Data in Brief 38 (2021) 107427

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data Article

The wildland-urban interface map of Italy: A nationwide dataset for wildfire risk management

Marina D'Este[a,*], Vincenzo Giannico[a], Raffaele Lafortezza[a,b], Giovanni Sanesi[a], Mario Elia[a]

[a] Department of Agricultural and Environmental Sciences, University of Bari A. Moro, Via Amendola 165/A, Bari 70126, Italy

[b] Department of Geography, The University of Hong Kong, Centennial Campus, Pokfulam Road, Hong Kong, China

ARTICLE INFO

Article history:
Received 15 July 2021
Revised 21 September 2021
Accepted 22 September 2021
Available online 29 September 2021

Keywords:
Fire management
Forest
Italy
Wildfires
Wildland-urban interface

ABSTRACT

A wildland-urban interface (WUI) raster map was created for the Italian peninsula with a resolution of 30 m per pixel. The map creation process consisted of three fundamental steps: (1) selection of buildings within the wildland-urban interface areas and subsequent classification of these into isolated, scattered, and clustered buildings; (2) creation of the tree canopy cover layer; (3) generation of WUI map by the intersection of two previous products. According to the WUI map, more than half of the total area of Italy is occupied by interface areas. Areas with buildings classified as clustered (24.61%) and scattered (19.15%) predominate on the territory compared to isolated buildings (14.93%). Most of the buildings are located in areas with a tree cover canopy between up to 64%. This map is functional to the implementation of forest fire prevention plans and to the identification of buildings that are close to fire risk areas such as forests, grasslands, and pastures.

* Corresponding author.
E-mail address: marina.deste@uniba.it (M. D'Este).

https://doi.org/10.1016/j.dib.2021.107427

Specifications Table

Subject	Environmental science, forestry, urban planning
Specific subject area	Natural Hazards
Type of data	Geospatial data
How data were acquired	The building footprints were downloaded from the Open Street map and regional geoportals. Corine Land Cover 2018 was downloaded from Copernicus Land Monitoring Service platform. Four 10 × 10 tiles were downloaded from Hansen Global Forest Change Data.
Data format	Raw Data: - Corine Land Cover (*.shp) - Global Forest Change (*.tif) - Building footprints (*.shp) Secondary Data: - WUI map (*.tif and *.shp)
Parameters for data collection	Administrative boundaries of Italy
Description of data collection	The WUI map was made according to the following steps: 1) Creation of vegetation layer by dissolving twelve land use classes of the Corine Land Cover 2018, 2) Creation of 300m buffer from the vegetation layer to identify wildland interface area, 3) Selection of building footprints that fell in 300m buffer and vegetation layer, 4) Creation of a buffer with a radius of 50m around each building footprint and subsequent classification in isolated, scattered, and clustered, 5) Creation of tree canopy cover layer, 6) Intersection of tree canopy cover layer and the building footprints classification layer. All the steps were made in QGIS 3.10.10 and Arcgis 10.7.1
Data source location	Primary data sources: - Corine Land Cover (2018) (https://land.copernicus.eu/pan-european/corine-land-cover/clc2018, accessed May 1, 2021) - Global Forest Change (2018) (https://earthenginepartners.appspot.com/science-2013-global-forest, accessed May 1, 2021) - OpenStreet Map (https://download.geofabrik.de/europe/italy.html, accessed May 1, 2021)
Data accessibility	With the article

Value of the Data

- The Wildland-Urban Interface (WUI) map represents the first free and available dataset in Italy.
- The beneficiaries of this data can be both national and international authorities and researchers. Researchers will be able to use this map for different purposes in the field of wildfire research and more broadly environmental research while authorities will be able to use this map as dataset for land management and urban planning.
- The adoption of this new approach to identify the areas where there is the coexistence of natural and human systems could help the fire management and the mitigation operations.
- Future studies could use this map in order to create new models describing wildfire occurrences and frequencies in WUI.

1. Data Description

In order to create the WUI map, the buildings extracted from Open Street Map were selected using a 300m buffer around vegetation layer. The vegetation layer was created by dissolving the Corine Land Cover classes as reported in Table S1 of the supplementary materials. For each selected buildings, a buffer of 50m radius was created and subsequently classified according to the parameters indicated in Table S2 of the supplementary materials. From the intersection between the buffers of classified buildings and tree canopy cover previously created using the Hansen Global Forest Change databases, the WUI map in shapefile and raster format with a resolution of 30m was generated as reported in the supplementary materials. The WUI map, covers the whole Italian Peninsula (Fig. 1). More than half of Italy is occupied by interface areas. Among these, about 25% of the total area of Italy is occupied by interface areas classified as clustered (741,605 ha) while scattered and isolated WUI, respectively cover 19.15% (577,250 ha) and 14.93% (450,058 ha) (Fig. 2A). The WUI areas characterized by isolated buildings are generally concentrated in remote areas and far from the coastline. WUI characterized by high house density (*i.e.*, scattered and clustered areas) are principally located along the coasts and plains where low slope predominates (Fig. 1A). Most of the buildings are in areas with low tree cover canopy. However, about 11.5% of buildings are in areas with a medium-high tree canopy cover (Fig. 2B).

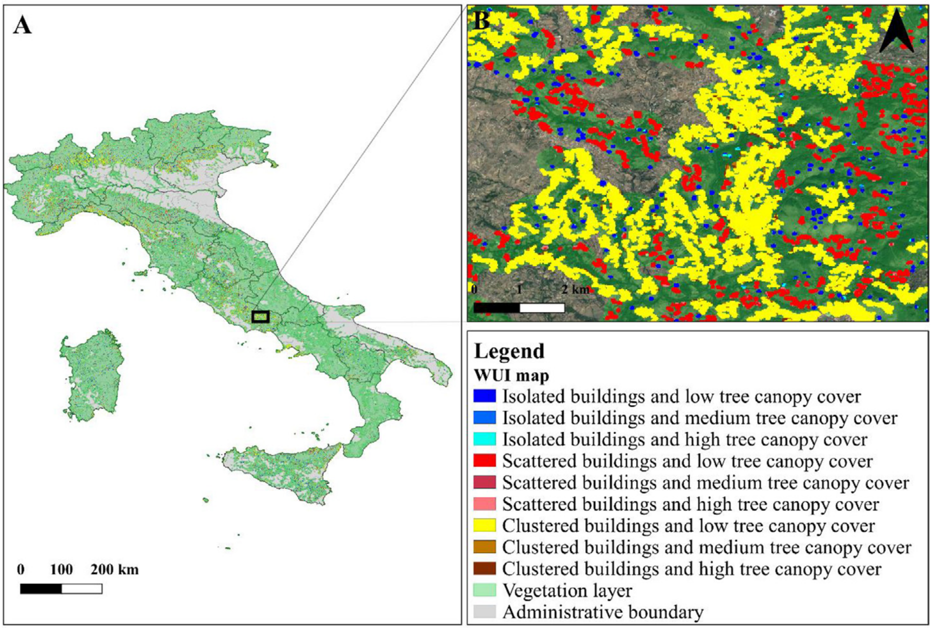

Fig. 1. The wildland-urban interface (WUI) map of Italy (A). In the panel B, a zoomed portion of the WUI map.

2. Experimental Design, Materials and Methods

WUI represents a zone of transition between human infrastructures and wildland vegetation [1–4]. In Italy, according to Framework Law on forest fire 2000/353 and regional plans, the WUI distances adopted vary from 50 to 200m around urban areas and 200 to 400 m around woody vegetation depending on local region [5–7]. In this study, we conventionally used a distance of 100m around each building and 300m around the vegetation. For the whole

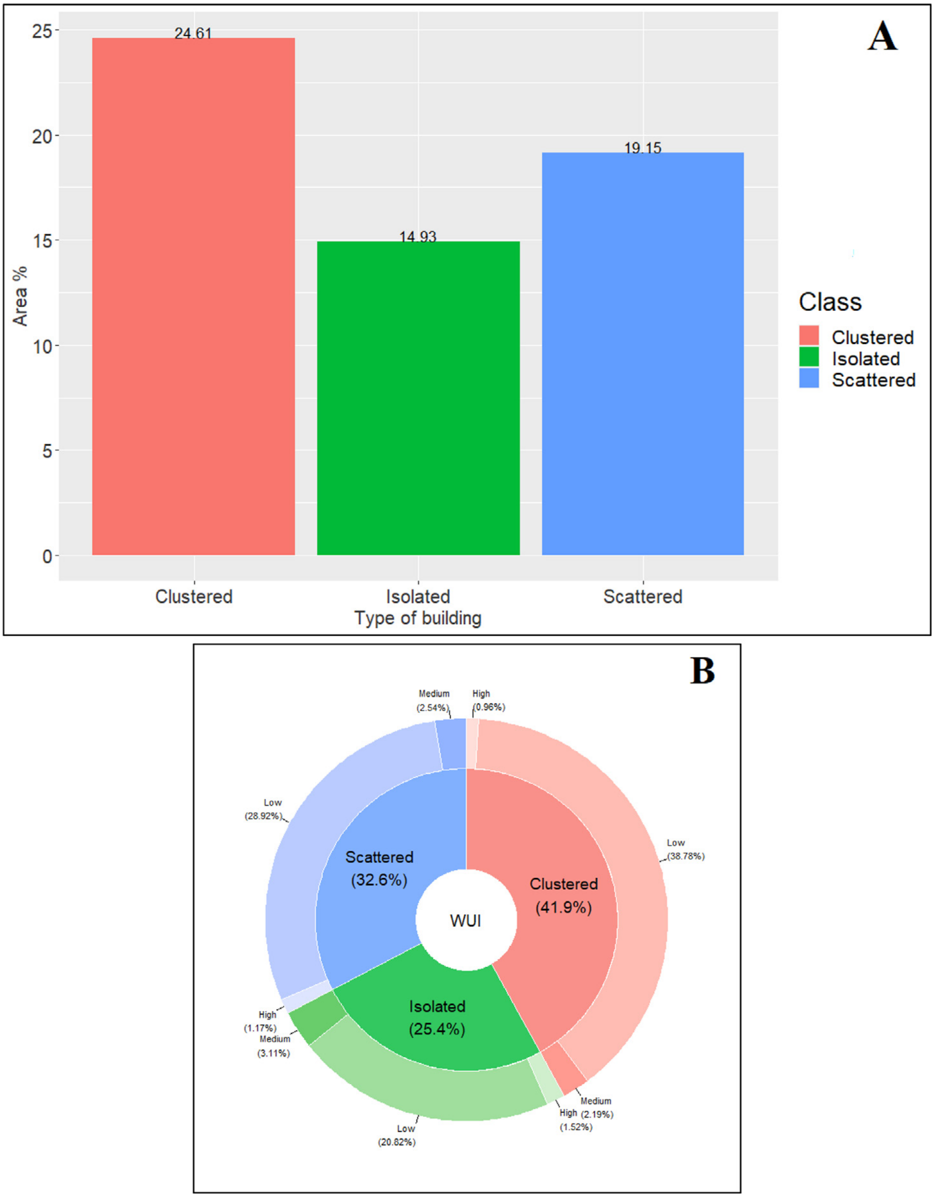

Fig. 2. Distribution of WUI areas covered by isolated, scattered, and clustered buildings in Italy based on the total area (A). Proportion of the surface (ha) occupied by the 9 WUI classes (B).

national territory, we used the buildings in shapefile format extracted from the Open Street map (https://www.openstreetmap.org/#map=8/38.935/-9.234, accessed May 1, 2021) and the data provide by regional geoportals. For some regions (*i.e.*, Molise), Open Street map was not detailed (*i.e.*, lack of some footprint buildings), and a local dataset was not available. This can be considered a limitation of analysis, but we will update the WUI map as new knowledge will be obtained. We excluded industrial, commercial areas, greenhouses, and warehouses whenever this information was available. Then, we created a vegetation layer using Corine Land Cover (CLC) 2018, downloaded from Copernicus Land Monitoring Service platform (https://land.copernicus.eu/, accessed May 1, 2021). Twelve classes were selected from CLC and dissolved in a single vegetation layer using QGIS Software (Table S1). Subsequently, a 300m buffer was created around vegetation layer in order to discriminate which buildings are in wildland-urban interface. Only the buildings that fell within the vegetation layer were considered, while the external buildings were excluded from the analysis [8]. A buffer with radius of 50m was created around each building and the overlapping buffers were merged. Therefore, we counted the number of buildings that fell inside each dissolved buffer. According to the method developed by Lampin-Maillet et al., [9], the selected buildings, and their buffers were classified into isolated, scattered, and clustered areas (Table S2).

For tree cover data, we downloaded four 10 × 10 tiles from Hansen Global Forest Change Data [10] with a resolution of 30 meters per pixel. We generated the tree cover map 2018 by subtracting the Forest cover loss 2000-2018 from the Tree canopy cover 2000. Then, we extracted the tree canopy cover map using buffer layer of buildings as mask. The tree canopy cover map ranges from 0 to 100% degree of coverage. We reclassified the tree canopy cover map using the 33rd and 66th percentiles as thresholds: low cover (0–64%), medium cover (65–89%), and high cover (90–100%). Finally, we intersected the building layer and tree canopy cover map using Arcgis 10.7.1. The combination of the three categories of buildings (isolated, scattered, and clustered) with the three categories of tree canopy cover (low, medium, and high), resulted in with the following 9 WUI classes:

- *Isolated buildings and low tree cover*: Number of buildings < = 3 and 0–64% of tree canopy cover.
- *Isolated buildings and medium tree cover*: Number of buildings < = 3 and 65–89% of tree canopy cover.
- *Isolated buildings and high tree cover*: Number of buildings < = 3 and 90–100% of tree cover.
- *Scattered buildings and low tree cover*: Number of buildings between 4 and 49 and 0–64% of tree canopy cover.
- *Scattered buildings and medium tree cover*: Number of buildings between 4 and 49 and 65–89% of tree canopy cover.
- *Scattered buildings and high tree cover*: Number of buildings between 4 and 49 and 90–100% of tree canopy cover.
- *Clustered buildings and low tree cover*: Number of buildings > = 50 and 0–64% of tree canopy cover.
- *Clustered buildings and medium tree cover*: Number of buildings > = 50 and 65–89% of tree canopy cover.
- *Clustered buildings and high tree cover*: Number of buildings > = 50 and 90–100% of tree canopy cover.

Ethics Statement

The authors declare that have read and follow the ethical requirements for publication. This work does not involve studies with animals and humans.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have or could be perceived to have influenced the work reported in this article.

CRediT Author Statement

Marina D'Este: Data curation, Methodology, Software, Writing – original draft, Writing – review & editing; **Vincenzo Giannico:** Investigation, Supervision; **Raffaele Lafortezza:** Writing – review & editing; **Giovanni Sanesi:** Writing – review & editing, Supervision; **Mario Elia:** Conceptualization, Investigation, Writing – review & editing, Supervision.

Acknowledgments

No funding to declare.

Supplementary Materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.dib.2021.107427.

References

[1] M.L. Chas-Amil, J. Touza, E. García-Martínez, Forest fires in the wildland–urban interface: a spatial analysis of forest fragmentation and human impacts, Appl. Geogr. 43 (2013) 127–137, doi:10.1016/j.apgeog.2013.06.010.
[2] M. Elia, M. D'Este, D. Ascoli, V. Giannico, G. Spano, A. Ganga, G. Colangelo, R. Lafortezza, G. Sane, Estimating the probability of wildfire occurrence in Mediterranean landscapes using artificial neural networks, , Environ. Impact Assess. Rev. 85 (2020) 11.
[3] F.J. Alcasena, C.R. Evers, C. Vega-Garcia, The wildland-urban interface raster dataset of Catalonia, Data Brief 17 (2018) 124–128, doi:10.1016/j.dib.2017.12.066.
[4] M. D'Este, M. Elia, V. Giannico, G. Spano, R. Lafortezza, G. Sanesi, Machine learning techniques for fine dead fuel load estimation using multi-source remote sensing data, Remote Sens. 13 (2021) 1658, doi:10.3390/rs13091658.
[5] S. Modugno, H. Balzter, B. Cole, P. Borrelli, Mapping regional patterns of large forest fires in Wildland–Urban Interface areas in Europe, J. Environ. Manag. 172 (2016) 112–126, doi:10.1016/j.jenvman.2016.02.013.
[6] M. D'Este, A. Ganga, M. Elia, R. Lovreglio, V. Giannico, G. Spano, G. Colangelo, R. Lafortezza, G. Sanesi, Modeling fire ignition probability and frequency using Hurdle models: a cross-regional study in Southern Europe, Ecol. Process. 9 (2020) 54, doi:10.1186/s13717-020-00263-4.
[7] M. Elia, V. Giannico, R. Lafortezza, G. Sanesi, Modeling fire ignition patterns in Mediterranean urban interfaces, Stoch. Environ. Res. Risk. Assess. 33 (2019) 169–181, doi:10.1007/s00477-018-1558-5.
[8] C. Lampin-Maillet, M. Jappiot, M. Long, C. Bouillon, D. Morge, J.P. Ferrier, Mapping wildland-urban interfaces at large scales integrating housing density and vegetation aggregation for fire prevention in the South of France, J. Environ. Manag. 91 (2010) 732–741, doi:10.1016/j.jenvman.2009.10.001.
[9] C. Lampin-Maillet, M. Jappiot, M. Long, D. Morge, J.-P. Ferrier, Characterization and mapping of dwelling types for forest fire prevention, Comput. Environ. Urban Syst. 33 (2009) 224–232, doi:10.1016/j.compenvurbsys.2008.07.003.
[10] M.C. Hansen, P.V. Potapov, R. Moore, M. Hancher, S.A. Turubanova, A. Tyukavina, D. Thau, S.V. Stehman, S.J. Goetz, T.R. Loveland, A. Kommareddy, A. Egorov, L. Chini, C.O. Justice, J.R.G. Townshend, High-resolution global maps of 21st-century forest cover change, Science 342 (2013) 850–853, doi:10.1126/science.1244693.