EU-USCA CLIMATE RISK AND RESILIENCE COOPERATION

CLIMATE FINANCE ADVISORS

EUROPEAN UNION

ISSUE BRIEF

Climate Risk And Water Infrastructure

CLIMATE RISK VERSUS ENVIRONMENTAL RISK

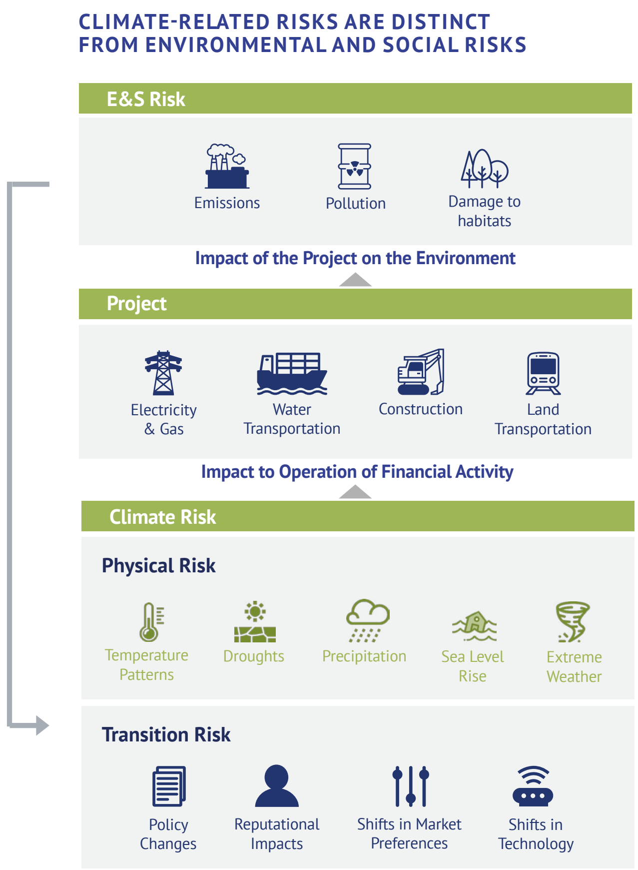
The distinction between climate risk and environmental and social risk is between the risk the changing climate poses to the viability of a project or company and the risk that the project or company poses to the environment or society.

Further, climate risks are classified as **transition risks** (risks based on the transition to a low carbon economy) and **physical climate risks** (caused by the chronic or acute expected changes in climate).

- It should be noted that environmental and social risks, insofar as they impact the global climate, are tied to climate risks and will exacerbate those risks.
- Managing these climate risks involves: (i) identifying and assessing risks, (ii) quantifying (where possible) those risks, and (ii) undertaking practices that can help manage and/or mitigate those risks, including through engaging with project developers and governments to enhance the design of projects according to predicted impacts.

Although the particular climate risks for water sector infrastructure are location-specific, the sector is highly exposed to long-term changes in precipitation. In addition, other chronic climate hazards such as changes in average temperature and sea-level rise can have large financial impacts on supply and demand for water infrastructure services as well as the structural integrity of assets and maintenance costs.[1] The sector is also exposed to acute risks such as droughts, landslides, and tropical cyclones, among others.

Environmental and Social vs. Climate Risk
Source: Climate Finance Advisors



PHYSICAL CLIMATE RISK

The U.S. experienced a total of 14 separate billion-dollar climate disasters in 2019, including 3 major inland floods, 8 severe storms, 2 tropical cyclones (Dorian and Imelda), and 1 wildfire event. 2019 also marks the fifth consecutive year (2015-19) in which 10 or more separate billion-dollar disaster events have impacted the U.S.[2]

- Water and wastewater projects, such as drinking water systems, wastewater treatment facilities, and stormwater pollution management, will all be critical components of building and fortifying community resilience, particularly as extreme weather events and chronic physical climate risks are expected to become more frequent and intense.
- Coastal water facilities are particularly at risk, with 162 wastewater treatment plants (serving 10.4 million Americans) vulnerable to flooding with a three-foot rise in sea-levels.[3]
- Climate events are major stressors to water infrastructure systems. To maintain existing systems and modernize facilities to face climate impacts and increased demand growth, the U.S. could face upwards of an estimated $1 trillion water infrastructure funding gap.[4]

In addition, physical risks to water infrastructure may manifest in unexpected ways.

- Increased average temperatures have a direct effect on water evaporation rates and thus on the reserves and supply of drinking water.
- Warming temperatures are contributing to increased aridity across the United States through greater evapotranspiration, drying soils, stressing plants, and ultimately reducing waterflow to streams, rivers, and other water sources.[5]
- In 2014 when half a million residents of Toledo, Ohio were warned not to use drinking water after a water treatment plant on Lake Erie was overwhelmed by a harmful algal bloom caused by sustained higher temperatures that summer.[6]
- The following table provides some useful examples of EU Member State innovative adaptation responses to specific physical climate hazards.[7]

Physical Climate Hazards Most Relevant for Water Infrastructure

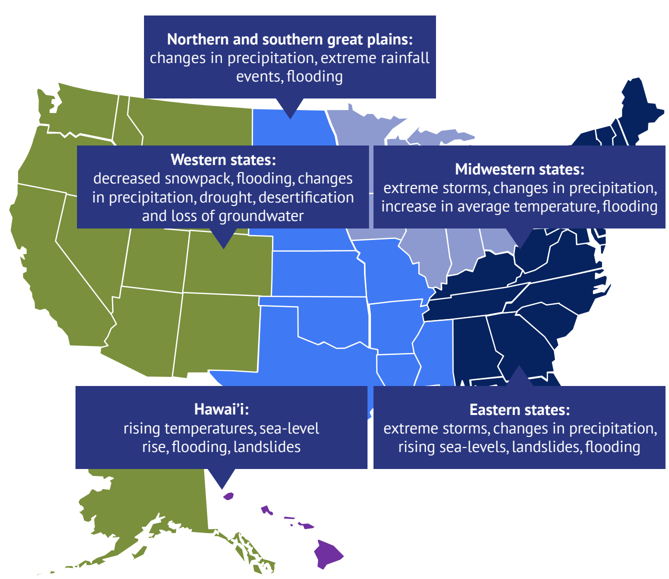
Climate Finance Advisors, adapted from National Oceanic and Atmospheric Administration, U.S. Department of Commerce

CHRONIC CLIMATE HAZARD	
Temperature	Long tern deviations from historically average temperature levels (either higher or lower)
Precipitation	Long term deviations from historically average rainfall levels (either higher or lower)
Sea Level rise	Long term rise of sea level at a location

ACUTE CLIMATE HAZARDS	
Drought	Depleted surface and/or ground water event resulting from a prolonged period of below average precipitation
Tropical cyclones	Rapidly rotating storms with a low pressure center characterized by high winds and rain
Wildfires	Uncontrolled fire, typically associated with higher temperatures and lower precipitation
Storm surge	Abnormal rise of water generated by a storm, over and above predicted astronomical tides
Flood	Overflowing of water to normally dry land can be associated with higher rain fall, storms, sea levels often associated with heavy rainfall that cam cause ground instability and the call of mud and rocks form slopes
Landslide	Often associated with heavy rainfall that may cause ground instability and the fall of mud and rocks from slopes

Identified Key Physical Hazards for Water Infrastructure in the United States

Source: Climate Finance Advisors, United States Global Change Research Program (National Climate Assessment)



TRANSITION RISKS

Transition risks are related to possible changes in policy and legal frameworks, evolving customer preferences and behaviors, as well as potential technology advances and substitution effects (in particular for fossil-based energy production and consumption among others) which may affect key financial parameters and could cause volatility in costs. Transition risks are relevant for water infrastructure:

- **Energy cost volatility and electricity blackouts:** Extracting water from rivers and aquifers, conveying it to storage facilities, treating it, distributing it, and collecting it as wastewater all take energy.
- **Water cost or price volatility:** Transitions to less resource-intensive production, such as low water use crops may decrease demand and thus decrease the cost of water. Conversely, decreases in available water supply may increase the cost of water, resulting in price increases for consumers. In addition, extreme water scarcity events can create long-term changes in consumer behavior and utilities can experience market risk from unexpected long-term decreased use. For example, researchers at the University of Barcelona observed a 2.2%-2.4% decrease in per capita water consumption when a severe drought required the imposition of consumption curbs. They also observed, that in the post-drought period, per capita water consumption in fact, further declined to 4.6%-4.9% lower than before the drought.[8]

Select Resilience Measures by EU Member States

HAZARD	COUNTRY AND PROJECT	MORE INFO
Change in average temperature	Ireland: Natural and other measures to combat algal blooms in drinking reservoirs	http://www.epa.ie/pubs/reports/research/water/Research_Report_353.pdf
Change in average precipitation	France: Nature-based solutions for increased rain in Normandy	http://www.normandie.developpement-durable.gouv.fr/IMG/pdf/7_-_ZAC_Luciline_-_Rives_de_Seine_cle051317.pdf
Sea-level rise	Portugal: Drought adaptation plan for water infrastructure and other resources in Alentejo	https://www.government.nl/topics/delta-programme
Drought	Portugal: Drought adaptation plan for water infrastructure and other resources in Alentejo	http://base-adaptation.eu/sites/default/files/case_studies/01_Alentejo_CSLD%20-%20Final_0.pdf
Extreme storms	Belgium: Stormwater drainage and storm surge barrier	https://afdelingkust.be/en/storm-surge-barrier-in-nieuwpoort
Flood	Estonia: Cloud-based data collection and flood management system	http://www.flydogmarine.com/products/smart-city/

1 Fecht, Sarah (2019). How Climate Change Impacts Our Water, Columbia University.

2 Smith, Adam (2020). 2010-2019: A landmark decade of U.S. billion-dollar weather and climate disasters, NOAA

3 Hummel, Michelle, Matthew Berry, Mark Stacy (2018). Sea Level Rise Impacts on Wastewater Treatment Systems Along the U.S. Coasts, Earth's Future

4 Moore, Rob (2018). Go Back to the Well, Natural Resources Defense Council.

5 University Corporation for Atmospheric Research. The Water Cycle and Climate Change.

6 Proceedings of the National Academy of Sciences (2020). Climate change and the aridification of North America.

7 Alliance for the Great Lakes (2019). Five Years Later: Lessons From the Toledo Water Crisis.

8 Bernardo, Valeria, Xavier Fageda and Montserrat Termes (2015). Do Droughts Have Long-Term Effects on Water Consumption: Evidence from the Urban Area of Barcelona, University of Barcelona.

Interested in learning more about this work or Climate Finance Advisors, contact us here: info@climate-fa.com

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