# A Roadmap for an Integrated Assessment Approach to the Adaptation of Concrete Bridges to Climate Change

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**Video title**: ***Adapting Existing Concrete Bridges for Climate Change: An Integrated Approach***

## Video Script

Bridges play a crucial role in our transportation infrastructure. Like all structures, both natural and man-made, bridges go through a natural aging process. However, their structural deterioration is enhanced by operational and environmental conditions, including daily traffic load, temperature, and humidity. Climate change is likely to worsen existing vulnerabilities and hasten bridge deterioration. However, the potential effects of climate change have not yet been considered in bridge codes, even though bridges are known to be vulnerable to changes in temperature, relative humidity, precipitation, and carbon dioxide ($CO_2$) levels.

In a new study published in the *Journal of Bridge Engineering*, a group of researchers has harnessed climate data, utilized physics-based modeling, and considered cost-effectiveness measures to prepare an integrated assessment approach for adapting concrete bridges for climate change. The researchers argue that such a proactive strategy will ensure construction of concrete bridges in a manner suitable to withstand future climate challenges, thereby reducing damages, curbing costs, and improving safety.

The researchers identify several significant climate-related effects on concrete bridges including scouring and flooding caused by heavy rainfall, heightened stress on bridge components due to rising temperatures and frequent heat waves, increased corrosion resulting from elevated $CO_2$ levels, and the potential need for bridge relocation due to rising sea levels. To safeguard concrete bridges against these adverse effects, they stress the need to integrate climate preparedness into the already existing planning mechanisms. Such adaptation measures can be determined using existing climate change data on the life cycle of existing bridges, identifying their vulnerabilities, and estimating the financial costs of both action and inaction related to potential bridge relocations and loss of life.

To enhance the resilience of existing concrete bridges, the researchers suggest conducting vulnerability analyses to make sure that the bridges are adapted to flooding, changes in $CO_2$ levels, temperatures, and traffic loads. Further, bridge-specific maintenance and inspection manuals should be regularly updated to monitor their structural health in response to changing environmental conditions. Additionally, the researchers recommend the implementation of a warning system when bridge safety is compromised.

In conclusion, by adopting this integrated approach, the safety, functionality, and longevity of existing concrete bridges can be enhanced in the face of a changing climate.