IMFSE MSc Thesis at Division of Fire Safety Engineering| Lund University (LTH) | Presented 2024-05-27.

Amina Labhiri

Supervisors: Dr Enrico Ronchi (LTH), Arthur Rohaert (LTH)

Examiner: Dr Håkan Frantzich (LTH)

INFORMING WILDFIRE EVACUATION GUIDELINES IN TOURISTIC AREAS

Popular Science Summary

Wildfires are increasing globally, and evacuating touristic areas where forests meet human communities is challenging due to tourists' unfamiliarity with their surroundings. This thesis aims to minimize the research gap in this area. It identifies the key factors influencing tourists' decision-making during wildfire evacuations. Additionally, it evaluates the effectiveness of current simulation tools in modelling these evacuations.

This work conducted a thorough literature review using the PRISMA framework to gather information on the factors influencing the evacuation behaviour of tourists in wildfire scenarios. The scooping review covered 23 varied relevant papers. A systematic methodology was employed to refine the variables extracted from the selected papers by iteratively refining them at various levels. 10 variables were presented at the end of this part of the thesis work namely property attachment, past-experience, preparedness, safety culture, risk perception, socio-demographics, interaction with authorities, place of residence, length of stay, transportation mode, information and group dynamics.

Following this, a set of tourist archetypes was identified based on a conceptual methodology. The tourist archetypes were defined by comparing the existing archetypes related to residents in wildfire evacuations and the likely impact of the selected variables from the literature review.

A simulation model of a case study involving tourists evacuating from a campsite was developed (Punta Milà campsite in northeastern Spain). This modelling part evaluates the effectiveness of available modelling tools in representing tourist evacuations during wildfires and pinpointing the stages of the evacuation process that have the greatest impact on total evacuation time.

Two software programs were used in this part of the work. The first, Pathfinder software, was used to simulate the pedestrian movement of tourists inside the campsite. The second, SUMO software, was used to simulate the movement of vehicles because a part of the evacuation process includes traffic evacuation. Since the pedestrian model (Pathfinder) and the traffic model (SUMO) are not integrated, Python code was used to convert the output from Pathfinder into a suitable format to be used as input for SUMO.

This thesis uncovered the limitations of current simulation tools in modelling the wildfire evacuation of tourists. It recommends explicitly incorporating the interaction between tourists and vehicles, integrating the pedestrian and traffic models, and accounting for human behaviour inputs in the traffic models. This thesis also investigates research gaps based on the literature review.

These suggestions help to refine and inform guidelines for wildfire evacuation in touristic areas.