



Historic England

Developing a risk framework for assessing the impacts of climate change on cultural heritage

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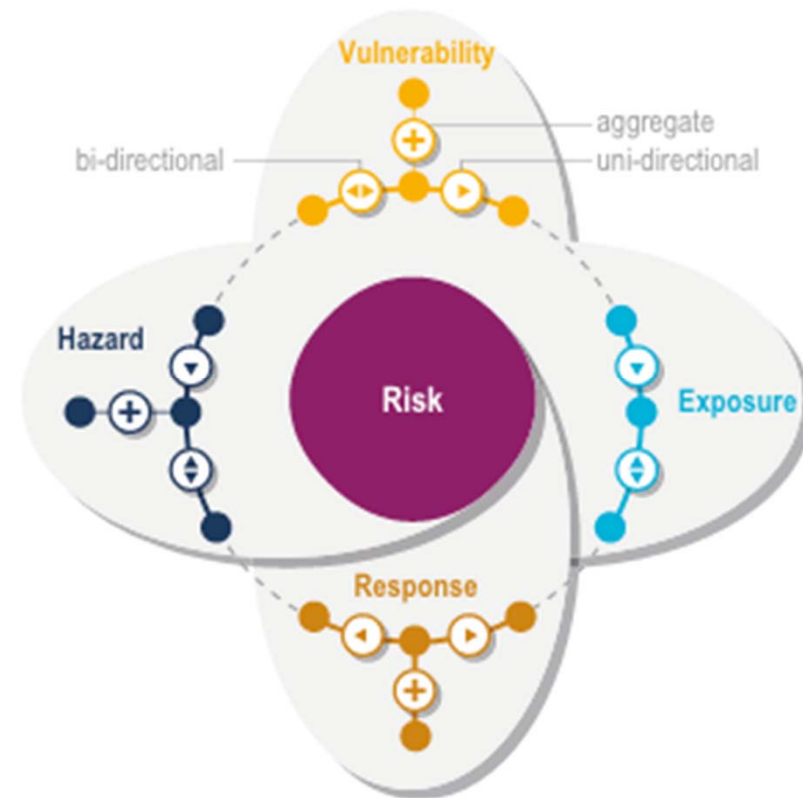


Contents

- The IPCC concept of risk
- Examples of risk assessment approaches
- A case study
- Complexities, datasets

IPCC

- This is the Intergovernmental Panel for Climate Change (IPCC)'s framework for risk which has 4 determinants
 - Hazard
 - Vulnerability
 - Exposure
 - *Response*



AR6 IPCC Risk Framework (Pörtner and Roberts 2022, 147)



Definitions of each term

- Hazard

“The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources (IPCC, 2019b).”

- Vulnerability

“The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC, 2019b).”

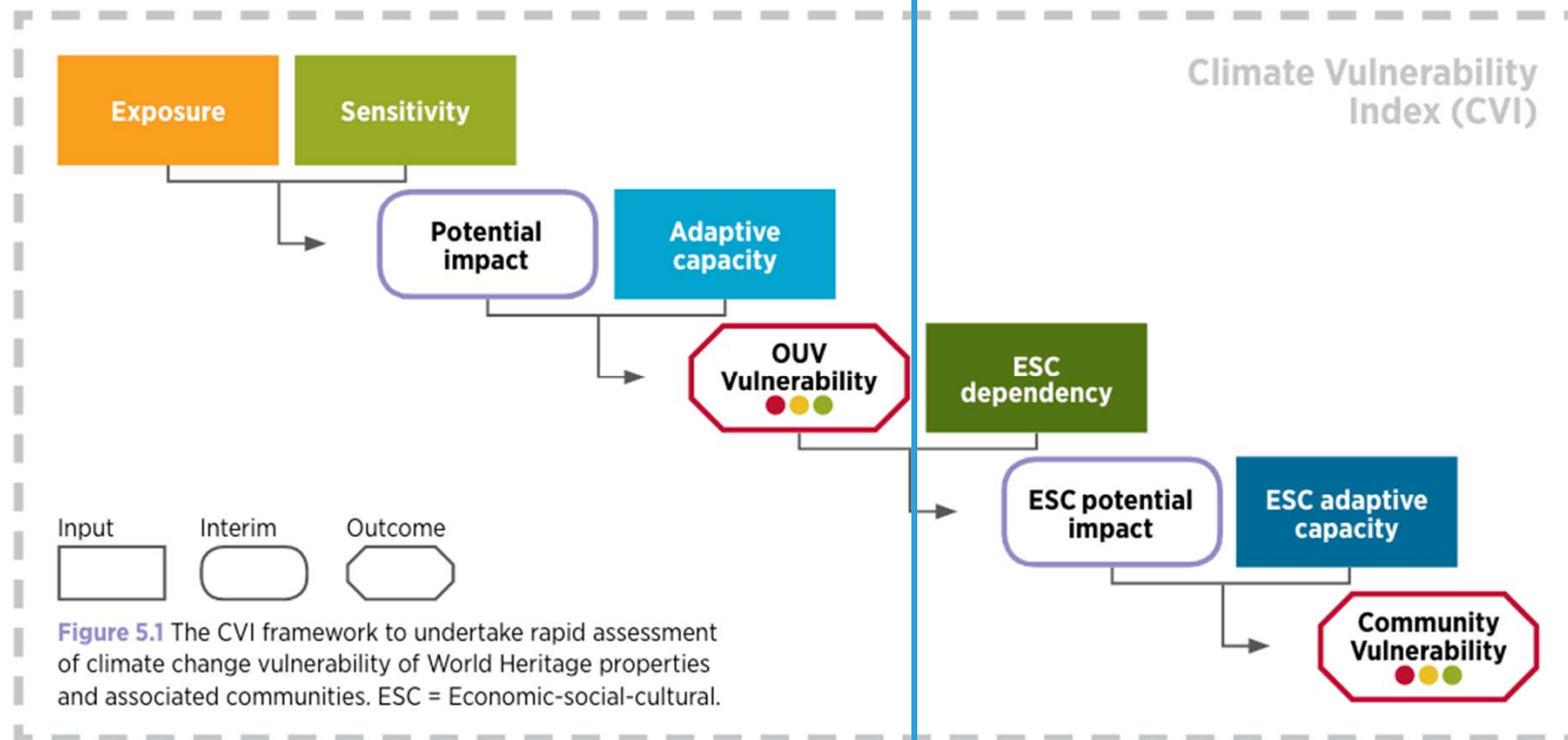
- Exposure

“The presence of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected (IPCC, 2019b).”

- *Response*

Examples of Risk Assessment Approaches

- OUV – Outstanding Universal Value
- ESC – Economic Social Cultural Dependencies





CVI Rapid Assessment

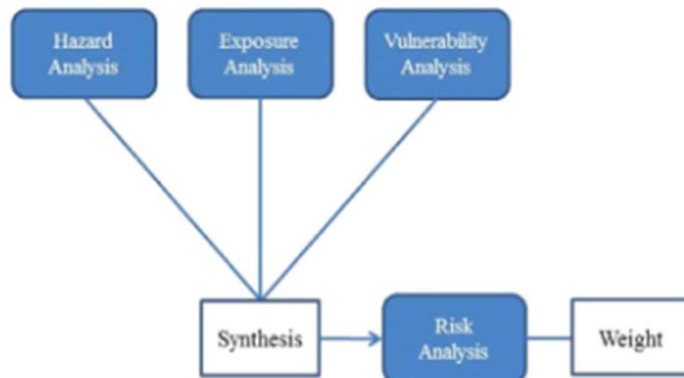
Key climate drivers	Sea Level Change	Precipitation Change	Storm Intensity and Frequency
Exposure	Very likely	Very likely	Possible
Temporal scale	On-going	On-going	Frequent
Trend	Moderate increase	Moderate increase	Slow increase
Exposure	Very likely ○○○○●	Very likely ○○○○●	Likely ○○○●○
Sensitivity	High-very high	High-Very high	High-Very high
Spatial scale	Extensive	Localised	Extensive
Compounding factors	Medium-High probability	High probability	Medium probability
Sensitivity	Very high ○○○○●	Very high ○○○○●	Very high ○○○○●
Potential Impact	Extreme ○○○●	Extreme ○○○●	Extreme ○○○●
Local management response	Moderate	Moderate	Moderate
Scientific/technical support	High	High	High
Effectiveness	Low	Medium	Low-Medium
Adaptive Capacity	Moderate ○●○	High ○○●	Moderate ○●○
OUV Vulnerability	High ○○●	Moderate ○●○	High ○○●
Combined OUV Vulnerability	High ○○●		

Other examples

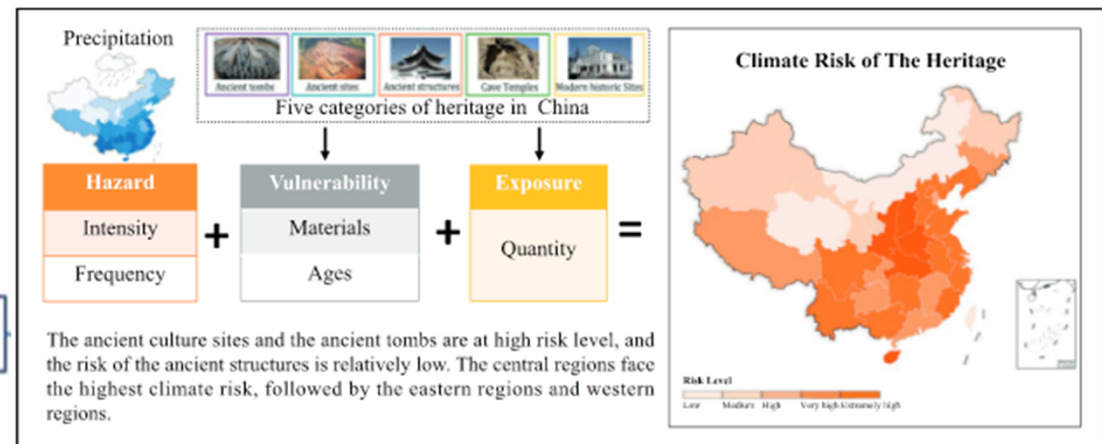


Ireland, national scale adaptation plan (Daly et al 2021)

Australia, Cultural Heritage Risk Index, (Forino et al 2016)



China, Precipitation risk on cultural heritage (Wang et al 2022)



Byland Abbey, North Yorkshire

Hazard:

“The **potential occurrence of a natural or human-induced physical event** or trend that may cause loss of life, injury, or other health impacts, **as well as damage and loss** to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources (IPCC, 2019b).”



Hazards

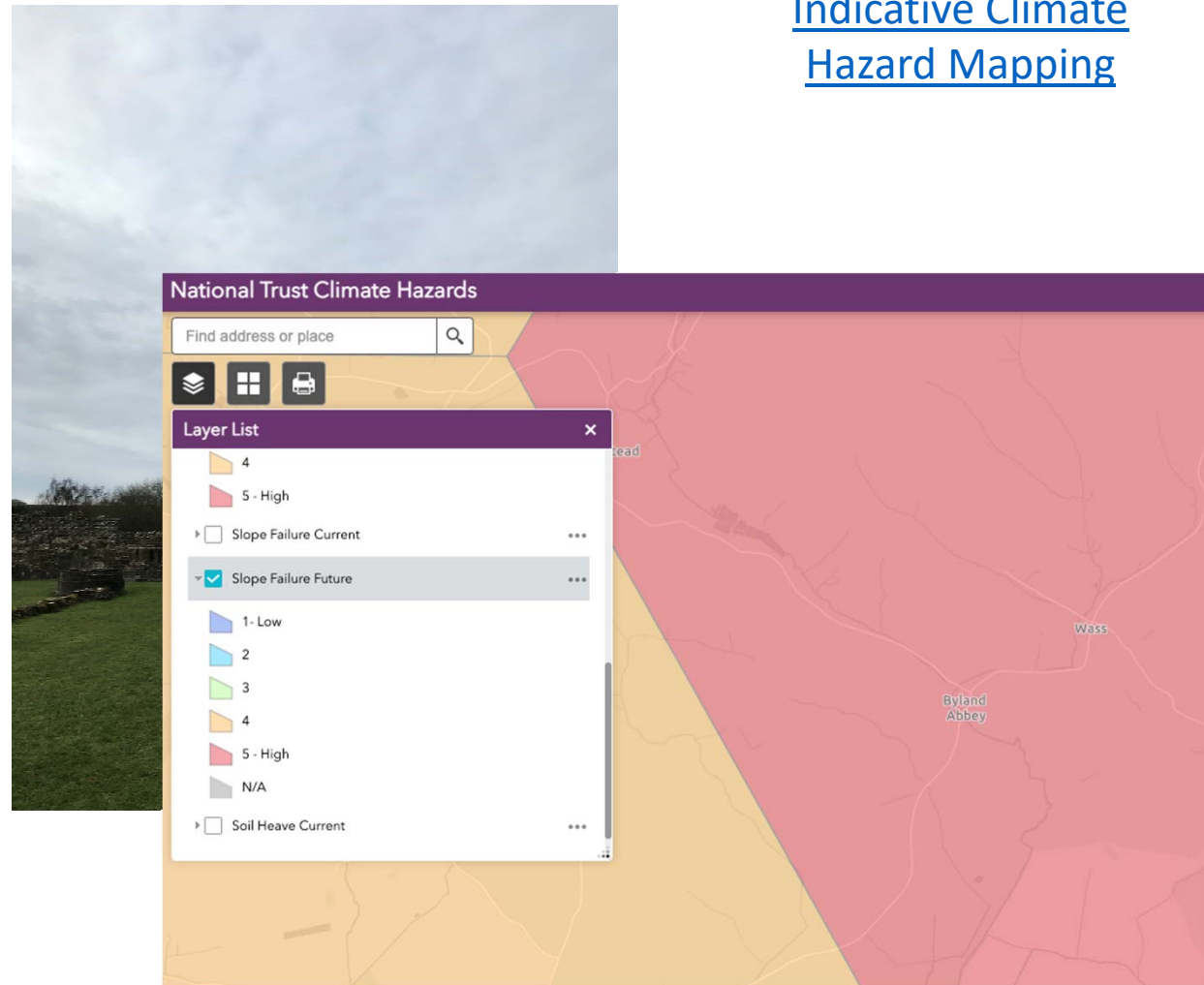
- Increased durations of rainfall with greater intensity
- Increasing annual temperatures

Byland Abbey, North Yorkshire

Hazards:

- From the indicative hazard mapping
 - Overheating and humidity – medium
 - Storm damage – medium low
 - Slope failure – high
 - Soil heave – high
- Wind-driven rain (WDR)

Indicative Climate Hazard Mapping



Byland Abbey, North Yorkshire

Vulnerability:
“The **propensity or predisposition to be adversely affected**. Vulnerability encompasses a variety of concepts and elements including **sensitivity** or susceptibility to harm and **lack of capacity to cope and adapt** (IPCC, 2019b).”



Vulnerability

- Current status: ruin
- Adaptive capacity: actively managed
- Weathering mechanisms: effects of freeze-thaw on the material

Byland Abbey,
North Yorkshire

Vulnerability

- Ruin

Listing Description
Details

BYLAND WITH WASS MAIN STREET SE 57 NW (east side) Byland 4/20 and 5/20
Byland Abbey (previously listed as By land Abbey and Abbey 4.1.55 gateway to the North West) GV I

Abbey church and monastic buildings. **Now ruinous**. Late C12, early C13 and C15. **Limestone ashlar and rubble**. Substantial remains of church including west front standing almost to full height. Ruins of monastic buildings standing to height of approximately 5 metres in places



Byland Abbey, North Yorkshire

Exposure:

“The **presence** of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure, or economic, social, or **cultural assets in places and settings that could be adversely affected** (IPCC, 2019b).”



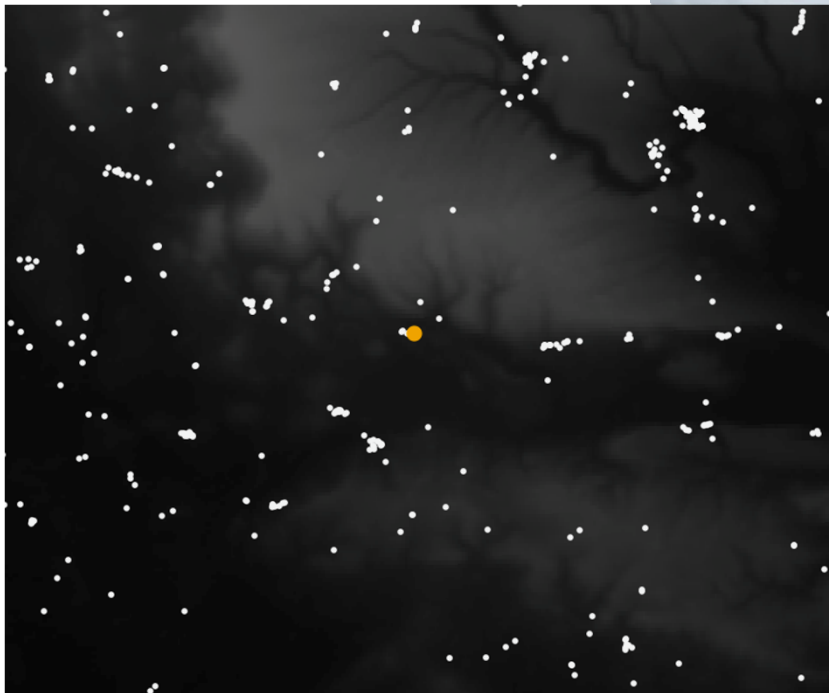
Exposure

- Place in the landscape
- Number of monuments in the area

Byland Abbey,
North Yorkshire

Exposure

- GIS



“Substantial remains of church including west front standing almost to full height. Ruins of monastic buildings standing to height of approximately 5 metres in places”

The [listing description](#)



A complicated
example: Chapel of St
George, Woolwich



Historic England



CHAPEL OF ST GEORGE (RUIN)

CHAPEL OF ST GEORGE (RUIN), GRAND DEPOT ROAD, SE18

Listed on the National Heritage List for England. [Search over 400,000 listed places](#)

II DATES OF MAIN PHASES, NAME OF ARCHITECT: Church of 1863, designed by Thomas Henry Wyatt.

EXTERIOR: After destruction by a flying bomb in 1944 the chapel remains a roofless shell with just the lower parts of the walling remaining, except at the W end where the entrance porch is largely intact. Built in the style of a large Early Christian/Italian Romanesque basilica. It is still an impressive monument.

Pilot

- with the National Heritage List for England (NHLE)
- Summer 2023



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Questions?

Citations

- Daly, C., Engel Purcell, C., Donnelly, J., Chan, C., MacDonagh, M., & Cox, P. (2021). Climate change adaptation planning for cultural heritage, a national scale methodology. *Journal of Cultural Heritage Management and Sustainable Development*, 11(4), 313–329. Scopus. <https://doi.org/10.1108/JCHMSD-04-2020-0053>
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