

Climate Resilience for Public Transit: Learning From the 100 Largest Transit Agencies

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ABSTRACT

Extreme weather-related climate events affect public transit, impacting travel behavior, human health, and quality of life. Transit agencies seeking to increase transit ridership as an efficient transportation measure must adapt to these events. Transit users are more vulnerable to extreme heat than people driving, as they mostly have to wait outside for their ride or walk/bike to and from transit stops. Here, we propose a study exploring transit agencies' proactive efforts toward disaster-resilient transit facilities. We focused on the 100 largest transit agencies in 2021 based on ridership from the National Transit Database by the Federal Transit Administration. We examined how public transit agencies include disaster resilience strategies in their strategic plans, long-term transportation plans, sustainability plans, and other similar plans. Transit agencies adopt various short-term and long-term strategies for disaster resilience based on the type of public transit facilities and disaster experience. For rail services, transit agencies build sea walls, elevate critical facilities, relocate or harden critical infrastructure, install power transformers and sensitive power equipment, and implement other strategies. To implement these strategies, transit agencies focus on pre-seasonal and preventive maintenance, vulnerability assessment of infrastructure, increasing system redundancy, collaboration and coordination with other agencies and institutions, and other initiatives. Transit agencies are also adopting disaster forecasting tools (e.g., on-demand flood simulations) and early warning systems, emergency protocols, and management plans. This study can help planners and policymakers understand the major climate events that transit agencies face, their associated impacts, and the strategies used to address these issues.

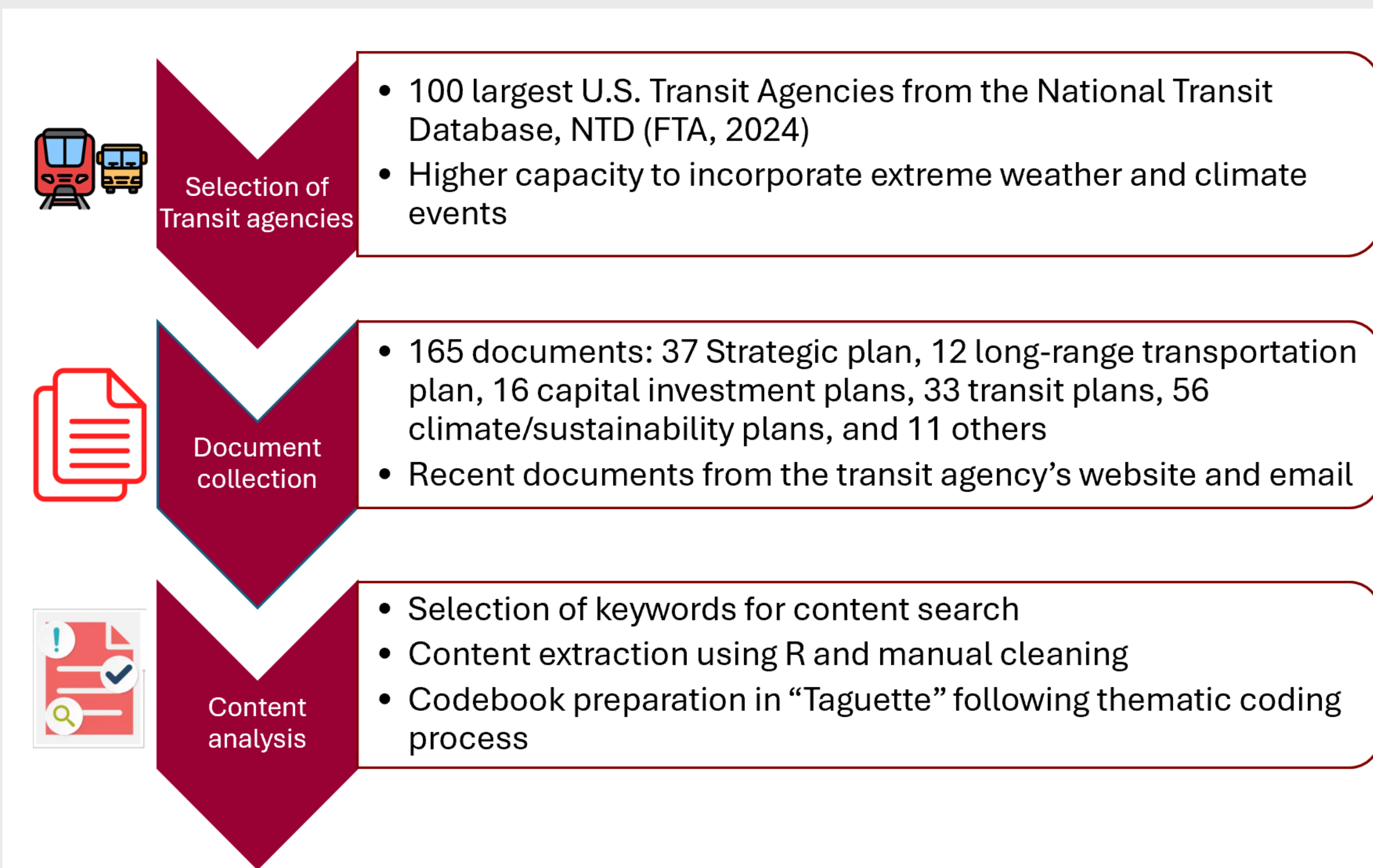
INTRODUCTION

- Climate change-fueled extreme weather events pose serious challenges for public transit services
 - ✓ Transit operation and service disruption
 - ✓ Infrastructure damage
 - ✓ Deterioration of service quality
 - ✓ Public safety threats
 - ✓ Reduce public transit ridership
- Public transit contributes toward climate mitigation
- Existing research mostly focuses on reactive emergency response rather than proactive long-term adaptation and resilience planning, considering extreme climate events

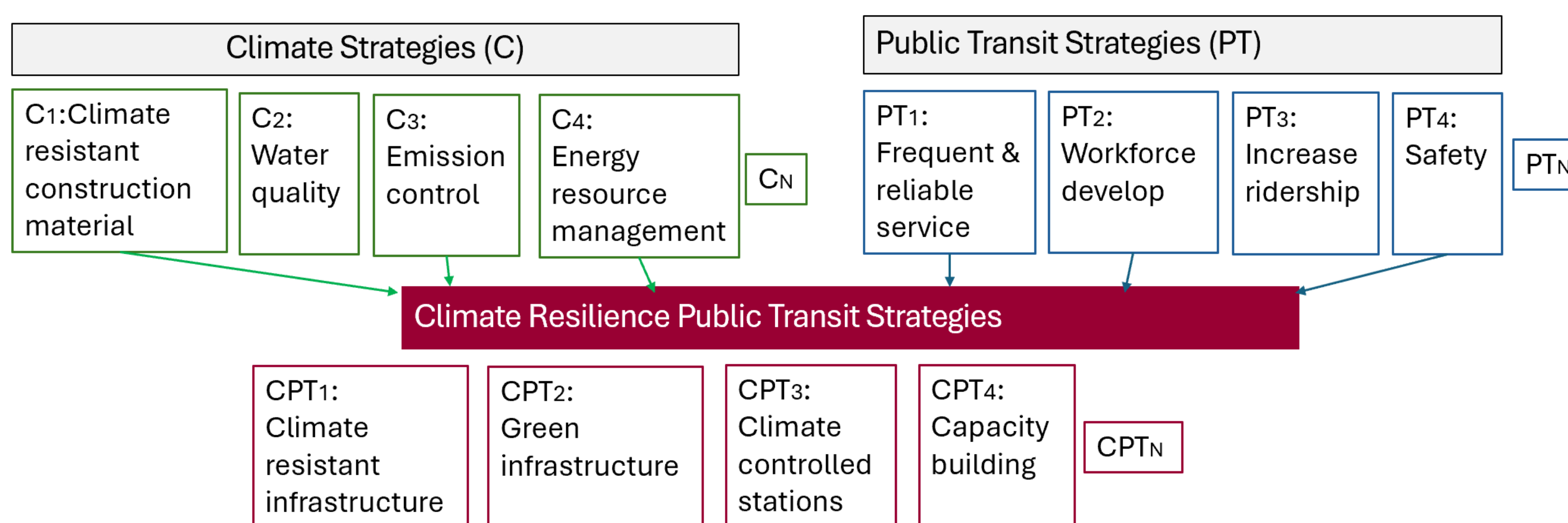
RESEARCH QUESTION

Explore how public transit agencies incorporate extreme weather and climate resilience measures within their plans

METHODS AND MATERIALS



Content Extraction Process

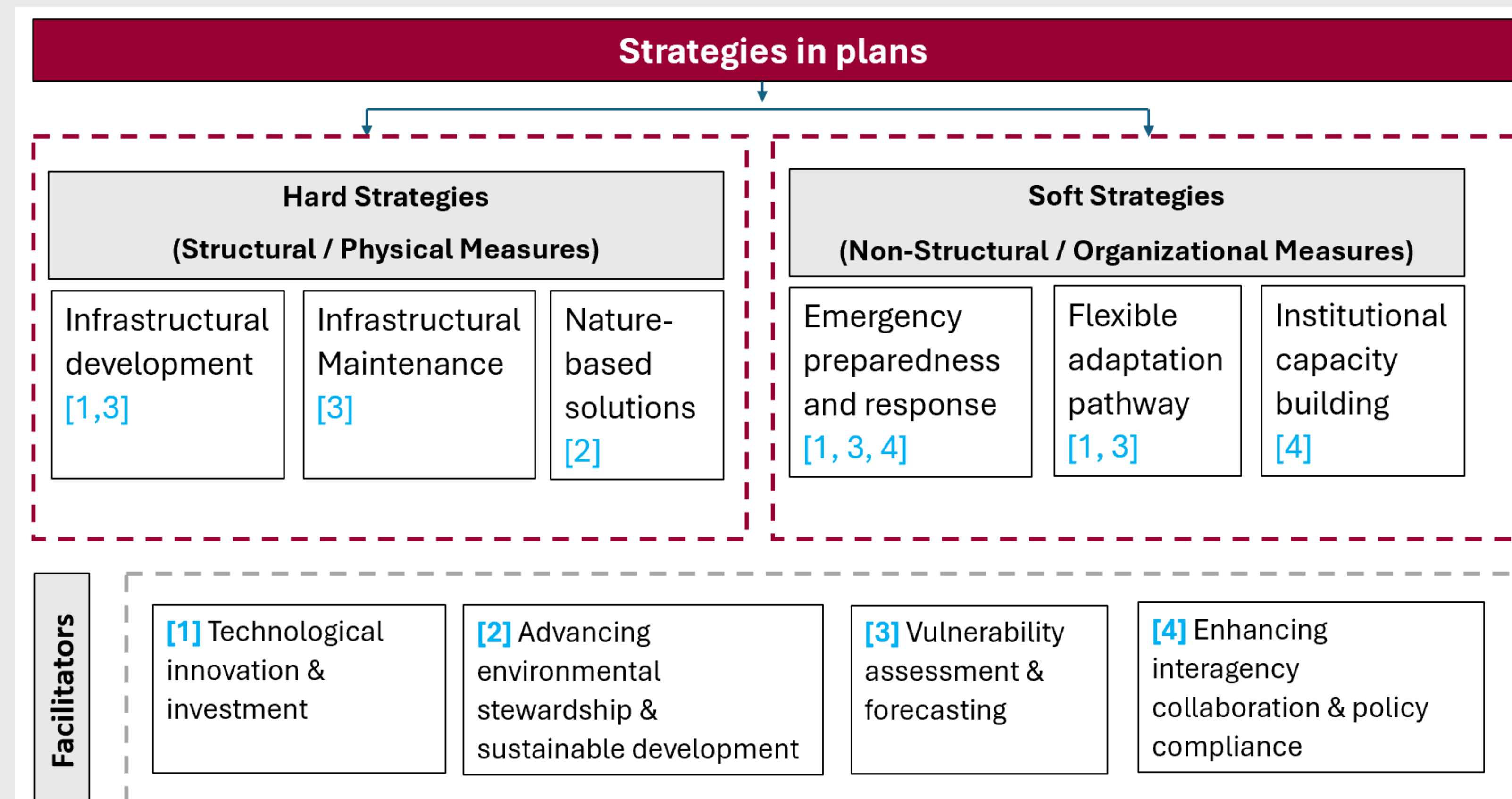


RESULTS

- Prior experience influences adopting climate resilience strategies.
- Major climate concerns:** Coastal Flooding, Sea Level Rise, Rainstorms, Flooding, Storms, Heat Waves, Ice Storms, Wildfires
- Major types of strategies:** Structural and non-structural



"NJ TRANSIT's experience during Superstorm Sandy, and its subsequent recovery, exposed vulnerabilities in the agency's regional transportation network and operations. Following the storm, NJ TRANSIT implemented multiple, long-term redesign and construction projects to harden and floodproof critical infrastructure." (NJ Transit Sustainability Plan, 2024)



		Major Structural Strategy				
Structural Strategy	3	Type of weather event				
		Coastal Flooding & Sea Level Rise	Rains	Heat	Ice Storm	Wildfires
Elevate facilities		✓	✓			
climate-resilient design and resistant material			✓	✓	✓	
Retaining walls and security fencing		✓				
Permeable pavement			✓			
Improve ventilation				✓		
Nature Based solution		✓	✓			✓

Infrastructural Maintenance

Preventive maintenance and inspection to ensure a state of good repair (e.g., OCTA and LA Metro in California, NJ TRANSIT in New Jersey).

IMPLICATIONS

