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E. Maillé, M.M. Fernandez Ramiro, C. Bouillon, C. Sirca

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Topic 5 Wild fire risk in the rural-urban interface

Lead authors *Rural-urban interface (RUI, synonym of WUI, wildland-urban interface) are key areas in land management and planning for wildfire risk mitigation. A tool for RUI mapping was developed to help decision makers cope with risk management. Several methods for fire-risk assessment in RUI were developed, depending on the scale, the geographical context and data availability. Methods and tools were validated based on fire simulations and are now available. In addition, projections of future risk in RUI were obtained using land cover and climate change simulations. In the next four or five decades, mitigation of wildfire risk will depend on land managers capacity to control RUI development.*

E. Maillé
M.M. Fernández-Ramiro
C. Bouillon
C. Sirca

Contributors

- F. Alcasena
- B. Arca
- A. Bellet
- B. Fierro
- F. Casula
- M. Long-Fournel
- D. Morge
- G. Pellizaro
- O. Price
- L. Pugnet
- M. Salis
- D. Spano
- A. Syphard
- B. Vila
- R. Ferrara
- G.V. Pintus
- Q. Henaff
- M. Santini
- E. Scocimarro
- V. Bacciu
- C. Quesada

Implications for policy and management

- ▶ RUIMap is a tool for RUI mapping. It enables land managers to locate critical areas for wildfire ignition and human vulnerability.
- ▶ Wildfire risk in RUI depends on fuel and building characteristics and their interaction.
- ▶ RUI are changing areas. If urban sprawl is not controlled, risk in RUI will increase notably in the next forty years.
- ▶ Future risk in RUI can be mitigated by limiting RUI sprawl and fuel load, by increasing building density and limiting RUI spatial complexity.

The problem: During the last decades, discontinuous urban sprawl within Mediterranean forest lands and wildlands led to the formation of large RUI problem (Lampin-Maillet et al., 2010). In such areas, burnable vegetation is closely mixed with

buildings and infrastructures. As a consequence, RUI are critical areas regarding the risk of wildfires (Salis et al., 2013). In the RUI, ignition probability is high because of human activities; while human vulnerability is maximized because of the high density of people. The knowledge of the spatial distribution of the different kinds of RUI, the associated risk and their past and future changes are key-decision elements for land management and planning.

The approach: The RUI research three main objectives were to: i) map the different types of RUI in the Mediterranean territories, ii) assess the wildfire risk associated to each RUI type, and iii) assess past and future change in RUI and the associated risk they induce. To do so, three methodologies for RUI mapping were specified and tested in different Mediterranean contexts: Central Spain, southern France and Sardinia (Italy). When validated, the methods were implemented in a dedicated easy-to-use tool, called "RUImap" (Fig. 5.1). Then, based on past fire studies, different models for risk assessment in RUI were specified. The models aimed at taking into account both hazard and vulnerability in RUI. Finally, past and future changes and risk in RUI were studied in several Mediterranean contexts using diachronic mapping and land cover change simulations.

Achievements: RUIMap is an easy-to-use software designed for RUI mapping at different scale levels (Fig. 5.2). The tool gives the user a choice between three main methods for RUI mapping: two at local or regional scale and one at global scale. The choice between regional scale methods depends on the geographical context and the available data. When using the RUI tool to map the different types of RUI, it is possible to assess risk in RUI by using one of the risk models specified in the FUME project. Again,



Left: Patones (Madrid, Spain)
 Right: Altinkaya (Antalya, Turkey)
 Photos: J.M. Moreno

the choice between methods depends on the user objective, the geographical context and scale, and the data availability. The "Irstea method" is designed to assess the fire ignition probability, the wildfire probability, the burned area ratio and finally, the global risk in relation to RUI types and other geographical variables. The "TRAGSATEC method" is designed to assess the demographic risk linked to population, a propagation risk linked to vegetation fuel, and a statistical risk linked to past fires. A model for human vulnerability assessment was also designed based on experts' analysis. Finally, all the models were validated using fire propagation simulations in RUI. The risk models were used to predict future-risk in RUI, in relation to future land cover change and climate change. An important increase of RUI areas and of risk is to be expected in the next forty years because of discontinuous urban sprawl and more importantly, dryness.

Lessons learnt and implications: During the next decades, forest fire-risk will continue to be a significant problem for land-managers. A clear map of RUI types enables decision-makers to more efficiently locate their operational actions for wildfire risk mitigation. The actions have first to simplify the interface between vegetation fuel and the resources

protected. Reducing urban sprawl by concentrating urban development would help mitigate wildfire risk in RUI. However, this would also increase vulnerability. Therefore, fire protection resources and fuel breaks should be located all around the discontinuous and continuous urban areas, to create a buffer between them and the forest.

Rural-urban interface

The rural-urban interface (RUI) represents an area between continuous artificial zones and continuous fuel vegetation (forest, shrubland, grassland). Small patches of agriculture may also be present. Within RUI, buildings and human infrastructures are closely mixed with fuel vegetation creating high wildfire risk. RUI are also changing areas in time: they become wildlands around towns, and disappear with the urban densification. The dynamics can be controlled by land management and planning measures.

Fig. 5.1: The RUImap tool.



Fig. 5.2: An example of rural-urban interface map at local scale. AI = Aggregation Index (i.e., an assessment of vegetation continuity).