDA |
| **Keywords** | Water resource management, Water supply, Riverine flood protection, Dams and reservoirs |
| **Location** | To be determined during project preparation and appraisal, taking into account the results of this screening process and associated data. |
| **Sub Sectors** | Dams & Reservoirs |
| **Outcome/ Service Delivery** | The project will select rehabilitation of dams based on an a priori agreed selection criteria, including the input from this Climate and Disaster Risk Screening Tool, aimed at prioritizing those interventions that address the risks within an explicit poverty and inequality framework. Prioritization will be based on the probability and impact of failure, both in terms of population impacted and socio economic infrastructure, including structural risks, hydrological risk, downstream hazard and economic benefits. These will be categorized further according to the level of readiness, to prioritize those within the set of dams ready for rehabilitation with detailed engineering designs and those requiring rehabilitation for which detailed designs are still required. Established procedures for prioritizing interventions include those developed by International Commission on Large Dams (ICOLD), and others. The project will also deliver significant soft components (as described earlier). |
| **Dams & Reservoirs** | This project will select priority dams and reservoirs to rehabilitate, and also facilitate the associated monitoring/information networks, integrated planning, regulatory and institutional upgrades, and safety policies and procedures. |

## 2.2 Summary of Exposure to Climate and Geophysical Hazards

Table 2 presents a summary description of exposure to climate and geophysical hazards at the project location for the Historical/Current and Future time frames. The Future time frame is based on changes projected to occur between the 1980-1999 average and a future average. This future average is most likely the 2040-2059 average (i.e., the default in the Climate Change Knowledge Portal - CCKP), but the range is dependent upon the specific time frame that the user applied using the CCKP or other climate information. Again, these descriptions, if based on information in the CCKP, may be supplemented by national data sets.

**Table 2: Summary of Exposure to Climate and Geophysical Hazards at Project Location**

| Hazard | Time Frame | Description of hazards for your location |
|---|---|---|
| **Extreme Temperature** | Current | Mean annual temperature has increased by 0.4°C since 1960, with the rate of increase more rapid in the dry seasons (November, December, January and February, March, April) and in the southern parts of Vietnam. The frequency of 'hot' days and nights has increased significantly since 1960 in every season, and the annual frequency of 'cold' days and nights has decreased significantly. |
| | Future | Mean annual temperature is projected to increase by 1 °C by 2050, with similar projected rates of warming for all seasons. Some studies indicate that similar warming is likely to occur across all regions, while others suggest that the country's southern climatic zone will experience smaller warming than the northern and north-central zones. A temperature rise of 1 °C is projected to increase the number of heatwaves by 100 to 180%, while the number of cold surges would decrease by 20 to 40%. Substantial increase is expected in the frequency of days and nights that are considered 'hot' under current climate, and decrease in the number of days and nights considered 'cold' under current climate. |
| **Extreme Precipitation and Flooding** | Current | Mean rainfall over Vietnam does not show any increase or decrease since 1960.The proportion of rainfall falling in heavy events has not changed significantly since 1960, nor has the maximum amount falling in 1-day or 5-day events. High year-to-year variation in rainfall across some regions of the country means that some areas that experience floods in rainy seasons can also experience drought in dry seasons. Intense rainfall associated with typhoons frequently causes immense destruction in heavily populated coastal areas as well as in the Red River and Mekong deltas, the country's major rice-growing areas. These deltas are also vulnerable to flooding caused by heavy monsoon rainfall. |
| | Future | Winter rainfall is expected to increase by 8% and summer rainfall by 1% by 2050. Autumn rainfall is projected to decline by 4% by 2050, while no change is projected for spring rainfall. The proportion of total rainfall that falls in heavy events is projected to increase by 2-14% by the 2090s, and the probability of extreme rainfall and flooding will increase, particularly in northern regions and cities such as Hanoi, with increased risk of landslides in mountainous areas. Projected increases in summer and winter rainfall, runoff, rainfall variability, and the proportion of rain falling in heavy events will have profound implications for flooding, both in coastal and deltaic areas as well as in hilly terrain, where flash floods and mudslides are a major risk. High inter-annual rainfall variability poses drought risk in many provinces at present. Projected increasing variability is likely to exacerbate drought risk. |
| **Drought** | Current | High year-to-year variation in rainfall across some regions of the country means that some areas that experience floods in rainy seasons can also experience drought in dry seasons. |
| | Future | High inter-annual rainfall variability poses drought risk in many provinces at present. Projected increasing variability is likely to exacerbate drought risk. |
| **Strong Winds** | Current | Exposed to strong winds associated with tropical cyclones |
| | Future | The maximum wind speed from tropical cyclones is expected to increase, but estimates are highly uncertain |
| **Tsunami** | Current | Coastal areas are slightly-moderately exposed to tsunamis |

## 2.3 Summary of Overall Project Risk

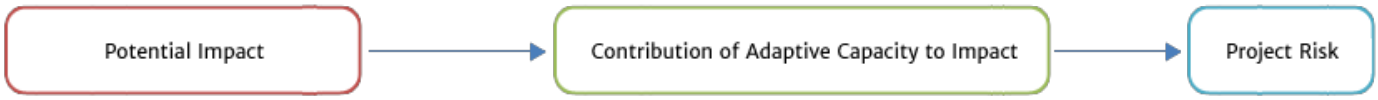
Tables 3A and 3B below summarize ratings for project components and/or project subsectors, and outcome/service level for *Historical/Current* and *Future* time frames. The ratings are derived on the basis of the hazard information, subject matter expertise, contextual understanding of the project, and the larger development context.

The results indicate where risks may exist and where further work may be required to reduce or manage these climate and geophysical risks. An ongoing process of monitoring risks, refining climate and other information, and regular impact assessment may also be appropriate.

### 2.3.1 Results Summary - by Component

Table 3A summarizes the ratings for the project. The results provide a characterization of risks caused by climate and geophysical hazard on project sub-sector and components. The potential impact due to exposure from hazards is modulated by the project's non-physical components (enabling and capacity building activities) and the larger development context to determine overall risk to the intended project outcome.

**Table 3A: Results Summary - by Component**




| Sub-sector | Potential Impact | | Non-Physical Components | | Development Context | | | | Outcome / Service Delivery | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Water Sector | | Broader Context | | | |
| Time Frame | Current | Future | Current | Future | Current | Future | Current | Future | Current | Future |
| Dams & Reservoirs | | | Data gathering, monitoring, and information management systems: Slightly Reduces Impact<br>Long-term strategic planning: Significantly Reduces Impact<br>Capacity building, training, and outreach: Significantly Reduces Impact<br>Overall: Significantly Reduces Impact | | Slightly Reduces Impact | | Prices (particularly food and energy): Significantly Reduces Impact<br>Education: Slightly Reduces Impact<br>Other ( ): Slightly Increases Impact<br>Overall: Slightly Reduces Impact | | | |

### 2.3.2 Results Summary by Time Frame

The matrix below depicted in Table 3B displays the same results as Table 3A, but does so by time frame.

**Table 3B: Results Summary - by Time Frame**

| | Current | | | | | Future | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Subsector | Potential Impact | Non-Physical Components | Development Context: Water Sector | Development Context: Broader Context | Outcome / Service Delivery | Potential Impact | Non-Physical Components | Development Context: Water Sector | Development Context: Broader Context | Outcome / Service Delivery |
| Dams & Reservoirs | | Data gathering, monitoring, and information management systems: Slightly Reduces Impact<br>Long-term strategic planning: Significantly Reduces Impact<br>Capacity building, training, and outreach: Significantly Reduces Impact<br>Overall: Significantly Reduces Impact | Slightly Reduces Impact | Prices (particularly food and energy): Significantly Reduces Impact<br>Education: Slightly Reduces Impact<br>Other ( ): Slightly Increases Impact<br>Overall: Slightly Reduces Impact | | | Data gathering, monitoring, and information management systems: Slightly Reduces Impact<br>Long-term strategic planning: Significantly Reduces Impact<br>Capacity building, training, and outreach: Significantly Reduces Impact<br>Overall: Significantly Reduces Impact | Slightly Reduces Impact | Prices (particularly food and energy): Significantly Reduces Impact<br>Education: Slightly Reduces Impact<br>Other ( ): Slightly Increases Impact<br>Overall: Slightly Reduces Impact | |

| | | | | |
|---|---|---|---|---|
| Insufficient Understanding | Not Exposed<br>No Potential Impact<br>No Risk | Slightly Exposed<br>Low Potential Impact<br>Low Risk | Moderately Exposed<br>Moderate Potential Impact<br>Moderate Risk | Highly Exposed<br>High Potential Impact<br>High Risk |

## 2.4 Key Drivers of Risks

Based on the results above, Table 4 highlights the key drivers of risks for each project component and/or subsector ratings. Specific consideration should be given to those which have high/moderate ratings. Note also the overall modulating effects of non-physical components and the broader development context to the project outcome.

**Table 4: Key Drivers of Risk**

| | Historical/Current Drivers | Future Drivers |
|---|---|---|
| **Hazards and Location** | Extreme Temperature<br>Drought<br>Strong Winds<br>Tsunami | Extreme Temperature<br>Extreme Precipitation and Flooding<br>Drought<br>Strong Winds |
| **Physical Components** | Dams & Reservoirs | Dams & Reservoirs |
| **Outcome / Service Delivery** | * | Dams & Reservoirs |

Key: High Risk  Moderate Risk 

* No high or moderate risks identified for this particular portion of the project.

- Overall, the Non-physical Components : **Significantly Reduces Impact**
- The Water Sector : **Slightly Reduces Impact**
- Overall, the Broader Development Context : **Slightly Reduces Impact**

## 3. Next Steps

Table 5A provides some general guidance on follow-up based on the risk ratings for the Outcome/Service Delivery. Table 5B lists some climate risk management measures for your consideration. Visit the "Next steps" page of the tool for guidance and a list of useful resources.

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

**Table 5A: General Guidance Based on Risk Ratings for Outcome/Service Delivery**

| | |
|---|---|
| **Insufficient Understanding** | Gather more information to improve your understanding of climate and geophysical hazards and their relationship to your project. |
| **No Risk** | If you are confident that climate and geophysical hazards pose no 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. |
| **Low Risk** | If you are confident that climate and geophysical hazards pose 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. You may also consider gathering additional information to increase your level of confidence in your rating. |
| **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 5B: Types of Climate Risk Management Measures for typical Water Projects**

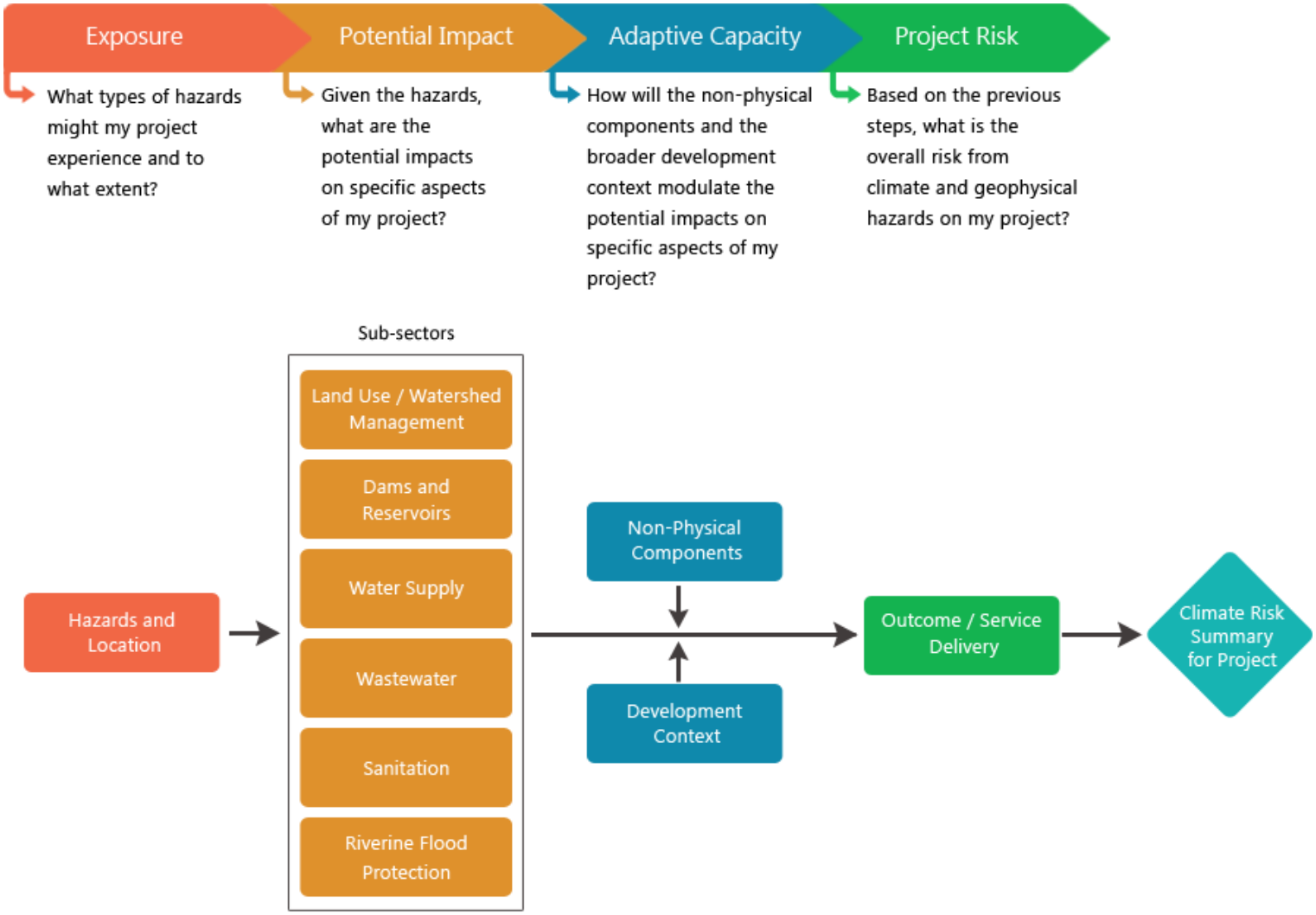
| CATEGORY | PROS | CONS | EXAMPLES |
|---|---|---|---|
| Accommodate and Manage | • Flexible<br>• Typically low-cost<br>• Useful when risk is low, but projected to rise in the future | • Temporary solution<br>• Can be insufficient in preventing losses | • Increasing repair and maintenance budgets<br>• Implementing demand-side management programs |
| Protect and Harden | • Can be used for existing and new assets<br>• Responds to immediate risks | • High cost<br>• Inflexible<br>• Effectiveness may decrease over time | • Expanding capacity of treatment plants<br>• Building flood protection structures around key facilities |
| Retreat and Relocate | • Long-term solution<br>• Responds to immediate risk | • High cost<br>• Inflexible | • Moving infrastructure further inland |

# Annex 1: Tool Approach

## Tool Approach

The framework below describes the approach taken to screen the project. Climate and natural hazards information used to screen the project is most likely obtained from the World Bank's Climate Change Knowledge Portal, which houses numerous global data sets with historical records and future projections as well as country-specific adaptation profiles.

**Figure 1: Project Level Climate and Disaster Risk Screening Tool: Approach for Water projects**



# Annex 2: Notes

Table A2-1 summarizes the sub-national locations of high risk noted during the assessment, if the user entered these sub-national locations. Table A2-2 summarizes all the notes entered by user for each section while completing the assessment, if the user elected to enter notes. These notes can help shed light on specific ratings as well as considerations and limitations of the user's expertise.

**Table A2-2 Summary of Comments by Section**

| Section | | Notes |
|---|---|---|
| **Hazards and Location** | Extreme Temperature | An estimated 1-1.3 million people are estimated to be drought-affected in 9 provinces of the Mekong region of Vienam, representing 13-17% of the total population. |
| | Extreme Precipitation and Flooding | Given its high exposure to floods and storms, and the fact that two of its most important economic sectors – industry and agriculture – are located in coastal lowlands and deltas – Vietnam has been listed by the World Bank as one of the five countries that will be worst-affected by climate change. |
| **Subsectors** | Dams & Reservoirs | In general, the dams and reservoirs in Vietnam are at risk from extreme weather events and will have a high potential for impacts from climate change in future. |
| **Non-physical Components** | Data gathering, monitoring, and information management systems | Project includes hydrological observation network and information systems |
| | Long-term strategic planning | It also includes the following related to planning, policy development, and safety: 1) integrated development planning and operational coordination mechanisms between irrigation and hydropower reservoirs; 2) regulatory and institutional support and strengthening on coordination mechanisms including national dam policy on registration, regulation, inspection, safety compliance and penalties; and 3) technical specifications, safety standards and regulations to internationally-accepted levels |
| | Capacity building, training, and outreach | The project has a significant focus on capacity enhancement, basin-wide integrated dam reservoir operation plans, emergency preparedness plan including dam break analysis, downstream flood mapping and benchmarking, awareness raising and evacuation drills for local communities living downstream; which also touches on improved emergency preparedness. |
| | Non-physical Components Overall | Combined, these features will reduce the anticipated potential impacts from climate change. |
| **Social, Economic and Political Factors** | Prices (particularly food and energy) | Vietnam has been ranked as one of the best-performing economies in the world over the past decade. Its economy has proven resilient to economic and other shocks; real GDP grew by an average of 7.3% per year over 1995-2005; the share of industry rose from 29% to 41% of GDP over the same period; and per capita income rose from US$ 260 in 1995 to US$ 835 in 2007. |
| | Education | Vietnam has made rapid progress in achieving several of the targets of the Millennium Development Goals, although poverty reduction is progressing at a slower pace for the country’s ethnic minorities. |
| | Other ( ) | Geographic concentration of assets: Given that a high proportion of the country’s population and economic assets (including irrigated agriculture) are located in coastal lowlands and deltas, Vietnam has been ranked among the five countries likely to be most affected by climate change. |
| **Outcome / Service Delivery** | Dams & Reservoirs | The non-physical components and development context combine to increase adaptive capacity and thus decrease the level of historical/current and future risk. |