

Implications of Climate Change for Adaptation by Wastewater and Stormwater Agencies

In 2008, WERF embarked on a Climate Change research program to understand how the potential impacts of climate change would affect wastewater and stormwater utilities. This report provides an overview of the current understanding of natural climate variability and the projected global climate changes over the next 20-50 years. It provides utility managers a reasonable indication of potential impacts to the storm and wastewater sectors, along with a strategy that can be used to evaluate the vulnerability of their facilities. The report will help utility managers understand why there is uncertainty in projections of future local climates and explains the implications of possible changes. It emphasizes the real task will be to develop strategies with sufficient flexibility and resilience to deal effectively with increased uncertainty.



With increased climate variability, there is greater uncertainty in planning for long-term wastewater treatment infrastructure.

Most importantly with increased climate variability, there is greater uncertainty in planning for long-term infrastructure. Wastewater infrastructure planning will need to take a sustainable path, which is necessary to assess how things could change, and how we can best adapt our practices to meet these changes. Although these are elements of a long-term strategy, utility planners need to begin moving on these items in the near-term – especially at the research level – to lead the way forward.

This report offers a way to move forward using a risk management approach. The familiar risk management paradigm consists of three steps: risk identification, risk characterization, and risk management (adaptation). It is necessary to take the problem apart and examine it piece by piece to perform a thorough risk identification analysis. For example, the possible impacts of increasing temperatures are far reaching when all the secondary effects on hydrologic and environmental processes are taken into account. This “deconstruction” of the problem is accomplished with the aid of cause-effect impact tree diagrams presented in the report, provides a good overview of the problem and a helpful way of organizing information.

The cause-effect impact tree diagrams represent major chains of causation that may be expected to result from climate change. First, as temperatures rise, it is expected that sea levels would rise due to warmer ocean temperatures and melting of land ice, such as glaciers. Next, warmer overall temperatures would be expected to produce two important changes in seasonal conditions over most of the continental United States. Warmer and shorter winters would be expected, as well as warmer and drier summers. Lastly, warming would be expected to accelerate and amplify the functioning of the hydrologic cycle to produce, among other things, more intense rainfall events.

The cause-effect impact tree diagrams trace through the linkages to show how climate changes produced by warming may result in impacts on hydrologic and environmental processes that may have implications for wastewater and stormwater facilities and operations. A risk characterization step needs to be undertaken to assess what is known and

BENEFITS

- Identifies the greatest implications of a changing climate for the wastewater and stormwater sectors.
- Provides a concise summary of climate change modeling and forecasting.
- Describes the general Risk Management Approach to adaptation planning.
- Outlines major adaptation challenges facing wastewater and stormwater agencies with emphasis on risk management.

RELATED PRODUCTS

Guide to Climate Risk Information – A Series of Technical Fact Sheets (CC1C08)

Post-Project Monitoring of BMPs/SUDS to Determine Performance and Whole-Life Costs (01CTS21T)

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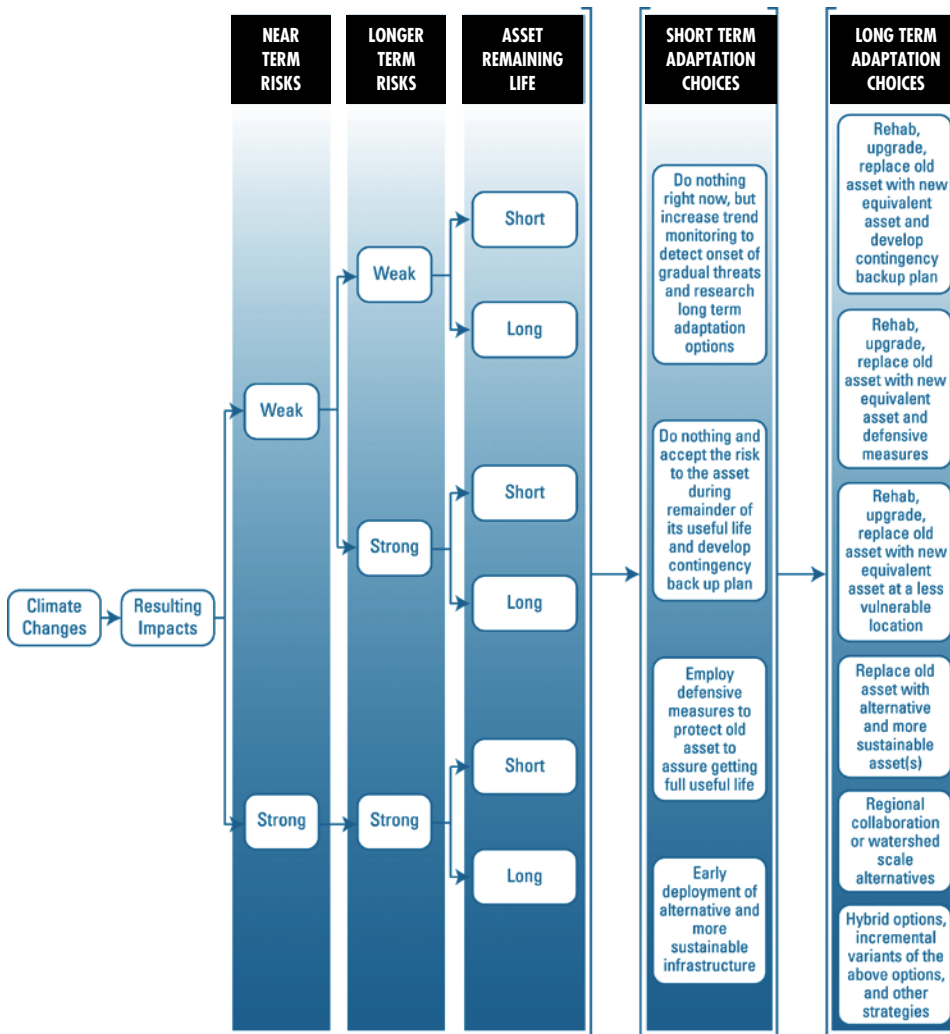
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not known about the possible magnitude and timing of these potential impacts and implications along each of the branches. To assist in making that risk assessment, the report provides a background review of the current understanding of climate change at a global level, including forecasts for the continental United States. The report outlines what is known about each of these specific areas of potential impacts and the implications.

The report illustrates an approach to manage the impacts and implications of climate change through “reconstruction” of the information provided in the cause-effect tree diagrams – bundling individual threats together for analysis by common endpoints relating to major facilities and operations. For example, the cause-effect impact tree diagrams identify a large number of potential impacts spawned by global warming that could affect performance requirements for wastewater treatment plants. But these multiple threats are driven by different processes that are understood with varying degrees of confidence and are proceeding on differing timelines. From a utility risk management perspective, it is necessary to evaluate each “threat bundle” as a package to assess which specific influences are likely to be the most critical to an individual utility’s facilities and operations and to gauge adaptation options with a composite rather than a piecemeal approach. This composite understanding is also the appropriate context for adaptation planning.



The Sustainable Path in Adaptation Planning.

Source: Stratus Consulting Inc.

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