

Mapping the wildland-urban interface from houses location and terrain slope in Patagonia, Argentina

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Introduction

The wildland-urban interface (WUI) is defined as areas where houses border or intermingle with wildland vegetation. Wildfires in WUI areas are a frequent concern in fire-prone ecosystems [1]. Our **objective** was to map the WUI of Bariloche in NW Patagonia, Argentina, applying a new methodology based on the slope and quantify the occurrence of ignitions in the WUI areas.

Materials and methods

We used a vegetation map [2] and houses locations from Microsoft building footprint [3]. We generated a digital terrain model from contour lines by interpolation. All the layers have a spatial resolution of 10 m.

We applied a cost distance function of ArcGIS software to delimit variable WUI areas. The tool uses the houses locations, the fuel raster, the digital terrain model and a factor that varies with the slope towards dwellings. The WUI reaches a maximum distance of 500 m under the most hazardous condition (houses surrounded by fuels on steep upslopes). We considered as WUI all populated areas if they are up to 500 m from large vegetated areas (>20 ha).

We used ignition data from historical records of 2015-2021 to quantify the incidence of ignitions that occurred in the WUI area.

Results and discussion

The WUI occupies 37% of Bariloche district (11,006 ha) and contains 81% (40,649) of total houses (Figure 1). The relative percentage of houses is similar in other WUI areas from NW Patagonia (97%) [4], but is minor in other regions (e.g., 45% in California and 21% in Chile) [5, 6].

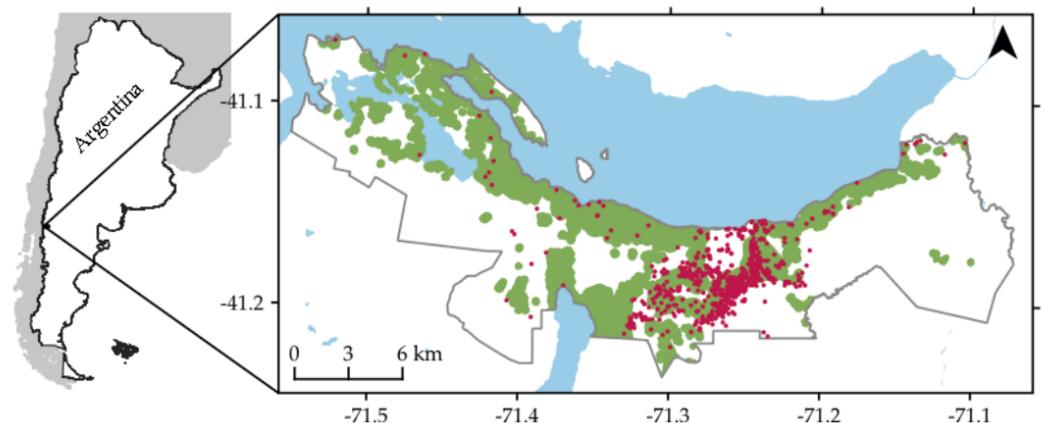


Figure 1. WUI (green) of Bariloche (grey line polygon) surrounding Nahuel Huapi lake (blue). Fire ignition points from 2015-2021 are shown in red.

Ignitions were concentrated in the WUI (76%, 828 ignition points). This high proportions of ignitions within the WUI is consistent throughout the literature [e.g., 4-6].

Conclusion

Unlike other regions, NW Patagonia seems characterized by a high percentage of houses within WUI areas. Higher ignition occurrence in the WUI demonstrates the relevance of its delimitation for wildfire prevention.

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