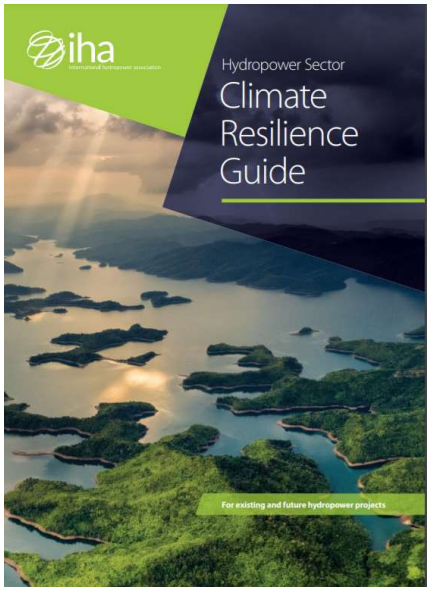
HYDROVISION INTERNATIONAL

CONNECTING THE GLOBAL COMMUNITY OF HYDRO VISIONARIES

IHA HYDROPOWER SECTOR CLIMATE RESILIENCE GUIDE

Mega Session - Climate Change: Opportunity, Risk and How Hydro can Adapt - HYDROVISION July 2024



Debbie Gray

Senior Energy Policy Manager,

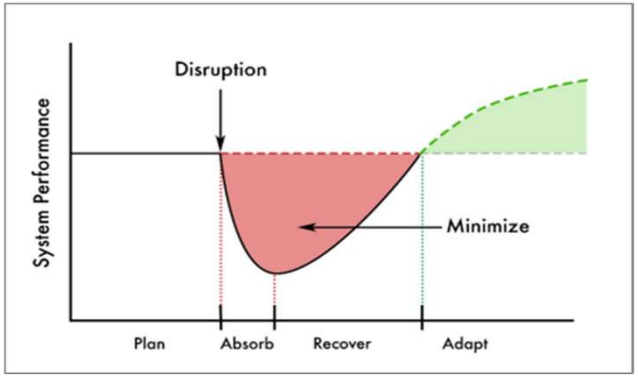
International Hydropower Association (IHA)

https://www.hydropower.org/publications/hydropower-sector-climate-resilience-guide

Objectives

Why do we need a guide?

- Hydropower projects worldwide are increasingly exposed to physical climate risks
- Need for capacity to absorb climate stresses, quickly recover from shocks and evolve into greater robustness => Climate Resilience
- Guide shall provide a practical approach for identifying, assessing and managing climate risks to enhance the resilience of new and existing hydropower projects.

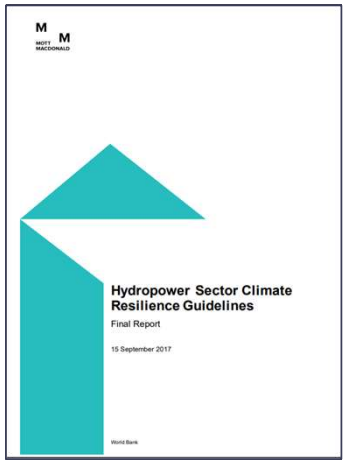


History of the Guide

Result of a 3-year process

2017: Beta Version

147 pages



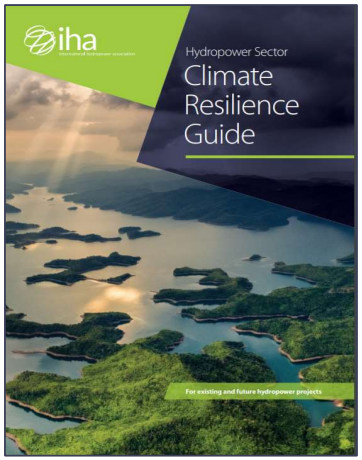
THE WORLD BANK

MOTT MACDONALD

Hydropower Stakeholder Group

2018: Refined Version

40 pages



THE WORLD BANK

European Bank for Reconstruction and Development

Advisory Panel

2019: Release

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A guide for the hydropower sector

Innovative methodology – Climate Risk Management Plan

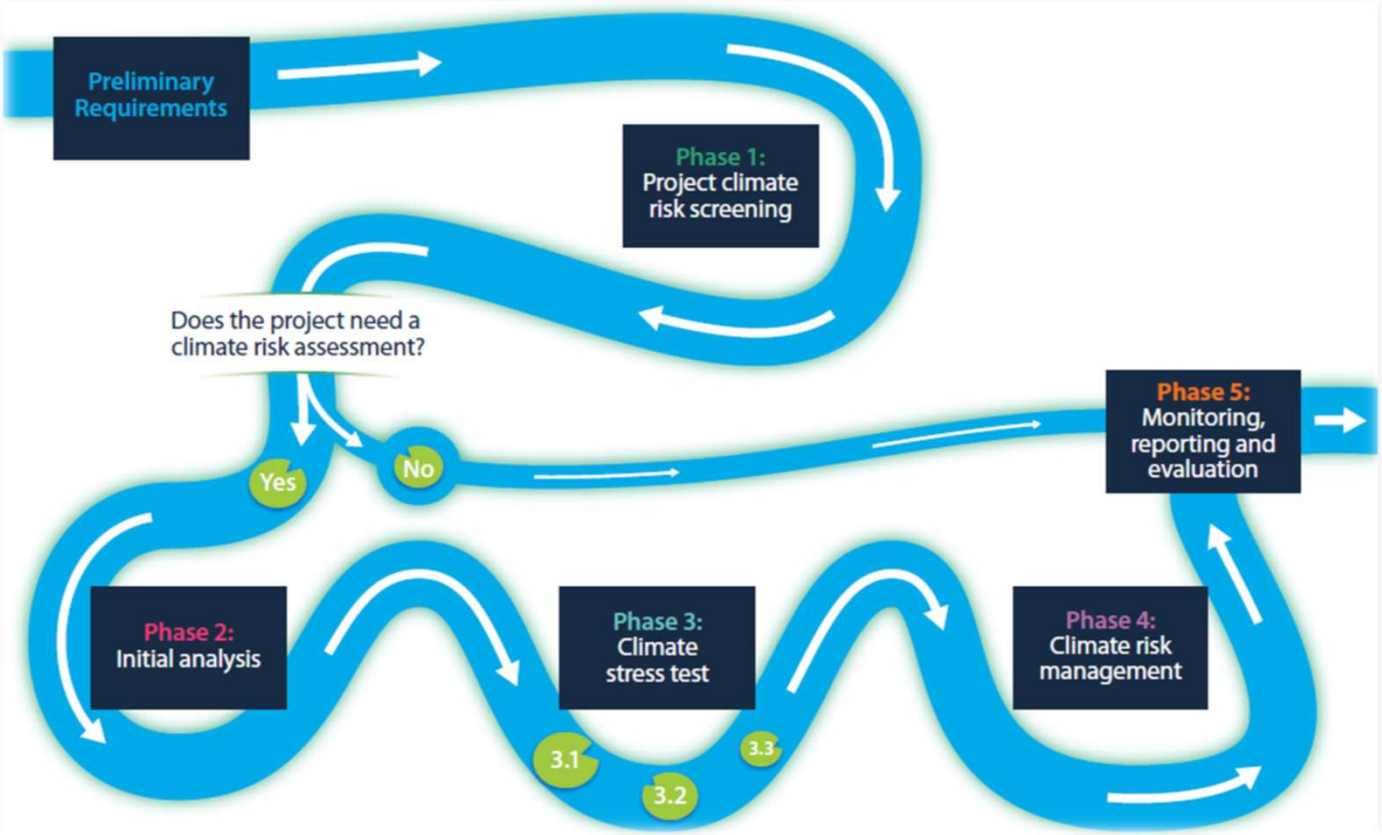
Addressing uncertainty

Decision Making under Uncertainty (DMU)

Bottom-up approach

Stress test to find system risks

Monitoring, Evaluation and Reporting plan



Providing guidance

Resilience measures

Annex A. Climate stressors list

For electricity production

- Generation shifts
- Load factor changes
- Min environmental flows variations

For access road

- Increased debris
- Increase risk of slope instability

For reservoir

- Glacial Lake Outburst Floods
- Sediment load increase

Annex C. Examples of adaptation measures

For electricity production

- Improvement of hydrological forecasting tools
- Reassessment of the type of scheme (base load/peaking and run-of-river/storage)
- Revised optimal minimum operating level

functional

For access road

- Debris screens, drainage and culverts
- Additional slope protection

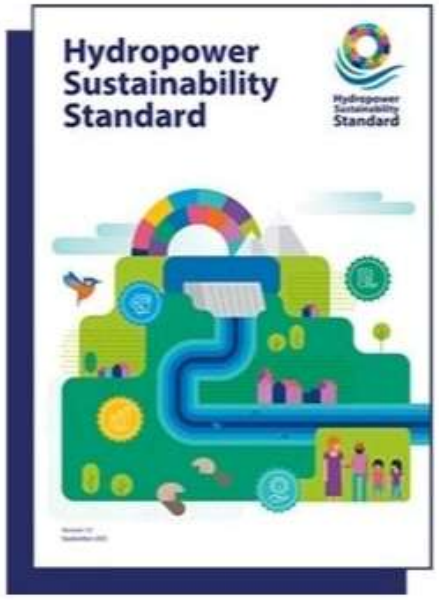
For reservoir

- Glacial monitoring
- Controlled glacial reservoir breach
- Change of dam type to allow overtopping
- Additional sediment management strategies

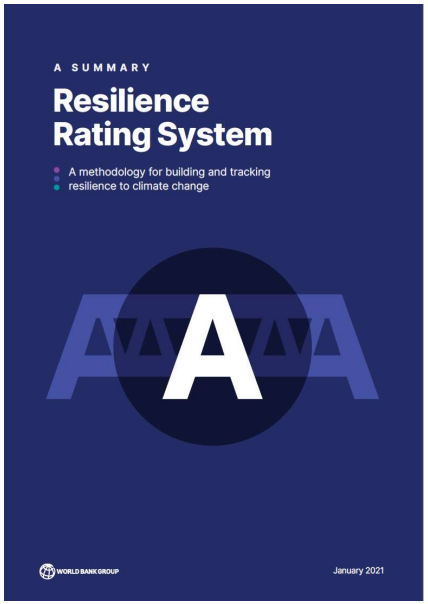
structural

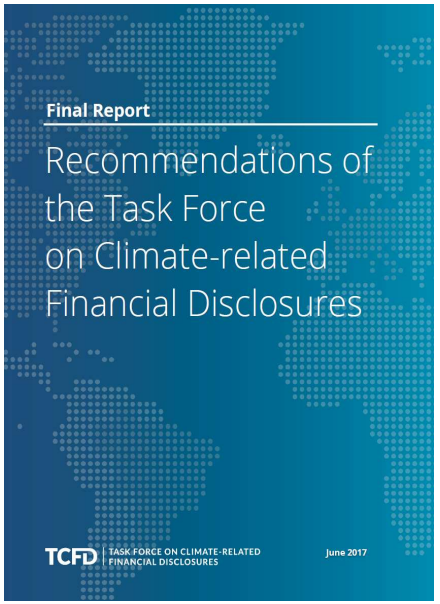
Alignment with other frameworks

Used as a reference for international institutions, multilateral banks



Climate Bonds INITIATIVE





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Feedback on the Climate Resilience Guide

Workshop - World Hydropower Congress, October 2023
Survey 2023 results

- Consensus on the benefits of phased and tiered approach behind the Climate Resilience Guide
- The Guide is widely used in conjunction with other assessment tools, such as hydrological and sedimentation modelling software
- Potential expansion and development: assessment of complex climate change impacts, harmonisation with other reporting processes
- For assessed projects, the Guide has proven to be effective instrument for qualitative climate resilience assessment

Case study

Cahora Bassa Climate Resilience Assessment

Study Objectives

- To carry out a climate resilience assessment (CRA) for Cahora Bassa Hydropower operation, under current conditions and potential changes in the baseline;

- To develop adaptation strategies through iterative risk assessment and management methodologies

Project Owner: Hidroeléctrica de Cahora Bassa

Location: Zambezi River in Mozambique

Commissioning date: 1976

Installed Capacity: 2075 MW

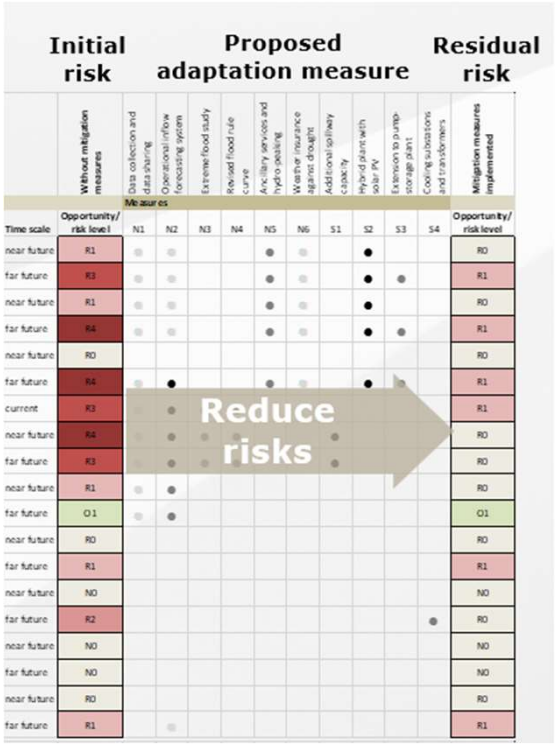
Consultant: AFRY

Time Schedule: Dec 2021 – Feb 2023

Source: Edite César Nhantumbo, HCB, World Hydropower Congress, 2023

Cahora Bassa Climate Resilience Assessment

Climate Risk Management Plan



Around 13 structural and non-structural adaptation measures were identified;

Some are in progress and other are still under discussion to be incorporated into the company's Investment Plan.

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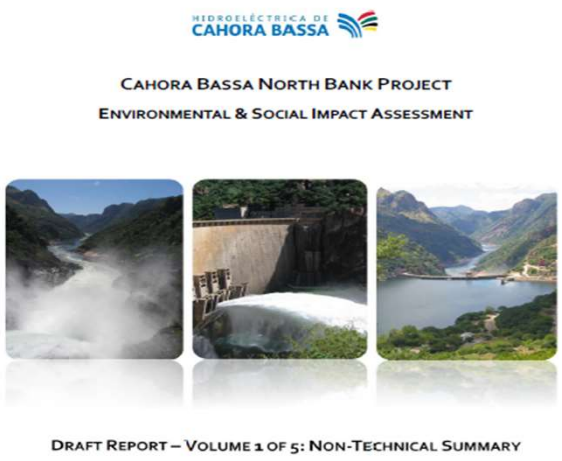
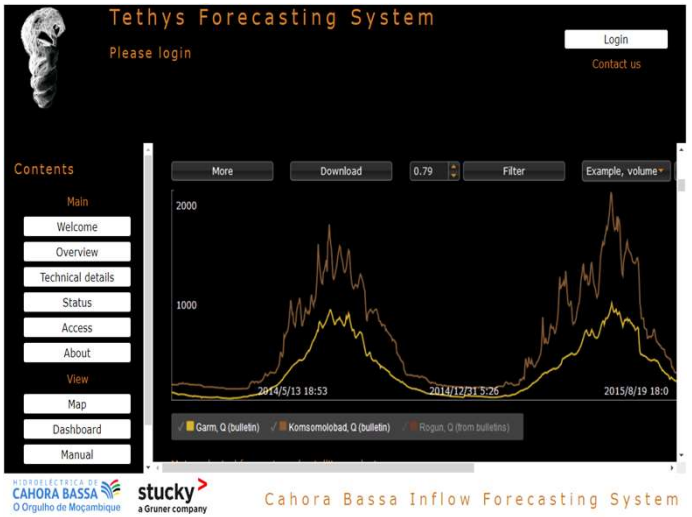
Source: Edite César Nhantumbo, HCB, World Hydropower Congress, 2023

Cahora Bassa Climate Resilience Assessment

Adaptation Measures – Under Implementation





Structural Measure

Sustainable Energy Growth
Solar PV Project (400MW)

Structural Measure

Addtional Spillway Capacity
Additional Power Generation (1200MW)

Non - Structural Measure

Inflow Forecasting System
Improvement of forecasting

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Source: Edite César Nhantumbo, HCB, World Hydropower Congress, 2023