

**Form for Dissertation/thesis/diploma/master thesis on WORLD HERITAGE  
to be sent to UNESCO, [wh-info@unesco.org](mailto:wh-info@unesco.org)**

**First name:** Emmanuel

**Last name:** Eze

**Your academic institution:** University of Heidelberg

**Street Address of Institution:** Institute of Geography, Im Neuenheimer Feld 348,

**City:** Heidelberg

**Postal Code:** 69120

**Country:** Germany

**Institution website:** [https://www.geog.uni-heidelberg.de/index\\_en.html](https://www.geog.uni-heidelberg.de/index_en.html)

**Nationality of author:** Nigerian

**Email of author:** [emmanueleze1900@gmail.com](mailto:emmanueleze1900@gmail.com)

**Language of thesis:** English

**Title of thesis:** Exploring capacity gaps for improved disaster risk reduction within  
UNESCO-designated heritage sites in Africa

**Type of thesis:** Doctoral dissertation

**Supervisor of thesis:** Professor Dr Alexander Siegmund

**Institution of Supervisor:** Department of Geography, Heidelberg University of  
Education & UNESCO Chair on World Heritage and Biosphere Reserve Observation  
and Education

**Supervisor's professional e-mail:** [siegmund@ph-heidelberg.de](mailto:siegmund@ph-heidelberg.de)

**World Heritage/UNESCO resources used:**

- Survey and interview responses by UNESCO actors
- World Heritage Website

**Date of (foreseen) submission of thesis:** October 28, 2024

**Mention of thesis in other publications:**

- University online publication of thesis – <https://archiv.ub.uni-heidelberg.de/volltextserver/35581/>

**Date:** February 24, 2025

# Abstract

The increasing occurrence of hazardous events like floods and droughts, intersecting with socio-environmental exposure and vulnerability, has escalated disasters, particularly impacting vulnerable regions in Africa. Natural and cultural heritage sites in Africa are vital for sustainability, linking past, present, and future generations while offering significant socioeconomic tourism-related benefits. Threats to these sites in Africa numbering 268 can alter host communities' identities and deprive future generations of their benefits. However, disaster exposure, vulnerability, and threat levels at these sites remain understudied. Also, the capacity levels and gaps of key actors are largely unknown. Addressing these gaps is crucial for sustainable protection against disasters and mitigating significant threats posed by natural and human-induced hazards.

The dissertation presented here uses exploratory cross-sectional mixed methods and comprehensively assesses disaster risks and capacities in Africa, aligning with the United Nations' Sendai Framework for Disaster Risk Reduction. It aims to answer two overarching research questions: (i) What is the level of exposure of heritage sites to disaster hotspots in Africa? And (ii) What is the capacity level of African UNESCO site actors for disaster risk management? These two broad questions are further split into seven sub-questions. The research utilized both primary data from surveys and interviews with UNESCO actors, and secondary data from relevant policy documents and the Index for Risk Management data. Analytical techniques, including descriptive statistics, mean difference tests, discrepancy analyses and machine learning, were employed to address the research questions.

The assessment reveals that 41 % of UNESCO-designated heritage sites in Africa are located in disaster hotspots. The nature of disasters in Africa is found to be predominantly social, and the vulnerability of these sites to increasing disaster risks is primarily driven by factors such as violent conflicts, population displacement, and poverty. Furthermore, the results indicate that while UNESCO actors in Africa possess strong competencies in disaster risk management, there is a noticeable gap in adopting innovative strategies and technologies for risk reduction. Additionally, hazard exposure, risk perception, and resource availability significantly influence disaster preparedness at these sites.

In conclusion, this thesis emphasizes the urgent need for extensive policy changes to address interconnected social disaster risk drivers in Africa and the imminent threats posed to the numerous heritage sites within hotspots. It also highlights capacity deficiencies among UNESCO actors demonstrating the importance of tailored professional development programs to enhance disaster risk management effectiveness. Bridging these gaps is essential for reducing disaster risk exposure to Africa's collective heritage, advancing resilience and sustainable futures.

**Journal publications that make up the thesis (*all open access and free-to-read*):**

- Eze, E., & Siegmund, A. (2024a).** Identifying disaster risk factors and hotspots in Africa from spatiotemporal decadal analyses using INFORM data for risk reduction and sustainable development. *Sustainable Development*, 1–22. <https://doi.org/10.1002/sd.2886>
- Eze, E., & Siegmund, A. (2024b).** Analyzing important disaster risk factors for enhanced policy responses in perceived at-most-risk African countries. *Environments*, 11(2):27. <https://doi.org/10.3390/environments11020027>
- Eze, E., & Siegmund, A. (2024c).** Next-generation core competency gaps for disaster risk management and preparedness in UNESCO-designated heritage sites. *Sustainable Futures*. 8 (100239), 11, <https://doi.org/10.1016/j.sfr.2024.100239>
- Eze, E., & Siegmund, A. (2024d).** Appraising competency gaps among UNESCO-designated heritage site actors in disaster risk reduction innovations. *Progress in Disaster Science*, 22 (100321), 9. <https://doi.org/10.1016/j.pdisas.2024.100321>
- Eze, E., & Siegmund, A. (2024e).** Exploring factors of disaster preparedness in UNESCO-designated heritage sites. *Geography and Sustainability*. 5 (3), 392-404. <https://doi.org/10.1016/j.geosus.2024.04.001>
- Eze, E., Petersen, M. & Siegmund, A. (2024).** Enhancing protection motivation for disaster preparedness among actors at UNESCO-designated heritage sites in Africa. *International Journal of Disaster Risk Reduction*, 109 (104599). <https://doi.org/10.1016/j.ijdrr.2024.104599>

# Contents

Dedication	ii
Acknowledgments	iii
Abstract	v
Zusammenfassung	vi
Declaration	viii
Publications	ix
Contents	x
List of Figures	xiv
List of Tables	xv
<b>Part I: Synopsis</b>	<b>1</b>
I.1. Introduction	2
I.1.2. Research aims and questions	6
I.1.3. Thesis Intersection with the Sendai Framework for Disaster Risk Reduction	7
I.1.4. Publication overview	8
I.2. Disaster risk assessment	11
I.3. Capacity assessment for disaster risk management	14
I.4. Research methods	18
I.4.1. Research design	18
I.4.2. Research paradigm	18
I.4.3. Research approach	20
I.4.4. Sampling	20
I.4.5. Data collection	21
I.4.6. Data analyses	23
I.4.7. Ethical practices	24
I.5. Scientific contributions	27
I.5.1. Research Question 1	27
I.5.2. Research Question 2	31
I.5.3. Integration of quantitative and qualitative results	46
I.5.4. Summary of thesis' contributions	52
I.6. Synopsis and conclusions	54
I.6.1. Results synthesis	54
I.6.2. Conclusions	59
I.6.3. Recommendations	61
I.6.4. Limitations	62
I.6.5. Outlook	64
<b>References (Part I)</b>	<b>66</b>
<b>Part II: Publications</b>	<b>76</b>
<b>II.1. Identifying disaster risk factors and hotspots in Africa from spatiotemporal decadal analyses using INFORM data for risk reduction and sustainable development</b>	<b>77</b>
II.1.1. Introduction	77
II.1.2. Conceptual framework of the study	80
II.1.3. Methods	88
II.1.4. Results	94
II.1.5. Discussion	109
II.1.6. Conclusion	112
II.1.7. Limitations of the study	113
II.1.8. Acknowledgements	114

II.1.9. References	114
Appendix (Paper 1)	122
<b>II.2. Analyzing Important Disaster Risk Factors for Enhanced Policy Responses in Perceived at-Most-Risk African Countries</b>	<b>133</b>
II.2.1. Introduction	134
II.2.2. Potential Contributions of This Study	135
II.2.3. Materials and Methods	136
II.2.4. Results	141
II.2.5. Discussion	146
II.2.6. Conclusions	149
II.2.7. Limitations and Suggestions for Further Research	150
II.2.8. Appendix A	151
II.2.9. References	156
<b>II.3. Next-generation core competency gaps for disaster risk management and preparedness in UNESCO-designated heritage sites</b>	<b>161</b>
II.3.1. Introduction	162
II.3.2. Methods	167
II.3.3. Results	171
II.3.4. Discussion and implications	185
II.3.5. Conclusion	187
II.3.6. Limitations of the study	188
II.3.7. Appendix	189
II.3.7. References	189
<b>II.4. Appraising competency gaps among UNESCO-designated heritage site actors in disaster risk reduction innovations</b>	<b>195</b>
II.4.1. Introduction	196
II.4.2. Methods	203
II.4.3. Results	206
II.4.4. Discussion	211
II.4.5. Conclusion	213
II.4.6. References	215
<b>II.5. Exploring factors of disaster preparedness in UNESCO-designated heritage sites</b>	<b>222</b>
II.5.1. Introduction	223
II.5.2. Methods	229
II.5.3. Results	233
II.5.4. Discussion	244
II.5.5. Conclusion	248
II.5.6. References	250
II.5.7. Supplementary materials (results)	255
<b>II.6. Enhancing protection motivation for disaster preparedness among actors at UNESCO-designated heritage sites in Africa</b>	<b>267</b>
II.6.1. Introduction	268
II.6.2. Methods	270
II.6.3. Findings	276
II.6.4. Discussion	292
II.6.5. Conclusion	294
II.6.6. References	295
<b>Appendices</b>	<b>300</b>