



Preserving the past, preparing for the future: Cultural Heritage and Climate Change

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From monuments to old cities: Climate change threatens history ^{1,2,3}



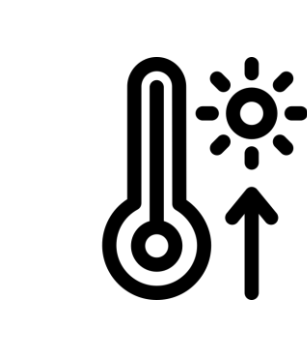
Rising sea levels
Flooding



Extreme rain events
Higher humidity



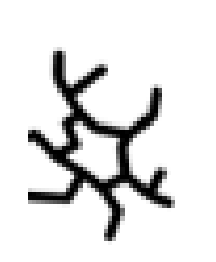
Heavy storms
Wind driven rain



Rising temperatures
Droughts
Fires



Cracks and fissures
Destabilisation
Mechanical failure

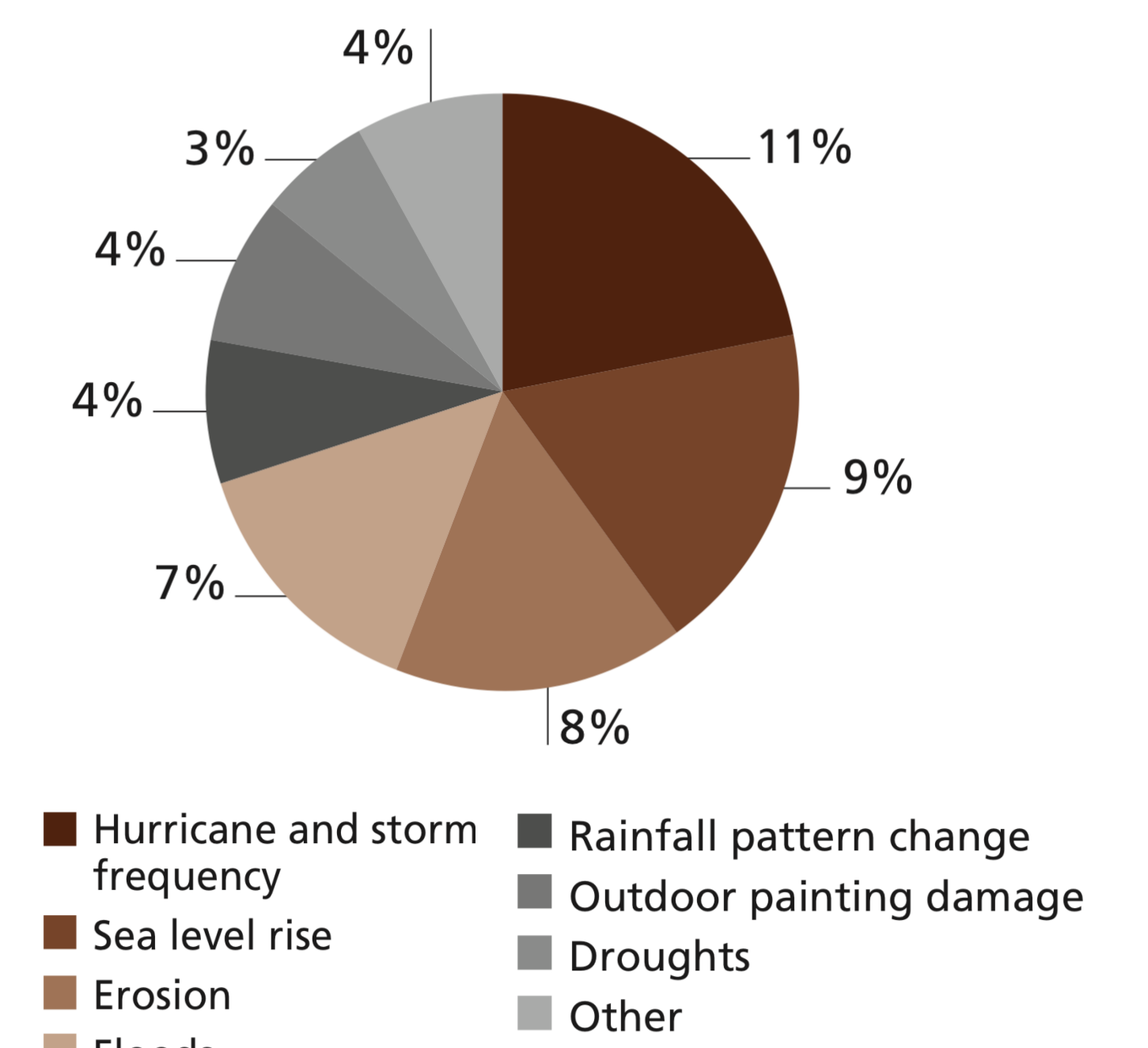


Surface erosion and degradation
Abrasion and discolouration
Corrosion and stone recession

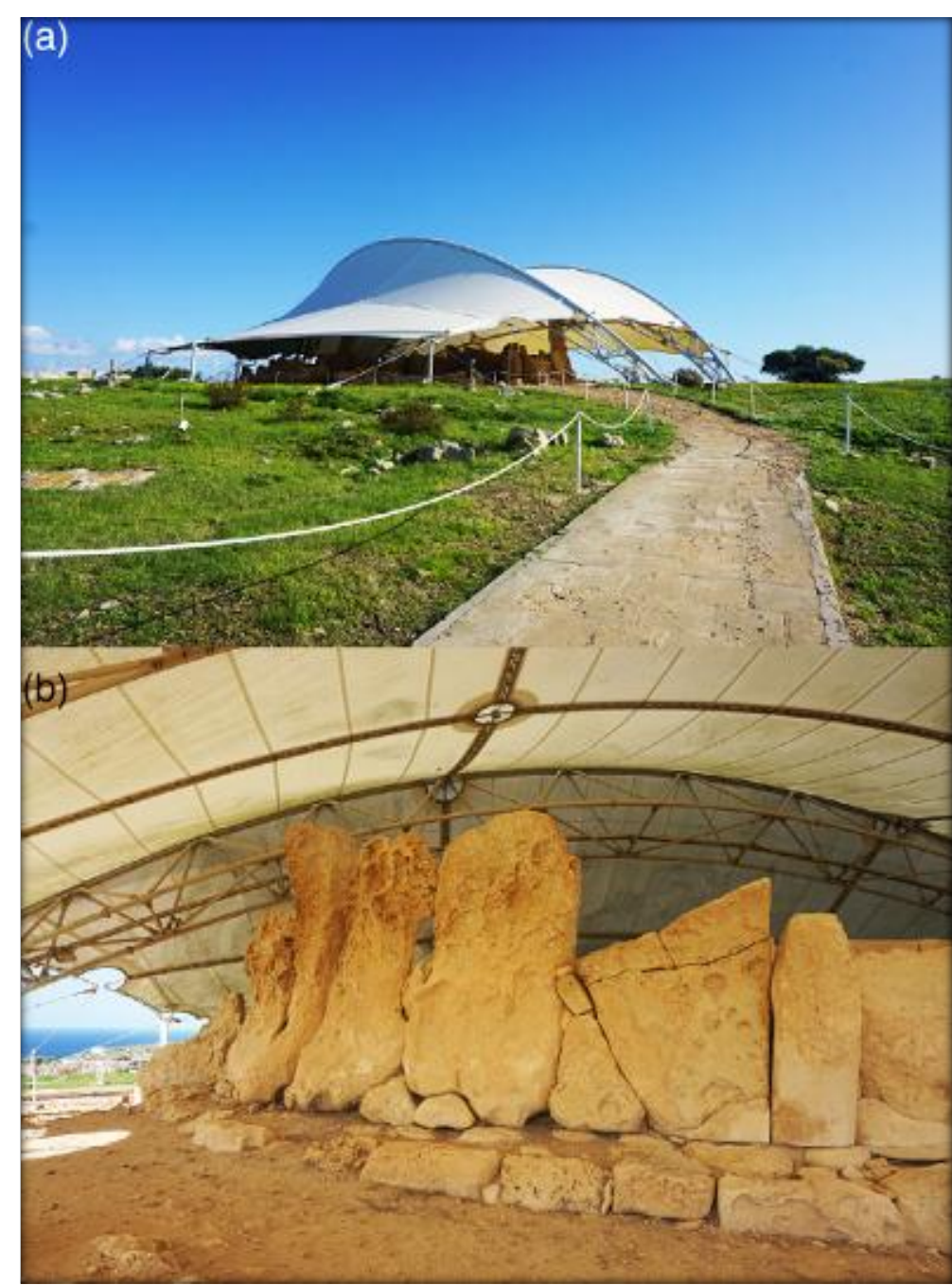


Salt crystallization cycles
Microbial and vegetative growth
Pollution

➤ Collapse, decay and **loss**



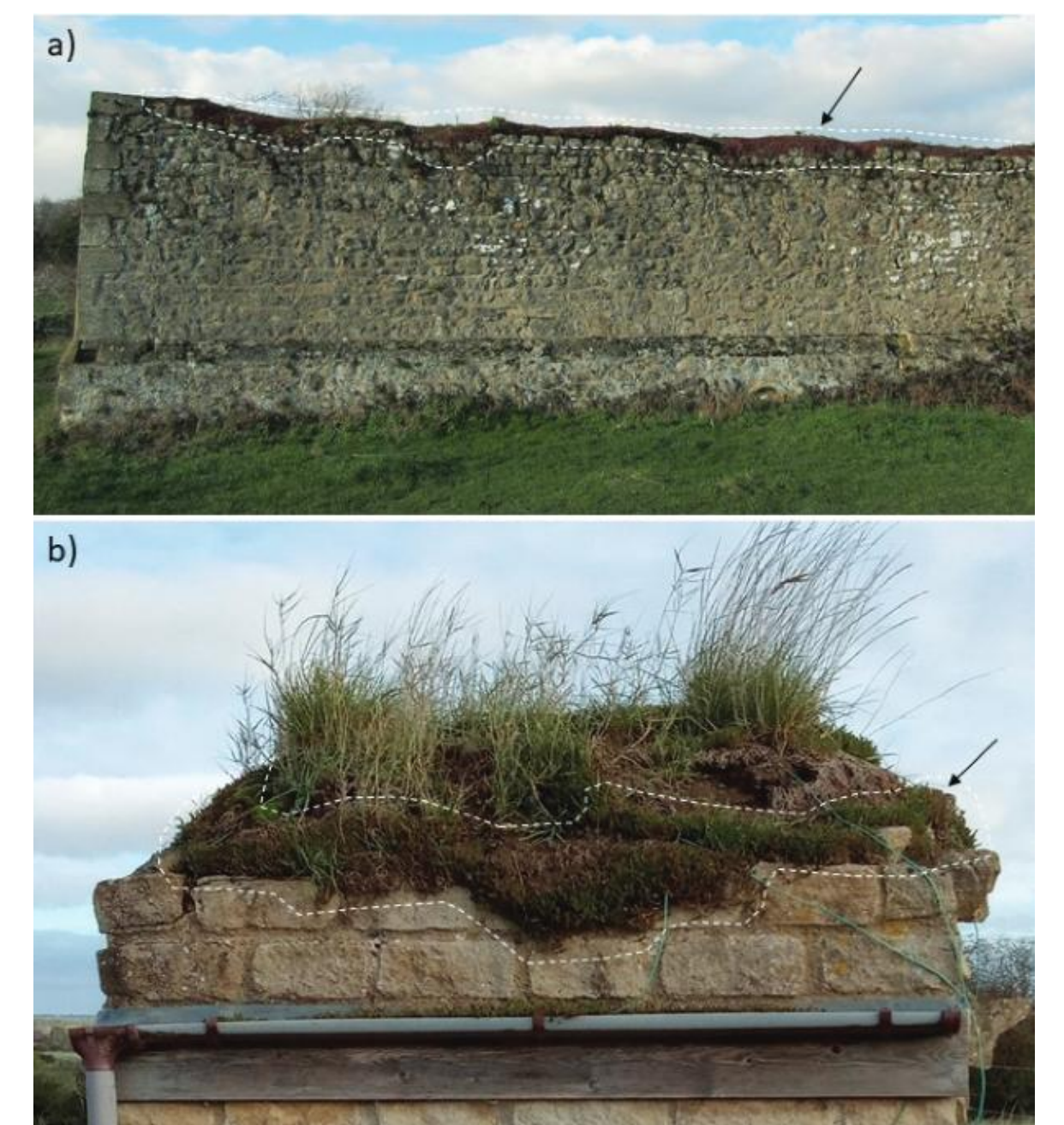
Threats of climate change reported for cultural World Heritage properties © UNESCO World Heritage Centre ⁴



Shelter to protect Haġar Qim Temple, Qrendi, Malta © Dr. Elena Sesana ³

Targeted actions can lower the risks ^{3,5,6}

- Open-sided shelters
- Soft Capping: Plants on top
- Protective coatings
- Backfilling fragile layers
- Improve site drainage and rainwater disposal
- Monitoring
- Global communication and collaboration
- Training, education and awareness-raising



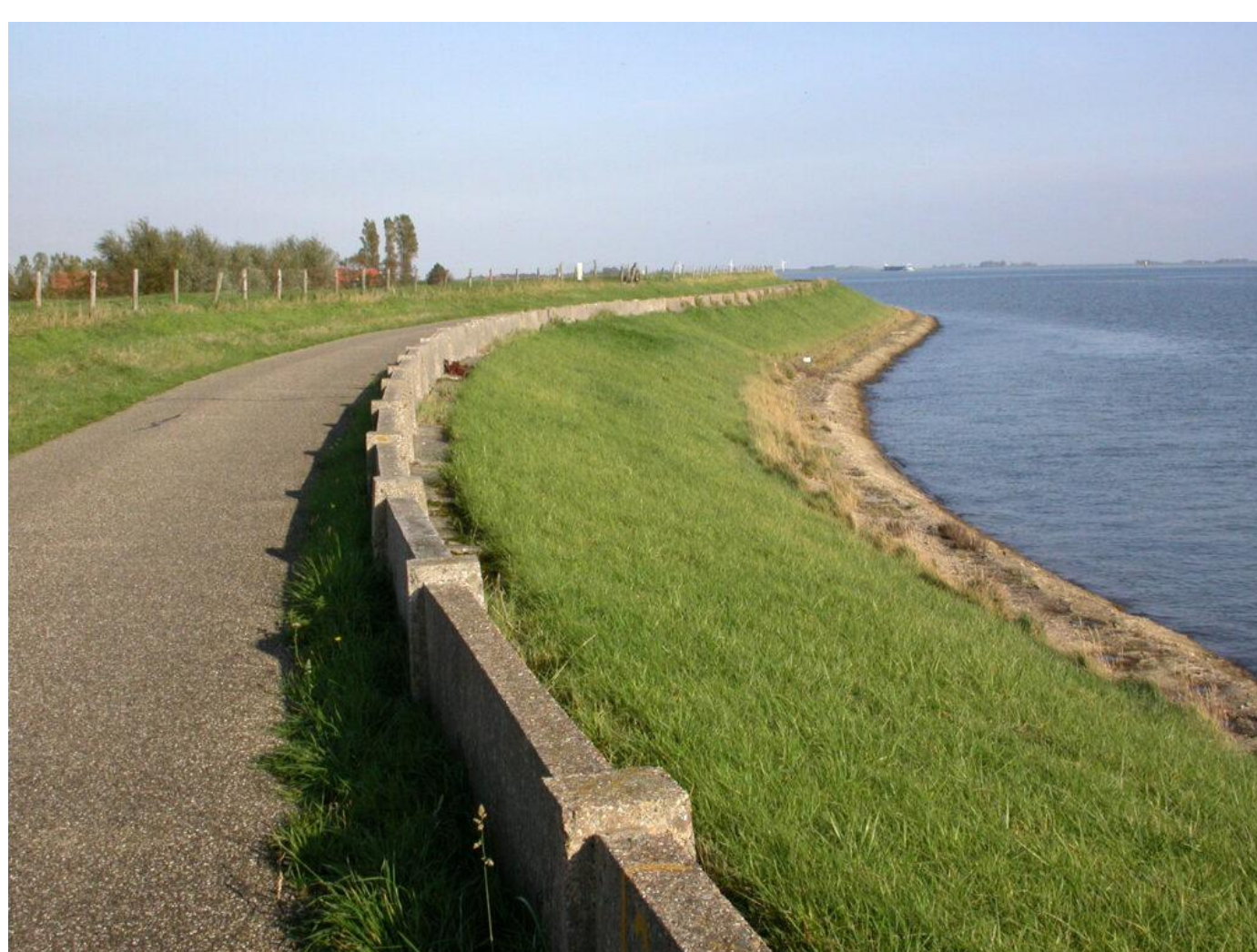
Soft capping on masonry at (a) Godstow Abbey, (b) test walls, England © Heather Viles ⁵

Protecting the past means gaining knowledge for the future

Cultural heritage holds artistic, historical, and spiritual value. It connects us to our past, shapes collective identity, and supports education. Heritage brings people together, fosters community, and offers personal inspiration and a sense of belonging ⁷. But we can also learn from it, for instance how to protect against floods or keep buildings cool in hot climate.

Dykes, canals and dwelling mounds in the Netherlands ⁸

Traditional flood protection techniques helped communities live safely in water-rich landscapes. Even former dyke remains and historic structures offer valuable insights into design, construction, and materials that can inform today's efforts in climate adaptation.



Muralt wall near the Oosterlandpolder, 2008 © Jan van den Broeke ⁹

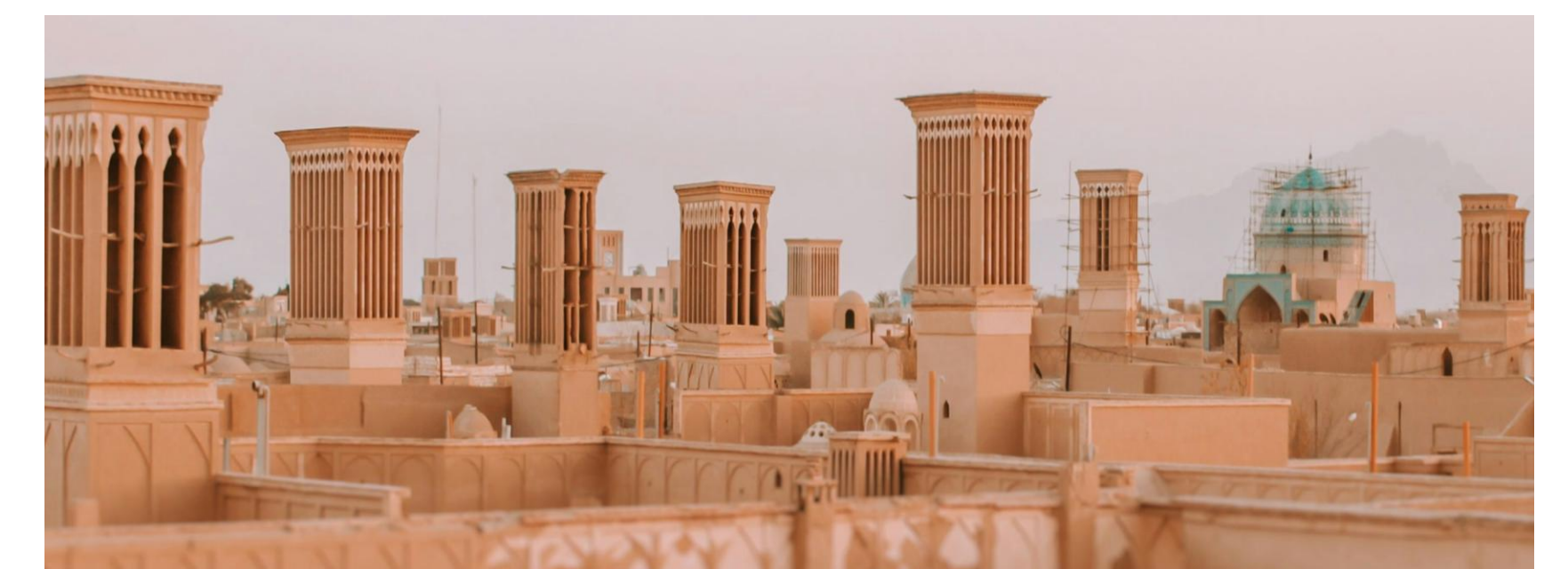


The Dyke of Diemen, 1705 © Jaap Hannes ¹⁰

Wind towers: traditional air conditioners

Wind towers were presumably first used in ancient Persia ¹¹ to keep buildings cool and allow people to live and work comfortably in the hot desert climate. They are designed to capture the wind and push it into the building to provide cool, clean and fresh air ¹².

less energy,
GHG emissions
and carbon than
modern A/C ¹¹



Traditional Wind Tower in the historic city of Yazd, Iran (UNESCO World Heritage) © Hasan Almasi ¹³



Modern Wind Towers at the Qatar University in Doha © Qatar University ¹⁴

Sources:
¹ Brimblecombe, P., Grossi, C. M., & Harris, I. (2010). Climate Change Critical to Cultural Heritage. In H. Gökçekus, U. Türker, & J. W. LaMoreaux (Eds.), *Survival and Sustainability* (pp. 195–205). Springer Berlin Heidelberg. ² Mosoarca, M., Keller, A. I., Petrus, C., & Recolta, A. (2017). Failure analysis of historical buildings due to climate change. *Engineering Failure Analysis*, 82, 666–680. ³ Sesana, E., Gagnon, A. S., Ciantelli, C., Cassar, J., & Hughes, J. J. (2021). Climate change impacts on cultural heritage: A literature review. *WIREs Climate Change*, 12(4), e710. ⁴ UNESCO. (2007). *Climate Change and World Heritage—Report on predicting and managing the impacts of climate change on World Heritage and Strategy to assist States Parties to implement appropriate management responses* (No. 22; World Heritage Reports). World Heritage Centre UNESCO. ⁵ Richards, J., Cooke, E. L., Coombes, M., Jones, J., Viles, H., 2024. Evaluating the robustness of nature-based solutions: future resilience of sediment-based soft capping as a conservation approach for heritage sites in Britain and Ireland. *Physical Geography* 45, 20–38. ⁶ Cassar, J., 2016. Climate Change and Archaeological Sites: Adaptation Strategies. *Cultural heritage from Pollution to climate change*. S.119. ⁷ Klamer, A. (2013). The values of cultural heritage. In I. Rizzo & A. Mignosa, *Handbook on the Economics of Cultural Heritage* (pp. 421–437). Edward Elgar Publishing. ⁸ Fatorić, S., Egberts, L., 2020. Realising the potential of cultural heritage to achieve climate change actions in the Netherlands. *Journal of Environmental Management* 274. ⁹ Zeeuwse Ankers, Dykes, <https://www.zeeuwseankers.nl/en/stories/dykes/>. ¹⁰ Dykes, 1500-1800, <http://dutchdykes.net/history/>. ¹¹ Khalid, A., & Dalilah Dahlan, N. (2023). Wind Catcher: A Lost Architectural Heritage with Timeless Passive Attributes. In K. Hmood (Ed.), *Conservation of Urban and Architectural Heritage—Past, Present and Future*. IntechOpen. ¹² Tolba, M. M. (2014). Wind Towers 'Wind Catchers' A Perfect Example of Sustainable Architecture in Egypt. *International Journal of Current Engineering and Technology*, 4(1). ¹³ City of Yazd. <https://unsplash.com/de/fotos/beigefarbenes-gebäude-tagsuber-jp3OEDO4Q-8>. ¹⁴ Qatar University (2017). *Qatar University Annual Report 2016 – 2017*.