Journal of Infrastructure Preservation and Resilience

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Foreword from the editor-in-chief: the inaugural issue of journal of infrastructure preservation and resilience

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Welcome to the inaugural issue of the *Journal of Infrastructure Preservation & Resilience* (JIPR): a peer-reviewed, multidisciplinary journal in the field of infrastructure engineering and management. Launched by Springer Nature, JIPR aims to provide a cross-disciplinary and international forum for researchers to disseminate innovative research and engineering practices that preserve the integrity, lifecycle performance, and resilience of new or existing infrastructure systems amid diverse climatic conditions, manmade and natural hazards, and other risks.

The many challenges towards achieving improved durability, reliability, and resilience of civil infrastructures must be addressed with proactive, holistic, and multidisciplinary approaches. This journal seeks to facilitate an in-depth dialogue and synergistic collaboration between both the infrastructure engineering community and the resilience and risk management community. We aspire to establish JIPR as the flagship journal in this emerging field with a focus on innovations in risk management and engineering applications as well as new materials, new technologies, and new perspectives.

All manuscripts will go through a rigorous yet relatively rapid peer-review process, which translates to benefits such as timeliness of publication, widespread dissemination, high visibility, and likelihood of high citations and broader impacts. We seek to present the cutting-edge innovations and/or latest insights and strive to maintain the highest standards of excellence for JIPR.

Infrastructure preservation and resilience (IPR) is an emerging, cross-disciplinary research field that, due to its potential impacts, merits increased attention and enhanced visibility. This is evidenced by the trends shown in Fig. 1, where the temporal evolution of IPR research topics over the last three decades is illustrated. Notably, there has been nearly exponential growth in the number of records published when searching the keywords "infrastructure preservation and resilience" in the Google Scholar database. In comparison, the amount of published research in "infrastructure preservation" or "infrastructure resilience" has leveled off in the last 4 years or so. This suggests the increasing amount of efforts in bridging the traditionally isolated infrastructure preservation and infrastructure resilience fields.

JIPR aims to provide the most complete and reliable source of information on current developments in the field and facilitate peer-to-peer exchange and dialogue beyond the conventional discipline boundaries, leading towards proactive and systematic solutions to enhance infrastructure reliability. The emphasis will be on publishing high-quality articles, including original research papers, research notes, and reviews—all of which contribute to advancing the knowledge base of infrastructure preservation and resilience and bridging the gaps between different disciplines and stakeholders relevant to the development and implementation of best solutions. The journal may also publish abstracts, proceedings, supplements, perspectives, and editorials. The journal welcomes submissions that offer significant value or new knowledge related to all areas of infrastructure preservation and resilience, ranging from roads, bridges, and tunnels to railways, airports, and energy infrastructure. In particular, we welcome studies that connect different topics and are highly

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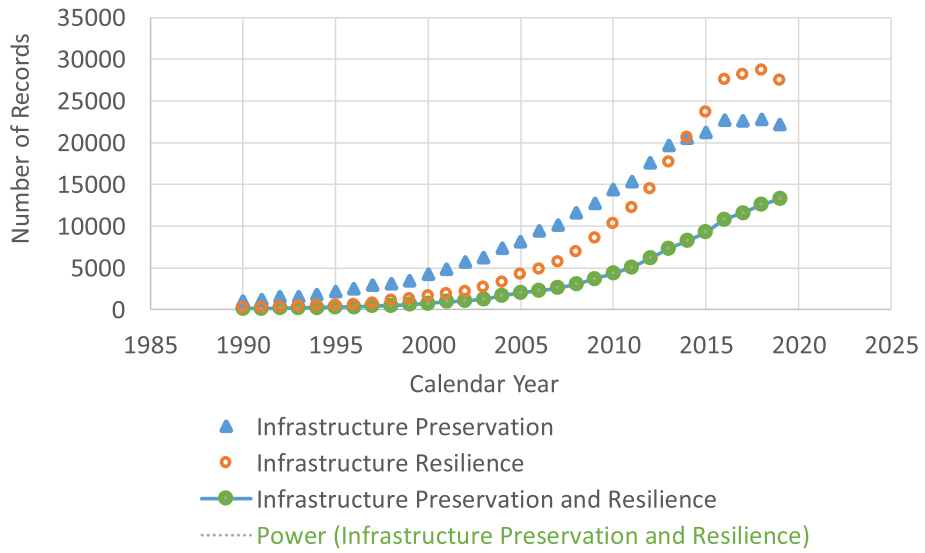

Fig. 1 Temporal evolution of published research related to infrastructure preservation and resilience, based on keyword searches using Google Scholar (all of which used "-medical" "-medicine" and "-microbial" to remove irrelevant records)

interdisciplinary in methodology. The topics may include but are not limited to:

- Preservation and monitoring against foundational risks of infrastructures (e.g., bridge scour and slope instability)
- Preservation and rehabilitation against infrastructure materials-related distresses (corrosion, freeze/thaw damage, alkali-aggregate reactions, cracking, rutting, aging, moisture damage, etc.)
- Infrastructure system response and resilience (e.g., adaptation to natural or manmade disasters, climate change and extreme weather, as well as social, financial, and technological risks)
- Decision support and management (e.g., data modelling and resilience assessment, hazard life cycle analysis, risk assessment, characterization/modeling of interdependencies)
- Transportation geotechnics and geoecology
- Remote sensing, online monitoring, and non-destructive evaluation of infrastructures
- Planning, design, construction, operations, inspection, evaluation, retrofitting and reinforcing of existing infrastructure systems.

For example, climate change poses risks to the durability, reliability, and safety of transportation systems and will likely induce considerable costs [2, 3, 8, 10], primarily through increases in frequency and intensity of climate extremes. Infrastructure will have to adapt to climate variabilities [4] manifested by increases in extremely hot days, heat waves, rising sea levels coupled with storm surges and land subsidence, intensifying drought-flood cycles, more frequent extreme precipitation, and increased intensity and occurrence of hurricanes. Exacerbated distresses and premature failures due to such climatic effects can lead to reduced resilience and higher demand for frequent inspection and rehabilitation of transportation infrastructure. Figure 2 provides a few examples to illustrate the multi-hazards faced by the transportation infrastructure, which may undermine the built environment and devastate human society.

In the first publications for this new journal, there are manuscripts that exemplify the wide range of subjects to be covered in JIPR, even though this is by no means a comprehensive list of subjects. These five papers cover a broad spectrum of infrastructures (road networks, houses, pipelines, urban asphalt pavement, and concrete elements for high-speed railway), and a diverse representation of risks (flooding, heavy rain, strong wind, acidic and dry climate, and fatigue cycles).

Abdulla et al. [1] have proposed a network diffusion-based methodology to "characterize the vulnerability of road networks to fluvial flooding", taking inspiration from how opinions spread in social networks or how contagious diseases spread in societies. Specifically, their research "applies a susceptible-impacted-susceptible (SIS) diffusion model to capture the impact of flooding on the road network connectivity" and they demonstrated the developed method using the road network in a Houston neighborhood.

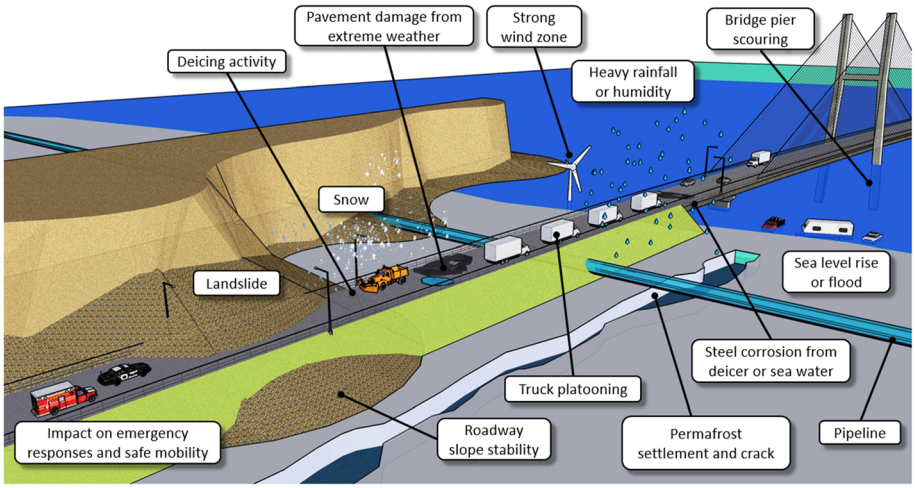

Fig. 2 Multiple challenges requiring the preservation and resilience of transportation infrastructure

Qin and Stewart [6] have conducted a risk-based cost-benefit analysis for climate adaptation measures adopted "for Australian contemporary houses subjected to non-cyclonic windstorms". Their research provides new insights into the risks and costs induced by construction defects in the specific adaptation measures and the regional differences in houses.

Salemi and Wang [7] have developed a Bayesian inference methodology to predict "the probability density of failure after initially estimating the equivalent initial flaw size (EIFS)" as well as the number of fatigue cycles (most critical time) before the pipe or plate would fail. Their research enables more informed and timely maintenance of metal pipelines.

Wang et al. [9] have provided an overview on how intensive rainfall (due to climate warming) affects urban asphalt pavement, with a focus on operational safety and service life of the pavement. They used Shenzhen, China as the city for case study and concluded with recommendations of mitigation measures to reduce the risks of urban waterlogging and pavement failure.

From a much more microscopic perspective, Long et al. [5] have investigated the deterioration behavior of steam-cured concrete material that is commonly used in precast elements for high-speed railway. Their research sheds new light on the risks of a harsh service environment to such materials by subjecting them to the coupled effects of chemical exposure (simulating acid rain) and wet/dry cycles.

I hope readers make good use of this journal and start some meaningful discussions, debates, and collaborations. The Editorial Board of JIPR welcomes your contributions and looks forward to many years of fruitful research to come. JIPR is here to help stimulate the flow of information and ideas, advancing the fields of infrastructure preservation and resilience.

Finally, I would like to take this opportunity to thank the associate editors, editorial board members, peer reviewers, contributing authors, and many others for making JIPR and this first issue possible. Special thanks also go to the members of the Springer Nature publishing team, especially Angelina Wagner (Journal Development Manager), Emily Balangatan (Journal Editorial Office Assistant), and Davinya Higgins (Manager JEO London).

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Authors' contributions
XS contributed solely to this paper. The author(s) read and approved the final manuscript.

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