

Projektkonferens InfraSweden2030

Climate change impact on safety and performance of existing and future infrastructure

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**INFRA
SWEDEN 2030**

Med stöd från:



FORMAS



STRATEGISKA
INNOVATIONS-
PROGRAM

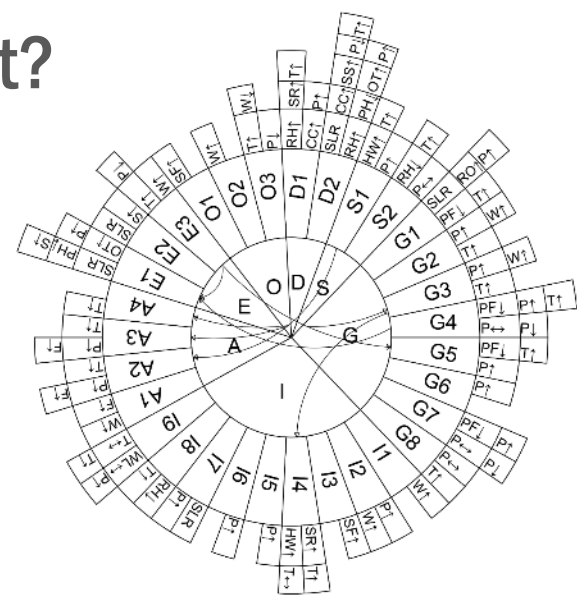
Projektets syfte (Project aims)

- The project aims to:
 1. Identify the potential climate change impacts on bridges^[1] and review their possible adaptation techniques^[2].
 2. Develop a risk-based prioritization method for considering the impacts of climate change on bridges^[3].
 3. Develop probabilistic methods for quantitatively assessing the most critical impacts of climate change on bridges. (Future work)
 4. Study the cost-effectiveness of adaptation techniques for the most critical impacts of climate change on bridges. (Future work)

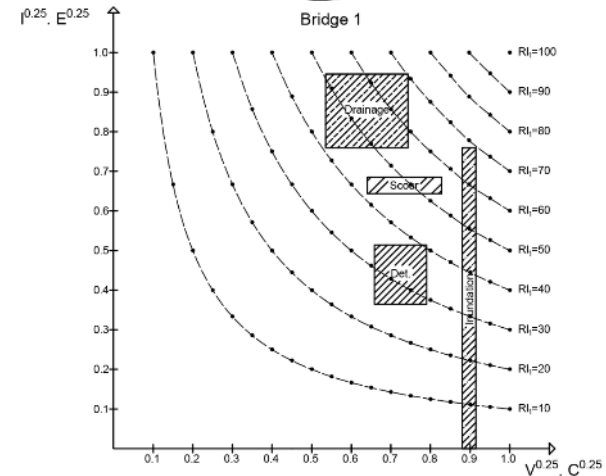
Vad är projektets tre viktigaste resultat?

(The three most important results)

- Several potential climate change impacts on bridges were identified.^[1]
- The possible adaptation techniques in response to these potential impacts were reviewed.^[2]
- A risk-based prioritization method for considering the impacts of climate change on bridges was developed.^[3]



R	$P(H)$	$P(E H)$	$P(D E \cap H)$	$C(D)$
description	Hazard: The probability of a climatic hazard (e.g. increased storm activity)	Exposure: The probability of an adverse impact on the bridge as a result of the hazard (e.g. increased storm surge heights)	Vulnerability: The probability of a damage resulting from the increased hazard and exposure	Consequences: The cost of such a damage
possible risk management measures	Reduction of GHG emissions (by e.g., introducing more strict regulations, reducing VMT through land use and urban planning strategies, etc.)	Regional adaptation measures, e.g.: <ul style="list-style-type: none"> • Storm surge barriers • Improved land use planning (e.g. relocation) 	Local adaptation measures, e.g.: <ul style="list-style-type: none"> • Increase bridge elevation • Insert holes in the bridge superstructure • Improve span continuity • Use tie-down, restrainers, or anchorage bars 	Adaptation measures for cascading effects: <ul style="list-style-type: none"> • Increase robustness • Increase network • Improved emergency and disaster preparation • Improved underst interdependencies



Viktiga lärdomar från projektet (Important lessons)

- Climate change can significantly impact the safety and performance of our infrastructure in general and bridges in particular.
- Therefore, including the potential climate change impacts in the planning, design, and management of our infrastructure is necessary.
- Despite the large uncertainties involved, methods can be developed to assist bridge managers in making more rational decisions regarding climate change impacts.

References:

[1] Nasr, A., Björnsson, I., Ivanov, O. L., Johansson, J., Honfi, D., & Kjellström, E. (2019). A review of the potential impacts of climate change on the safety and performance of bridges. *Sustainable and Resilient Infrastructure*. doi: 10.1080/23789689.2019.1593003

[2] Nasr, A., Kjellström, E., Björnsson, I., Honfi, D., Ivanov, O. L., & Johansson, J. (2019). Bridges in a changing climate: A study of the potential impacts of climate change on bridges and their possible adaptations. *Structure and Infrastructure Engineering*. doi: 10.1080/15732479.2019.1670215

[3] Nasr, A., Björnsson, I., Honfi, D., Ivanov, O. L., Johansson, J., & Kjellström, E. (Submitted Manuscript). Risk-based prioritization method for considering the effects of climate change on bridges. *Journal of Infrastructure Systems*