



# Safeguarding Heritage



## A Vulnerability Assessment of Continental Portugal's UNESCO World Heritage Sites

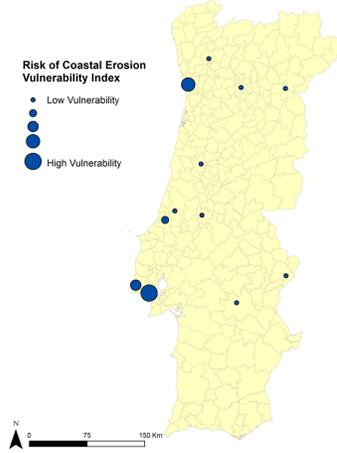
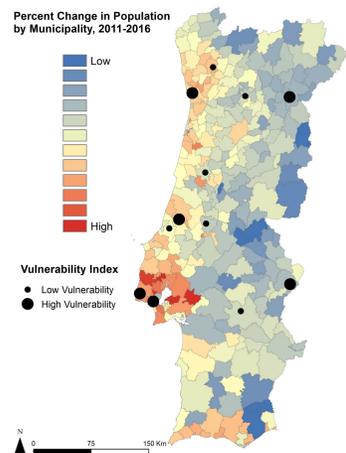
### Background

Cultural heritage lies at the intersection of several themes in international affairs. As the world adapts to a changed climate, and as the nature of conflict becomes increasingly localized, archeologists and policymakers will be faced with finding new, sustainable methods of preserving the world's cultural patrimony. In so doing, they will have to balance the demand for access by tourists with the cultural, social, and developmental needs of the host community. Furthermore, they will take on a progressively editorial position as the quantity of sites in need of preservation outpaces the provision of resources required to deal with them.

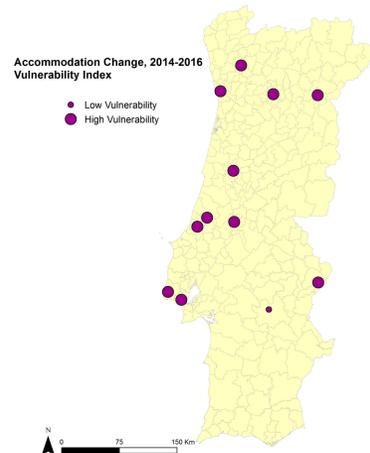
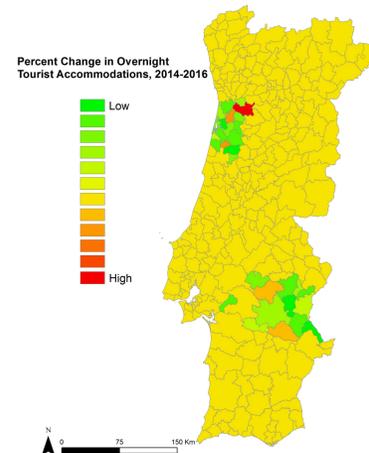
Since the 1974 Carnation Revolution that ended a half-century of fascist rule, Portugal has leveraged its immense cultural heritage resources for economic development, nation branding, and the solidification of domestic democratic institutions. As Portugal has recently experienced a boom in tourism, the Portuguese government is seeking to expand its network of internationally recognized heritage sites through the UNESCO World Heritage program, while trying to maintain those already inscribed on the list. This project seeks to understand which of the twelve UNESCO World Heritage sites in continental Portugal are most vulnerable to destruction based on four criteria: change in host community population, change in tourist visitation rates, and proximity to areas at risk of coastal erosion and forest fires. By knowing the degree to which each site faces specific threats, the Portuguese government and UNESCO can take preventative measures to halt or mitigate the human and environmental factors threatening the country's network of UNESCO World Heritage sites.

### Population

### Coastal Erosion



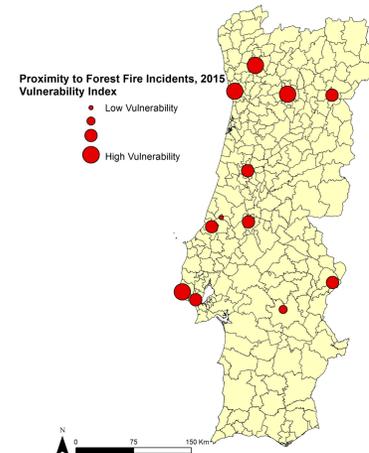
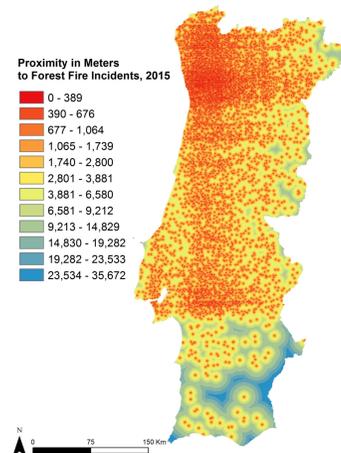
### Overnight Tourist Accommodations



### Methodology

To determine which of Portugal's UNESCO sites are most vulnerable to human and environmental destruction, I created a vulnerability score, at the municipal level, for each of the four indicators listed above. Operating under the assumption that too large of a shift, either positive or negative, in host community population could have a destabilizing effect on the upkeep of cultural heritage resources, I coded heritage sites in municipalities with extremely high or low percent change in population between 2011 and 2016 as 3, minor changes in population were scored as 2, and negligible or no change was scored as 1. As a proxy for changes in visitation rates to UNESCO sites, I considered the change in overnight tourist accommodations between 2014 and 2016. Municipalities were assigned a vulnerability score ranging from 1 to 6, with 1 representing low (or negative) change in overnight tourist accommodations, and 6 representing very high growth. To determine those sites most at risk of coastal erosion, I created five erosion zones based on the Euclidean distance from the coast. Sites within the closest coastal erosion zone received a 5, those in the next closest a 4, and so on. To identify the sites most at risk of forest fire, I considered their proximity to incidents of forest fires in 2015. After conducting a density analysis to find hotspot areas prone to forest fires, I assigned vulnerability scores to sites falling within one of six proximity zones, with those closest receiving a 6, those next closest a 5, and so on. The scores were weighted to reflect the general severity of each threat, with population change weighted as .15, tourist accommodations as .3, coastal erosion as .25, and forest fires as .3. Each score was multiplied by the appropriate weight, and each of the four scores for each site were added together to create a composite vulnerability score. These scores fell within a composite index of 1 to 5.3. For final analysis, these scores were then grouped into four categories: high, high-mid, low-mid, and low vulnerabilities.

### Forest Fires



UNESCO World Heritage Site	Location	Population Change (-15)	Tourist Accommodation (.30)	Coastal Erosion (.25)	Forest Fires (.3)	Total Vulnerability
Historic Centre of Oporto, Luiz I Bridge, and Monastery of Serra do Pilar	Porto	0.3	1.2	1	1.8	4.3
Monastery of the Hieronymites and Tower of Belém	Lisbon	0.3	1.2	1.25	1.5	4.25
Cultural Landscape of Sintra	Sintra	0.3	1.2	0.75	1.8	4.05
Historic Centre of Guimarães	Guimarães	0.15	1.2	0.25	1.8	3.4
Alto Douro Wine Region	Lamego	0.15	1.2	0.25	1.8	3.4
Monastery of Alcobaça	Alcobaça	0.15	1.2	0.5	1.5	3.35
Garrison Border Town of Elvas and its Fortifications	Elvas	0.3	1.2	0.25	1.5	3.25
Prehistoric Rock Art Sites in the Côa Valley and Siega Verde	Vila Nova de Foz Côa	0.3	1.2	0.25	1.5	3.25
University of Coimbra Alta and Sofia	Coimbra	0.15	1.2	0.25	1.5	3.1
Convent of Christ	Tomar	0.15	1.2	0.25	1.5	3.1
Monastery of Batalha	Batalha	0.3	1.2	0.25	0.9	2.65
Historic Centre of Évora	Évora	0.15	0.9	0.25	1.2	2.5

### UNESCO World Heritage Sites Composite Vulnerability Index

- Low Vulnerability
- Low-Mid Vulnerability
- High-Mid Vulnerability
- High Vulnerability

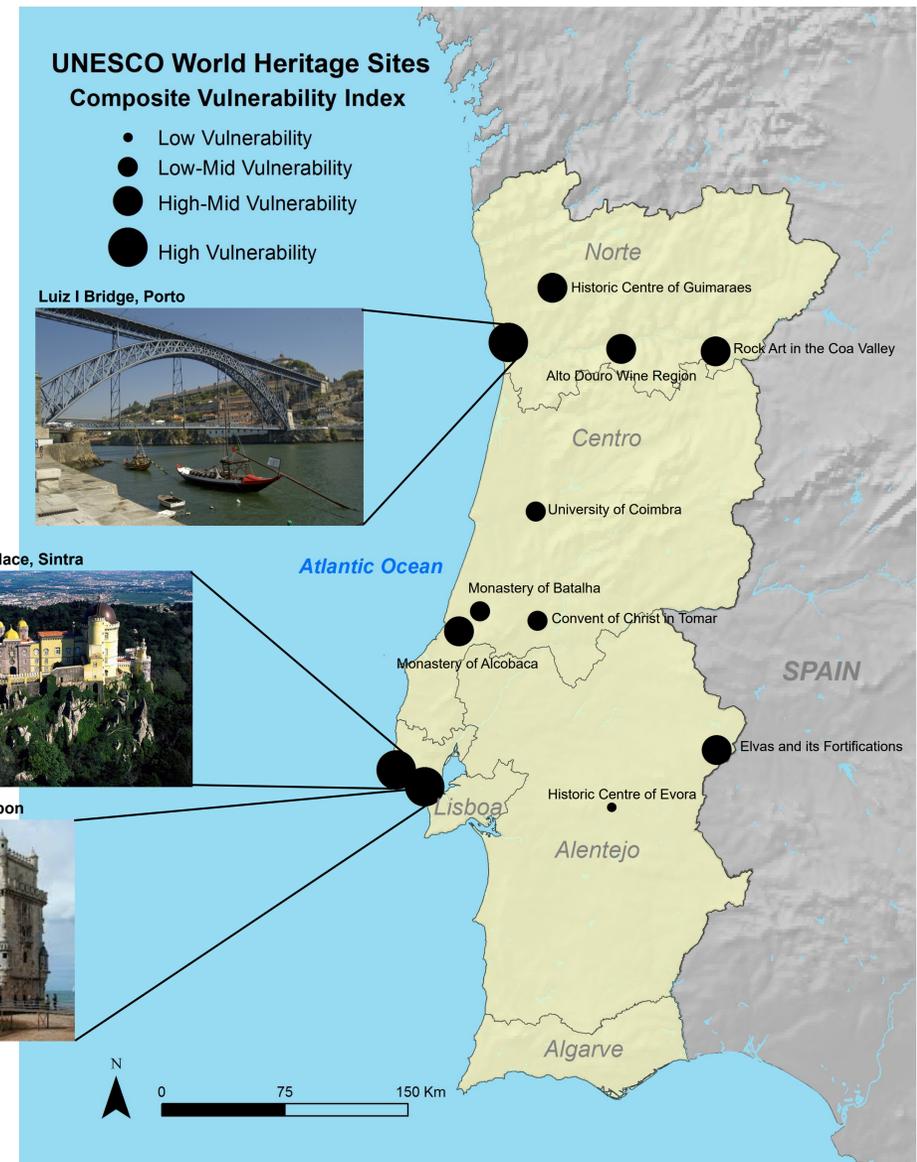
Luiz I Bridge, Porto



Pena National Palace, Sintra



Tower of Belém, Lisbon



### Conclusion

Of the twelve UNESCO World Heritage sites in continental Portugal, three were found to have a high vulnerability, five have a high-mid vulnerability, three have a low-mid vulnerability, and the remaining one has a low vulnerability. The implications from this analysis are that Portugal must allocate more resources to address the factors that threaten its cultural heritage. To ensure that Portugal's cultural heritage remains intact for future generations, the government of Portugal must seek support from other partners across all sectors. Finally, this project should be considered as just a starting point for future spatial analysis. Areas for future research include all of Portugal's UNESCO World Heritage sites, including those located in the Autonomous Regions of the Azores and Madeira, as well as those sites awaiting inscription on the World Heritage List, or sites of cultural importance that have not received international designation. Furthermore, a full vulnerability assessment should be conducted that takes into consideration all 83 factors identified by UNESCO as threatening the preservation of the world's cultural heritage.

Coordinate Systems: WGS 1984 UTM Zone 29N, GCS WGS 1984 (overview map)  
 Projections: Transverse Mercator, Equidistant Conic (overview map)  
 Sources: Portuguese National Institute of Statistics (INE), Portuguese Institute for Conservation of Nature and Forests (ICNF), European Environment Agency (EEA), ESRI Data Maps 10, Wikimedia Commons, UNESCO World Heritage Centre, UNESCO World Heritage Committee, Global Administrative Areas Database (GADM), GIK, Natural Earth

Cartographer: Nelson Tamayo

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