



CLIMATE RESILIENCE PROOFING OF SMALL WATER, WASTEWATER & IRRIGATION PROJECTS

A TOOL FOR PROJECT PROMOTERS

WHAT IS CLIMATE-PROOFING FOR WATER, WASTEWATER & IRRIGATION PROJECTS?



A PLANNING CONSIDERATION

Climate proofing is the action taken to safeguard clean water supply and safely managed sanitation from potential disruptions stemming from climate change related events. The process aims to increase the resilience of water and wastewater facilities and minimize the potential negative impacts of climate change by employing, if required, an array of adaptation measures.



A 4-STEP PROCESS

that includes: (1) recognition of potentially harmful climate conditions (presently and in the future); (2) identification of sensitive processes and assets that are most likely to be negatively impacted when exposed to climate change related events; (3) understanding of potential consequences and the likelihood of experiencing them; (4) adaptation planning.



A LIFE-CYCLE APPROACH

that foresees the integration of adaptation measures in the planning, design, and operation of the facility.

WHY PERFORM CLIMATE-PROOFING?

- To proactively advise on measures and strategies that aim to increase the capacity of water and wastewater projects to offset the impacts of extreme weather events and adapt to the changing climate conditions of the future.
- To fulfill the climate proofing requirements set out in the legislation for several EU funds such as European Regional Development Fund (ERDF), Cohesion Fund (CF), InvestEU, Connecting Europe Facility (CEF), and the Just Transition Fund (JTF).
- To reduce the climate-related pressure on water supply and protect water availability and water quality.
- To reduce the economic losses from weather and climate-related extremes and ensure continuity of operations.
- Because the implementation of adaptation measures is less expensive when performed at the early planning stage of the project.

The tool is meant to assist the climate-proofing of **small water, wastewater & irrigation projects** against the following three broad classes of climate hazards*:

WATER HAZARDS

- > **Extreme rainfall events** triggering pluvial and fluvial flooding
- > **Coastal floods** and storm surges submerging low-lying areas with over-flowing water
- > Long term **changes in the precipitation patterns** leading to intensified droughts
- > Cascading hazards (e.g., nutrients runoff from farmlands after heavy rains, warmer temperatures accelerating the growth of bacteria etc.) **impairing the quality of available water**

EXTREME WINDS

- > **High winds and cyclones**

TEMPERATURE-RELATED HAZARDS

- > **Heatwaves or cold spells**
- > **Wildfires**
- > Changes in the **average annual temperatures** and changes in the number of days with zero-crossing (i.e., frequency of freeze-thaw cycles)

SOIL HAZARDS

- > **Landslides** & land subsidence triggered by sudden downpours
- > Degraded soils from water and wind **erosion**
- > Changes in the equilibrium of fresh and saltwater in coastal areas triggered by sea-level rise, intensified agriculture activity and excessive groundwater pumping.

*The climate hazard classification follows the one included in the Taxonomy Climate delegated act.

POTENTIAL CLIMATE IMPACTS

WATER TREATMENT

- Dilution of influent; Inundation of tanks and structural damages; Filter clogging
- Changes in the biochemical reactions; Biofilm growth; lower quality effluent
- Faster degradation of membranes; increased water toxicity impacting the efficiency/cost of treatment

SEWERAGE NETWORK

- Damaged pipes; Wastewater backflows into properties.
- Unpleasant odors during low-flow conditions
- Broken pipes/joints; Sewage spills; Faster degradation of pipes in erosive environments.

ENERGY SUPPLY

- Lightning strokes; Flooding of substations; Damaged towers / overhead lines; power outages
- Grid network overload; blackouts



Energy Supply

INTERCONNECTIONS

Road Network

ROAD NETWORK

- Closed roads; access restrictions

WATER DISTRIBUTION

- Damaged pipes/joints/tanks; Corrosion of mechanical devices
- Temperature-induced stressing of pipes/water tanks; risk of permeation and leaching, microbial growth
- Damaged pipes & tanks, Pump cavitation; Sediment buildup in valves

WATER EFFLUENT & RECEIVING WATER BODY

- Toxic/ Low quality effluent
- Thermal discharge of sewage; ecological threat
- Changes in the morphology of rivers, Sediment washing; Impaired water quality

WATER SOURCE

- Drought: Reduced water levels; Water-supply shortages; Flood: Reservoir and downstream damage
- Algal growth; impaired water quality, seasonal variations of water availability
- Sediment washing; Reduced water storage capacity; Landslide dam breaching.

WASTEWATER TREATMENT

- Treatment bypassing; Dilution of wastewater Damaged tanks/screens etc.
- Variations in the effluent quality; Slower treatment rates during very cold days
- Longer retention times, Imperfect removal of sediments; faster degradation of membranes/filters; Lower-quality sludge waste.

IRRIGATION NETWORK

- 'High-strength wastewater' effluent unsuitable for irrigation
- Changes in irrigation demand patterns
- High-salinity irrigation water; reduced crop yields; public health issues



WHAT TYPE OF GUIDANCE IS PROVIDED?

Questionnaires and checklists that will help you:

- Determine the likelihood of experiencing extreme climate-related events and cascading hazards.
- Understand how slowly evolving changes of climate patterns may affect the performance and operations of water and wastewater projects.
- Identify assets and processes that are most likely to experience damage or malfunction.
- Determine the reliance of project to external physical infrastructure and the broader socio-economic system.
- Employ redundancies to minimize single points of failure.
- Integrate in the design modular concepts that can be easily adjusted to accommodate future changes (e.g. in the availability of land, supply-demand changes)
- Build resilience in the operational planning and emergency management.

The guide contains **built-in functions** that will help you:

Automatically compile the risk profile of the project to different hazard classes and threats

Assemble a list of adaptation measures to minimize damage and downtime

Ensure continuation of operation under varying climate conditions

Identify soft-measures (facility-specific or community-wide) to alleviate climate stressing

Plan design provisions that can be dynamically adapted to changing climate conditions

Prioritize adaptation measures based on their cost-effectiveness

Keep track and audit the risk management process

WHO CAN USE THE GUIDE



- **Project promoters** of small-scale developments
- **Public or private investors** aiming to better comprehend the risks they undertake when financing property development projects or public-use buildings

HOW TO USE THE CLIMATE-PROOFING TOOL



GETTING STARTED



Before starting the climate-proofing exercise, go through the **technical documentation of the project**. What are the key functions of the project? Which assets are involved in the various processes? Which technical specifications have been incorporated in their design?



Make a list of all processes and assets. How do the different components interact with each other (input - output) and how do they interact with the external environment? How reliant is the project to other infrastructure systems (i.e., power and transport network) for performing its function?



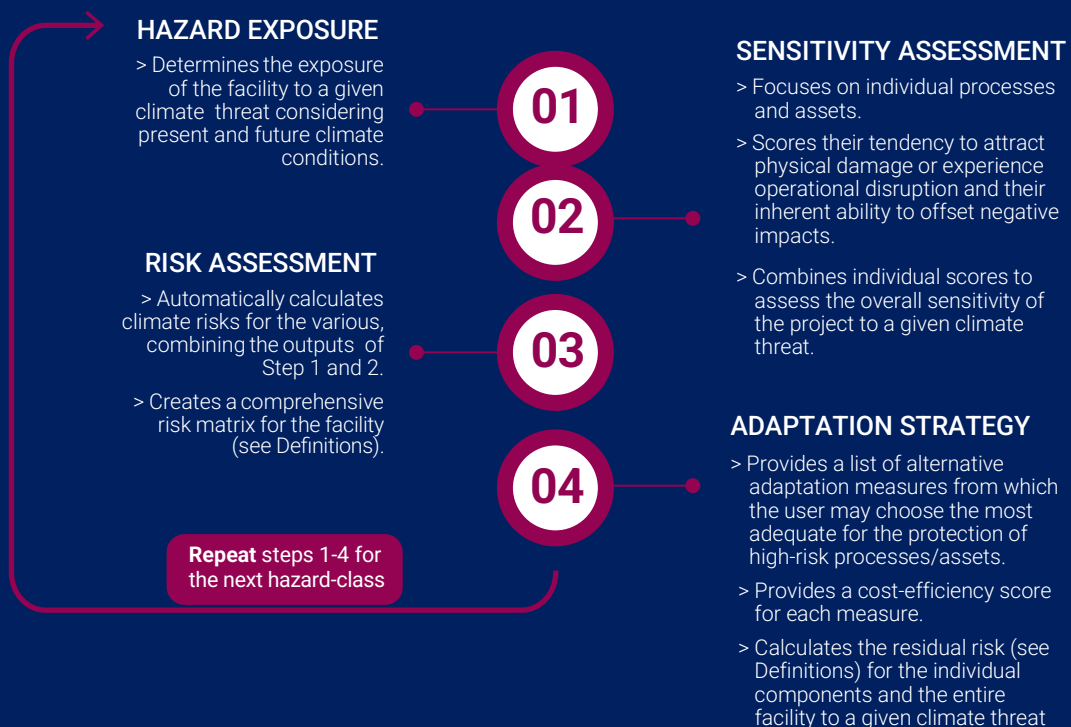
ANALYSIS



Select the type of facility for which the assessment is performed among the following options: Drinking water supply, Wastewater collection and treatment, Irrigation.



For each hazard class, repeat the process below:



OUTCOME



A climate risk overview of the building (before and after the implementation of adaptation measures).



A list of selected adaptation measures that will be implemented to address all significant risks identified.



HOW DOES THE TOOL PERFORM THE CLIMATE RISK AND VULNERABILITY ASSESSMENT?

- The tool is intended for small projects. It performs a simplified likelihood analysis that considers the probability of experiencing the most severe hazard in the project location.
- It uses an indicator-based approach for the characterization of potential climate hazards and risks, that is simple albeit subjective.
- It relies on empirical evidence and hence can be applied by non-experts.
- It does not however entail the robustness of a quantitative risk analysis which evaluates losses on exposed elements using probabilistic metrics.

WHAT COULD BE CONSIDERED AS **SMALL-SCALE** WATER OR WASTEWATER PROJECTS THAT COULD USE THE TOOL?

The **definition of small-scale projects** is subject to variations **based on country-specific context and regulation** and should be defined by the National Managing Authorities.

JASPERS recommendation for small water, wastewater and irrigation projects that could use this Excel tool is provided below. For larger projects a climate resilience assessment following the methodology in the EC "Technical guidance on the climate proofing of infrastructure in the period 2021-2027" is recommended.

