GIS MULTISOURCE DATA FOR THE SEISMIC RISK ASSESSMENT OF URBAN AREAS

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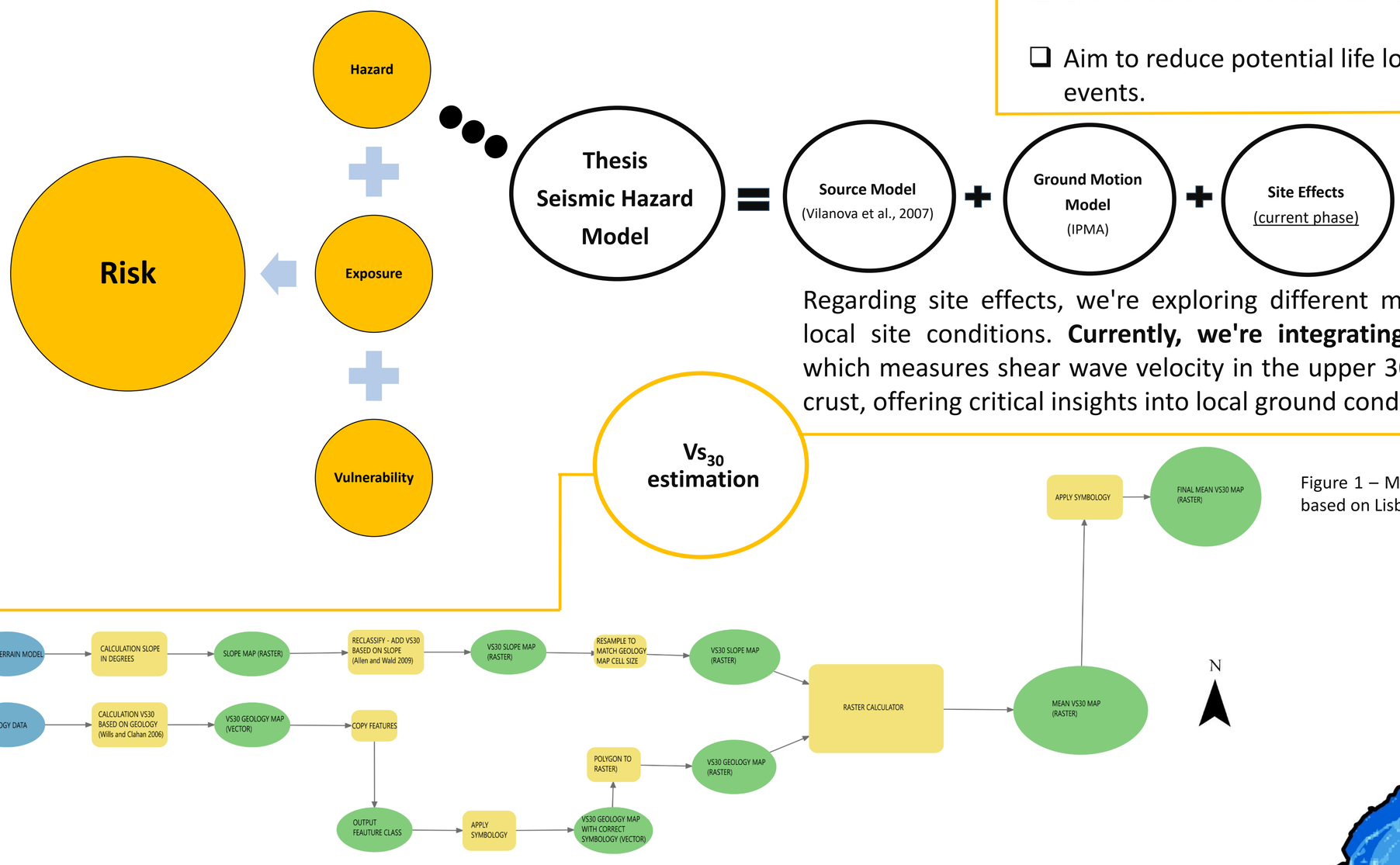
1. Introduction

In 2020, natural disasters globally affected around 100 million people, causing substantial economic and human losses. The population density in low-lying coastal or riverside areas heightens the risk of significant impacts from natural disasters.
Due to its location, Portugal's tectonic environment induces low to moderate seismic and co-seismic hazards with the potential for considerable economic and human losses, especially in urban areas like Lisbon, underlying the urgency for enhanced risk assessment and preparedness strategies. While robust seismic risk models exist for Lisbon, the absence of a user-friendly tool capable of automatically estimating real-time earthquake damages and safe rescue pathways is a notable gap. This is where the proposed 3D web-GIS platform will play an important role.

2. Objectives

- ❑ Provide real-time maps highlighting vulnerable areas.
- ❑ Incorporate 3D building models to improve undestanding of potential impacts.
- ❑ Enable identification of high-risk zones.
- ❑ Offer an interactive user-friendly platform.
- ❑ Aid policymakers and urban planners.
- ❑ Help in planning safe rescue pathways and prioritizing response efforts.
- ❑ Enchance overall urban resilience.
- ❑ Aim to reduce potential life loss and economic damages in seismic events.

3. Seismic Risk Analysis



Regarding site effects, we're exploring different methods to account for local site conditions. **Currently, we're integrating the Vs_{30} parameter**, which measures shear wave velocity in the upper 30 meters of the Earth's crust, offering critical insights into local ground conditions.

Figure 1 – Model built for estimation of Vs_{30} in ArcGIS Pro based on Lisbon geological data and digital terrain model.

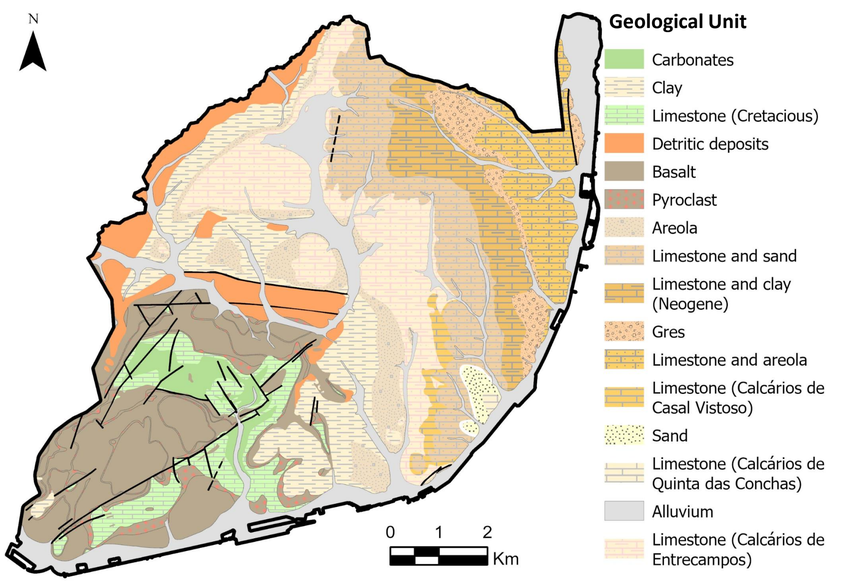


Figure 2 – Simplified Geological Map of Lisbon city, based on the geological map 34-D Lisboa and 34-B Loures at scale 1:50 000.

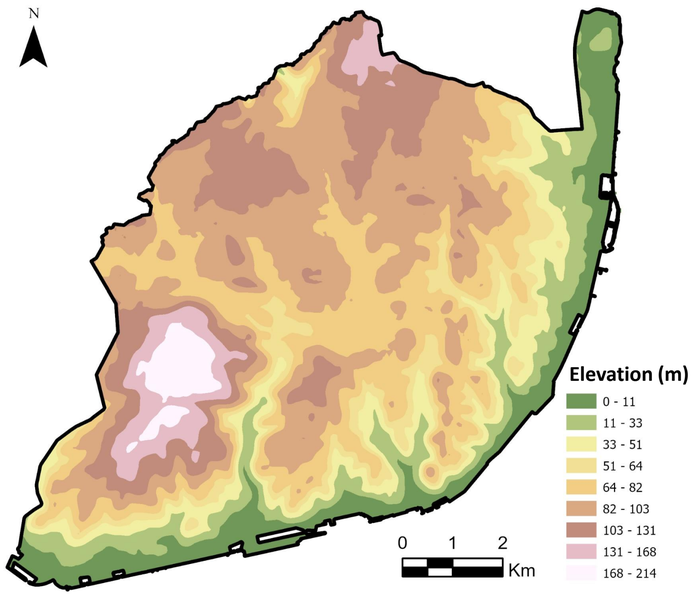


Figure 3– Digital Terrain Model of Lisbon city.

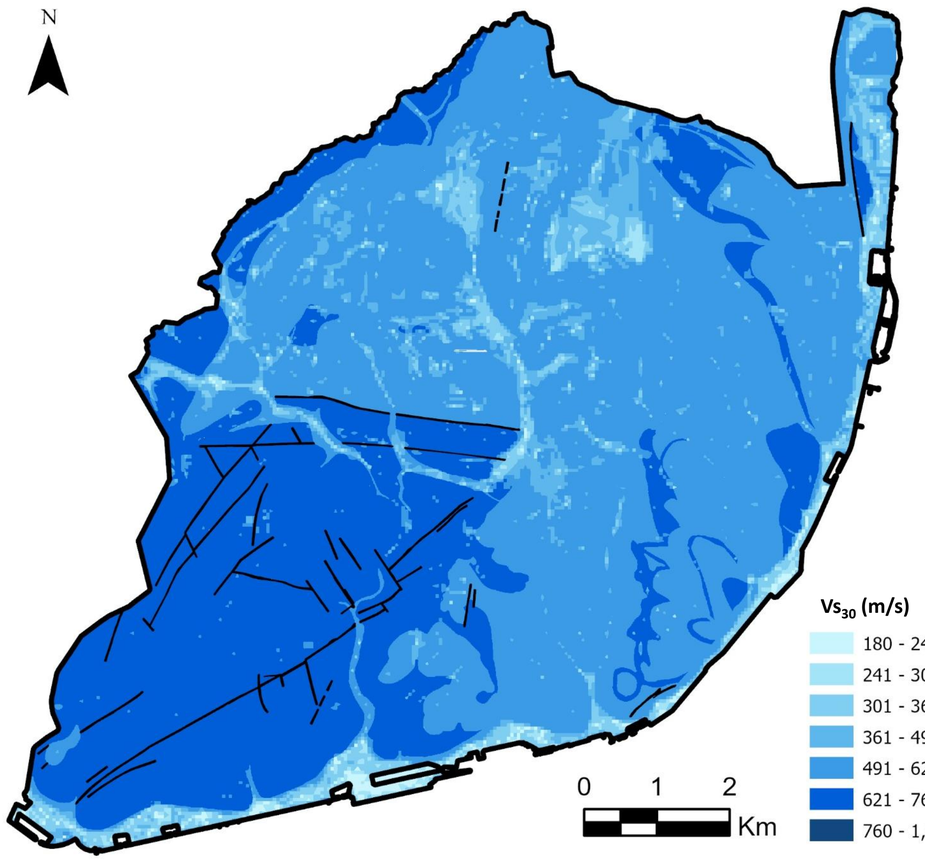


Figure 4 – Mean Vs_{30} map based on geology and topographic data for Lisbon city. Vs_{30} intervals as used in Silva et al., 2015

4. Conclusion

In conclusion, while the thesis current goal is to finalize the seismic hazard model, it's important to note that it remains a work in progress. We continue to review additional inputs and considerations to enhance its accuracy and effectiveness.

References

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