

Rural-Urban interfaces and improvement of forest fire prevention and preparedness

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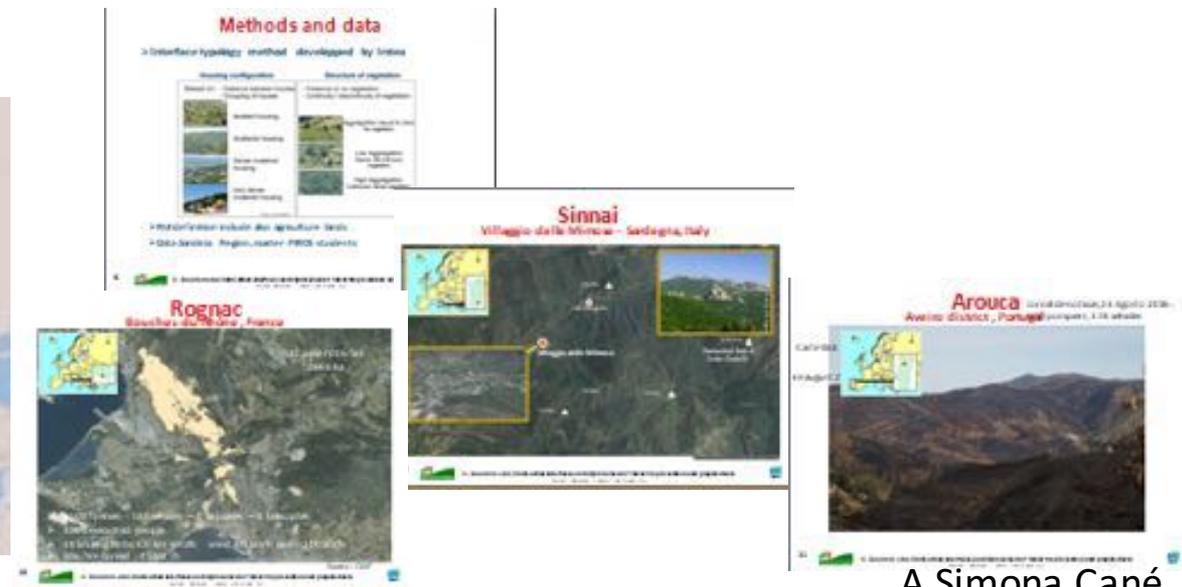
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(h) Université de Lille



Summary

- Using RUI method and software
- Research results and applications
- Study cases in Italy, France and Portugal
- Questions, lacks, problems and propositions



A Simona Cané

RUI : a key role

- **RUI mapping** : to improve knowledge of the territory
 - - Location of human vulnerabilities
 - - To make actions for prevention
 - - To prepare people, stakeholders and firefighters
 - - To deliver easy-to-use information

Methods and data

Irstea method : WUI definition

WUI is defined within a maximum radius of 100 metres around every house located in a distance inferior to 200 metres from forests .



Source :C. Bouillon / IRSTEA

In this space 50m brush clearing is mandatory by French law

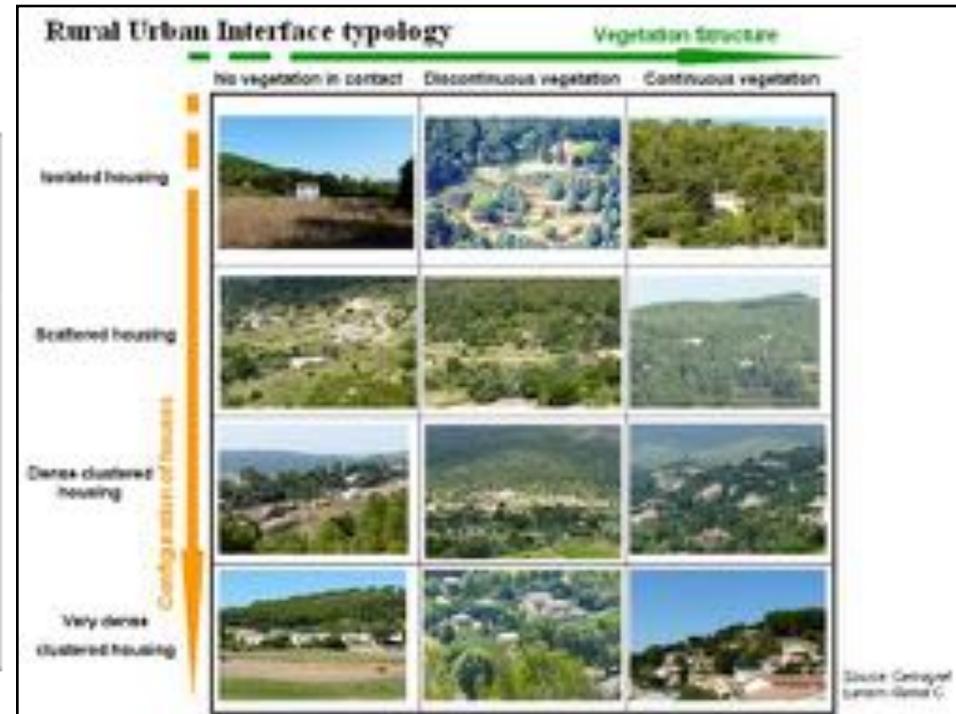
➤ **The RUI definition include also agriculture and others natural areas**

Methods and data

➤ Interface typology method developed by Irstea



Source :C. Lampin-Maillet / IRSTEA



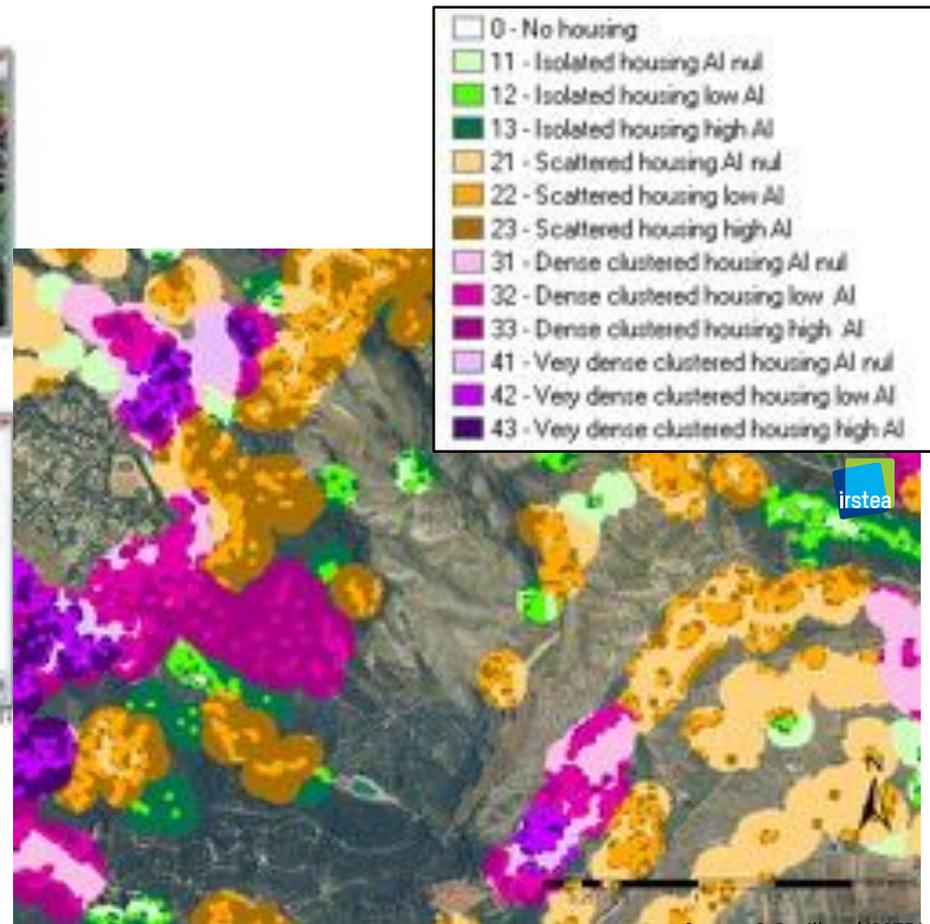
Source :C. Lampin-Maillet / IRSTEA

Methods and data

RUI mapping method and software: a tool for prevention



RUImap software : automated RUI mapping with 3 available methods on global and local scale



Source : C. Bouillon / IRSTEA

Irstea local scale method RUI map sample

Methods and data

Location of houses in the RUI

Isolated



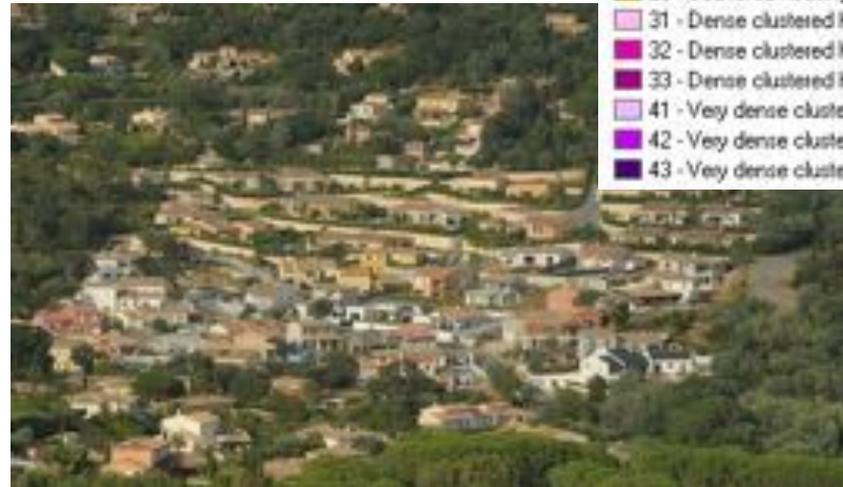
Scattered



Dense



Very dense



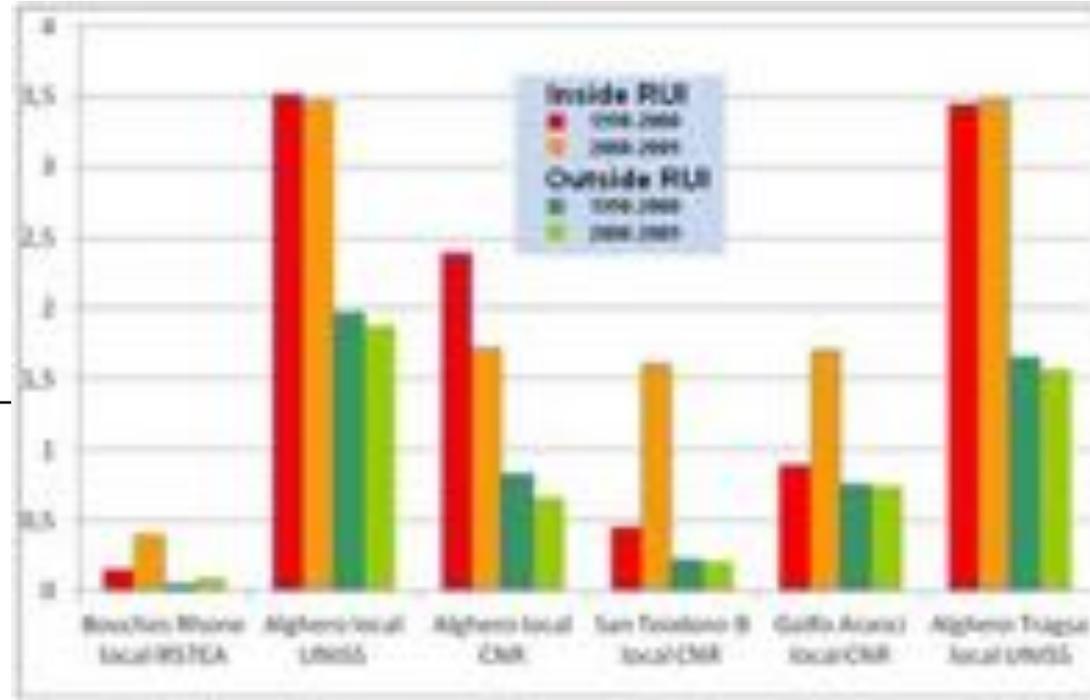
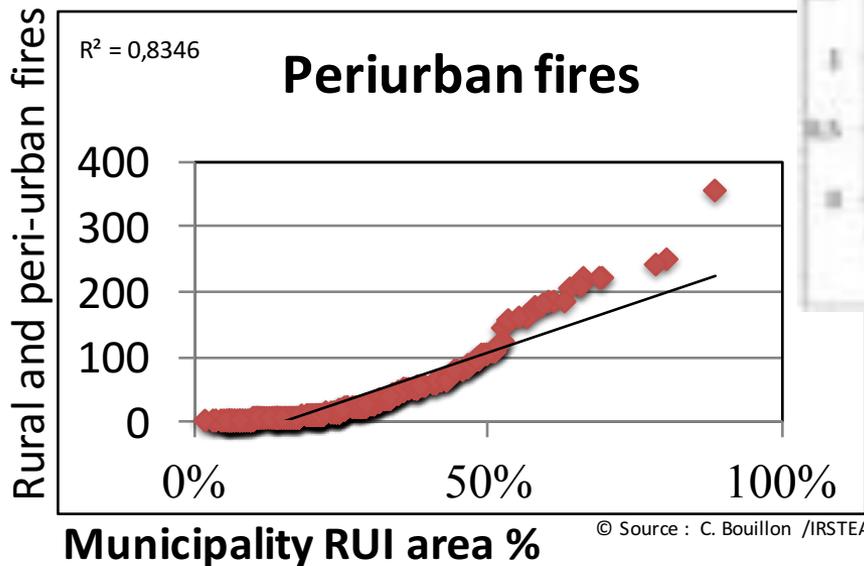
- 0 - No housing
- 11 - Isolated housing AI nul
- 12 - Isolated housing low AI
- 13 - Isolated housing high AI
- 21 - Scattered housing AI nul
- 22 - Scattered housing low AI
- 23 - Scattered housing high AI
- 31 - Dense clustered housing AI nul
- 32 - Dense clustered housing low AI
- 33 - Dense clustered housing high AI
- 41 - Very dense clustered housing AI nul
- 42 - Very dense clustered housing low AI
- 43 - Very dense clustered housing high AI

© Photos : C. Bouillon

RUI and fires

High density of fire ignition in Rui

RUI area is still growing in all mediterranean regions, with about an annual rate from 2% to 5%



© Source : FUME/ C. Bouillon /IRSTEA

- Ignition per km² greater in Rui

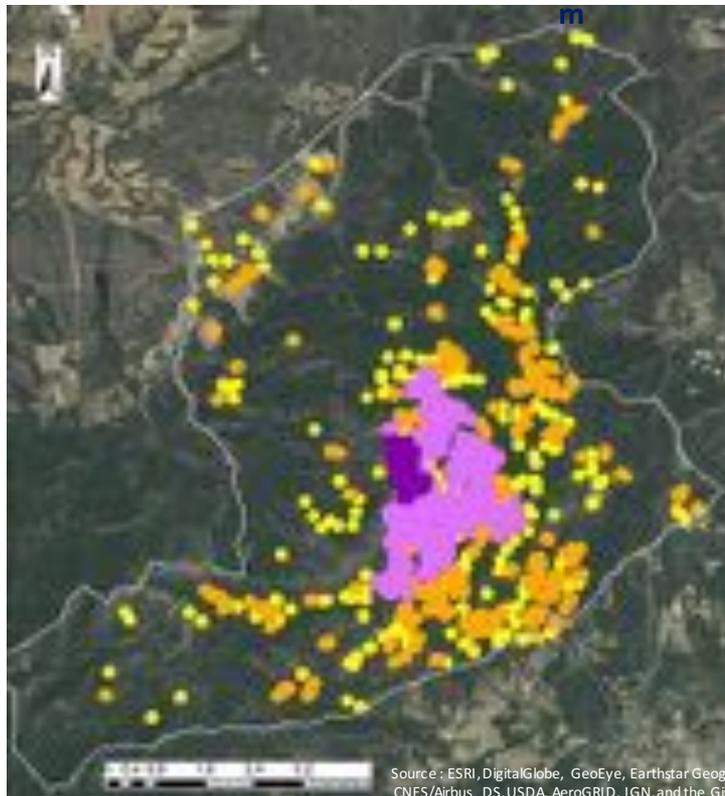
Managing the territory

Uses of RUI maps

Improve knowledge of the territory : RUI location, distribution and vulnerability

On a local scale..

Pixel 2,5m



© Source : C. Bouillon / IRSTEA

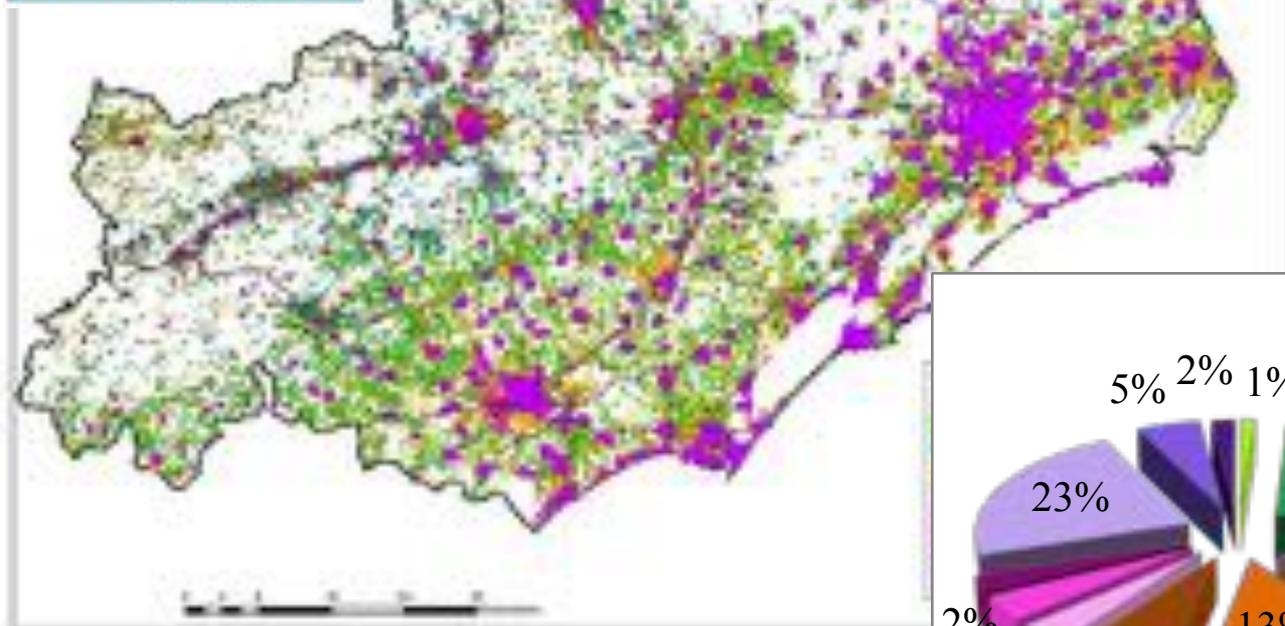
On a global scale

Pixel 100 m



© Source : UNISS

Managing the territory



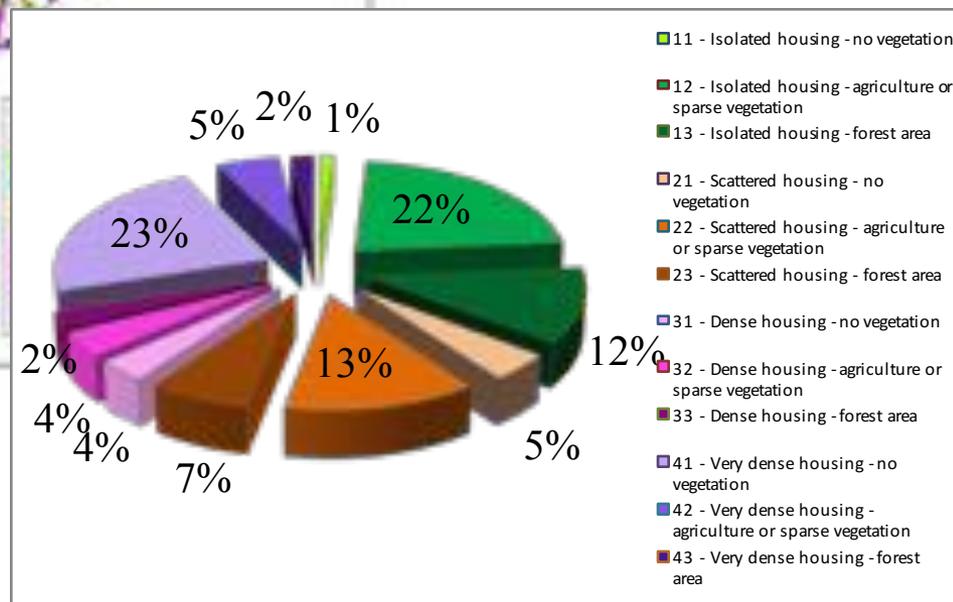
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Importance of RUI

Département de l'Hérault - France

**RUI area : 146600 ha
(23% of total area)**

Isolated : 35%
Scattered : 25%
Dense : 10%
Very dense : 30%



© Source : K Djazouli / C. Bouillon /IRSTEA

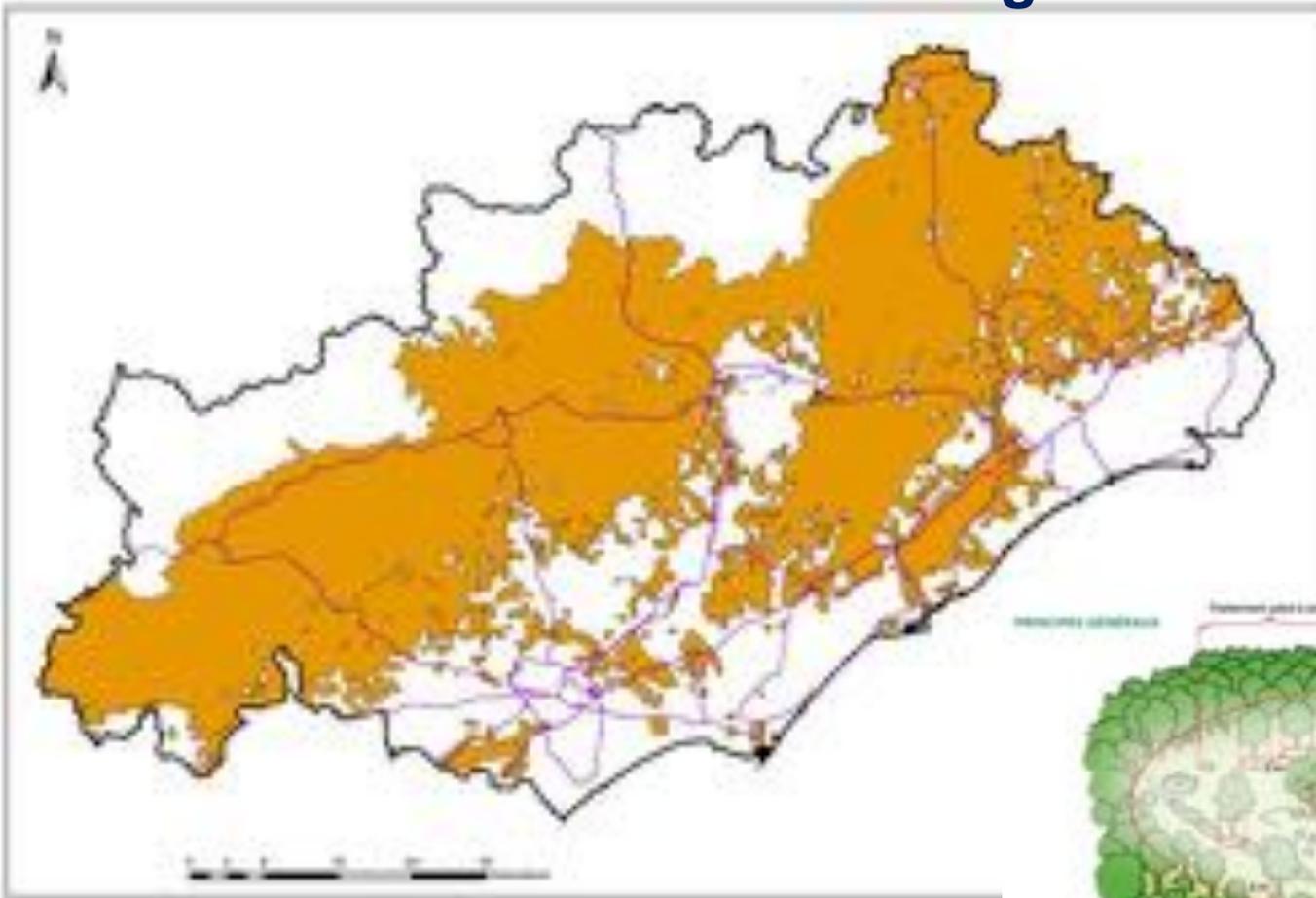
Managing the territory

Brush clearing zone

Brush clearing around buildings : 50m radius

Mandatory by law

Integrated in the planning documents



© Source : K Djazouli / C. Bouillon / IRSTEA

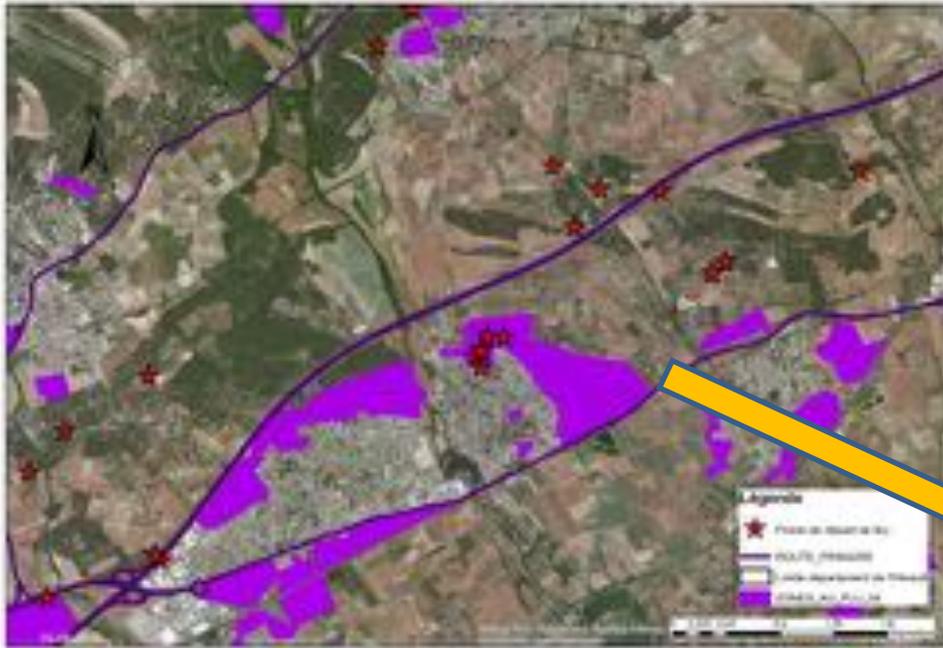
Brush clearing is regulated in 32 départements of south of France régions Nouvelle Aquitaine, Corse, Occitanie, Provence, plus Ardèche and Drôme.



Source : BETEC

Managing the territory

Impact of land planning policies



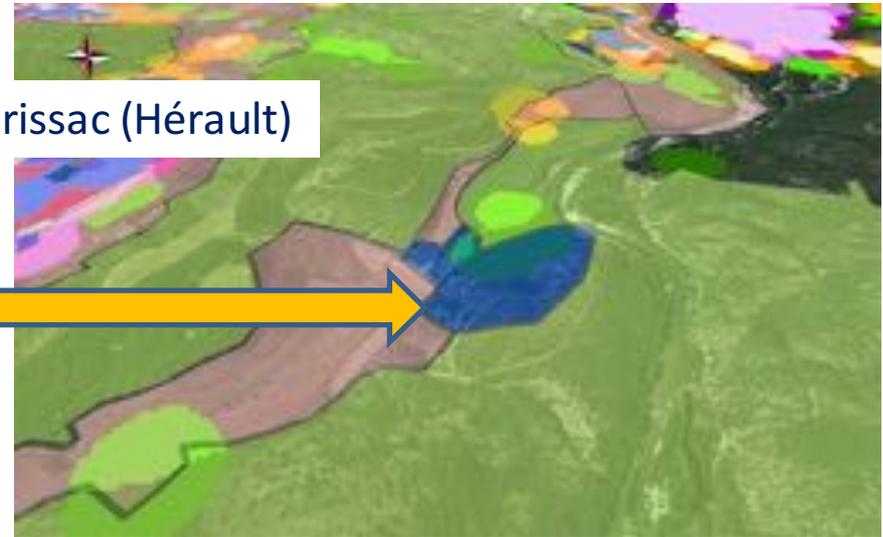
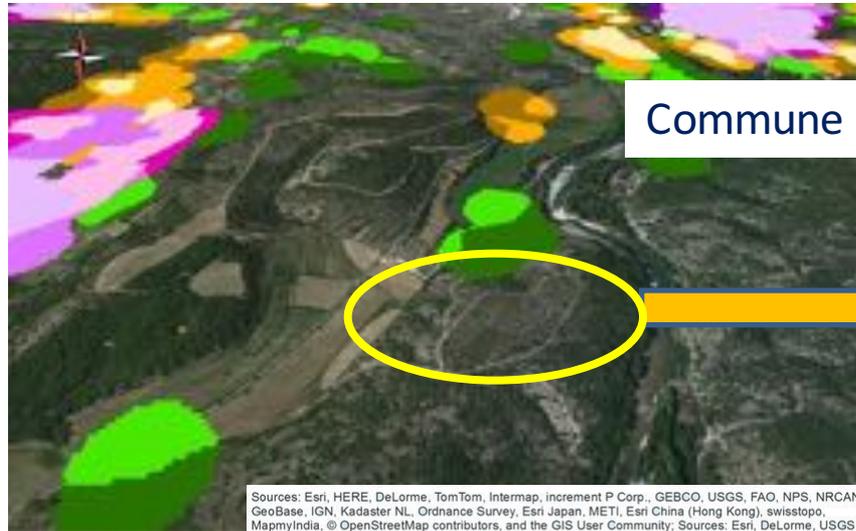
Creation of a new fire prone area : case of AU zoning



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community; Sources: Esri, DeLorme, USGS, NPS

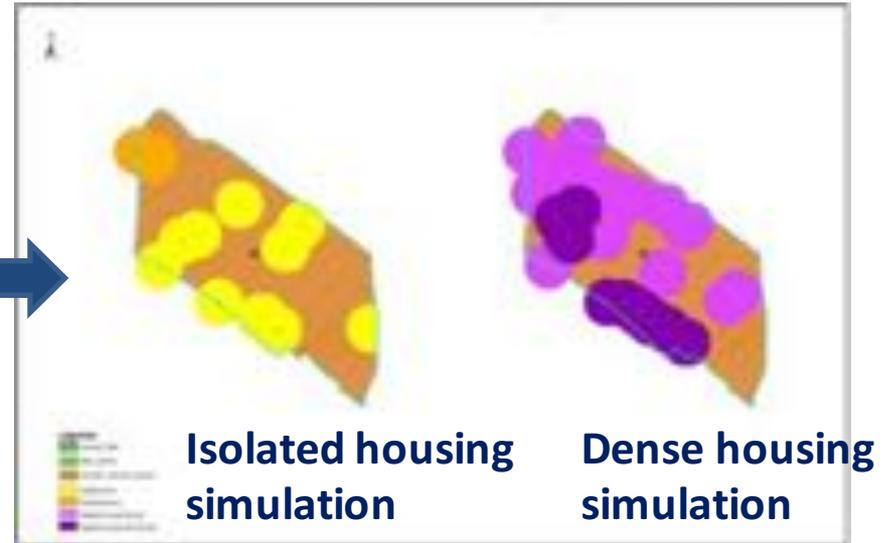
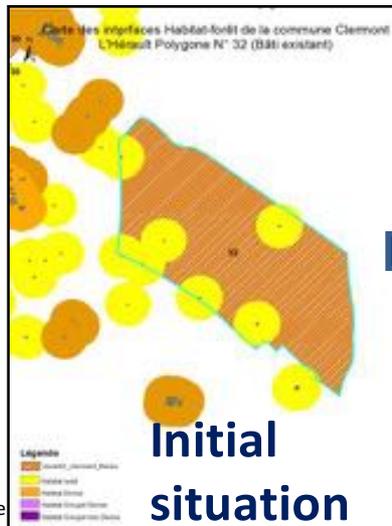
Managing the territory

Land planning and risk



Decision support tool
Consequences of zoning changes on RUI

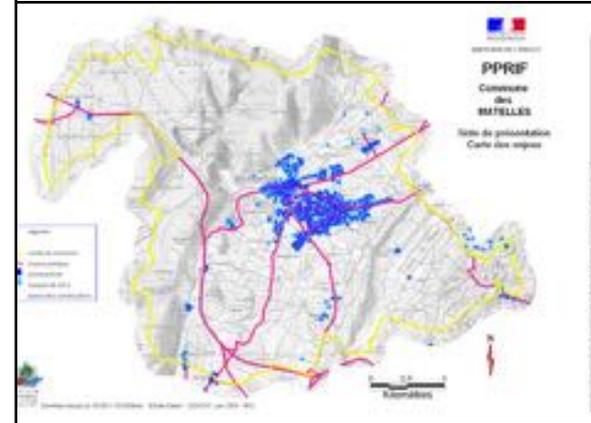
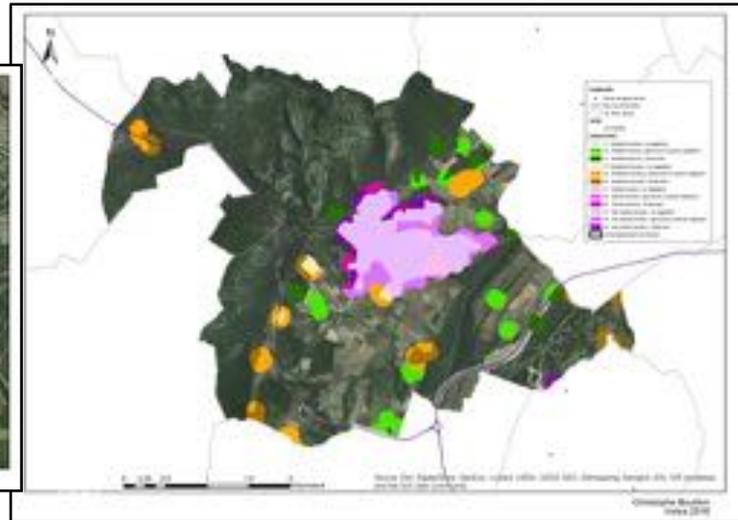
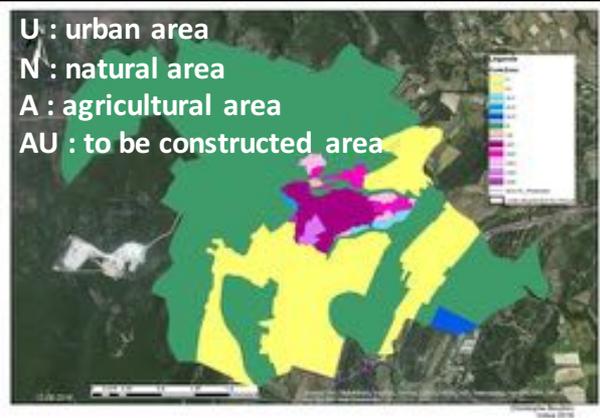
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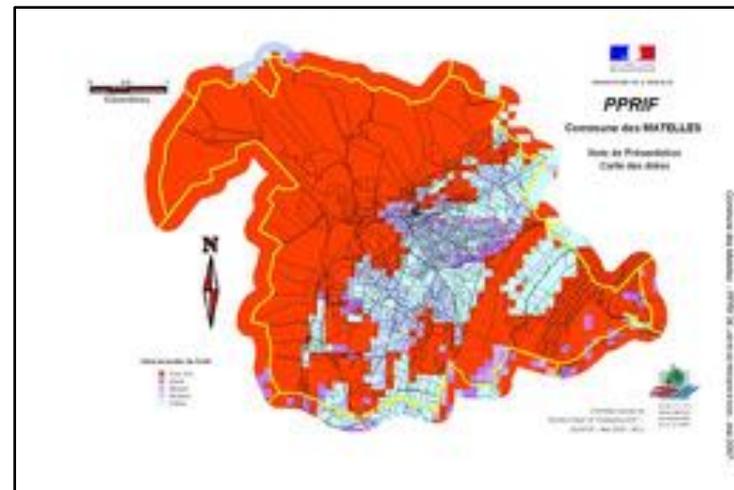
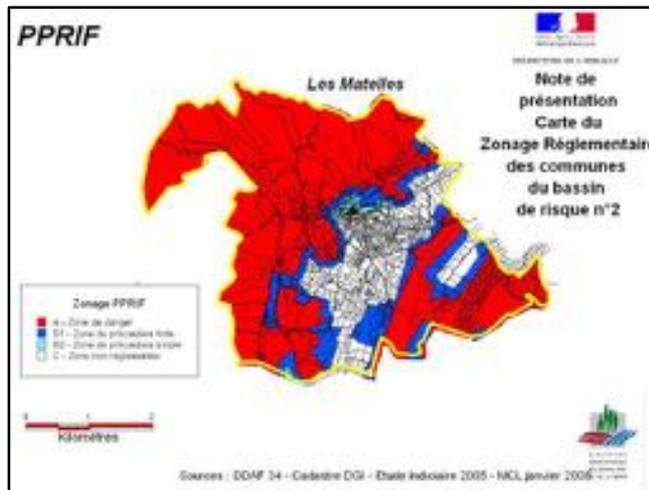
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Managing the territory

Prevention and risk managing



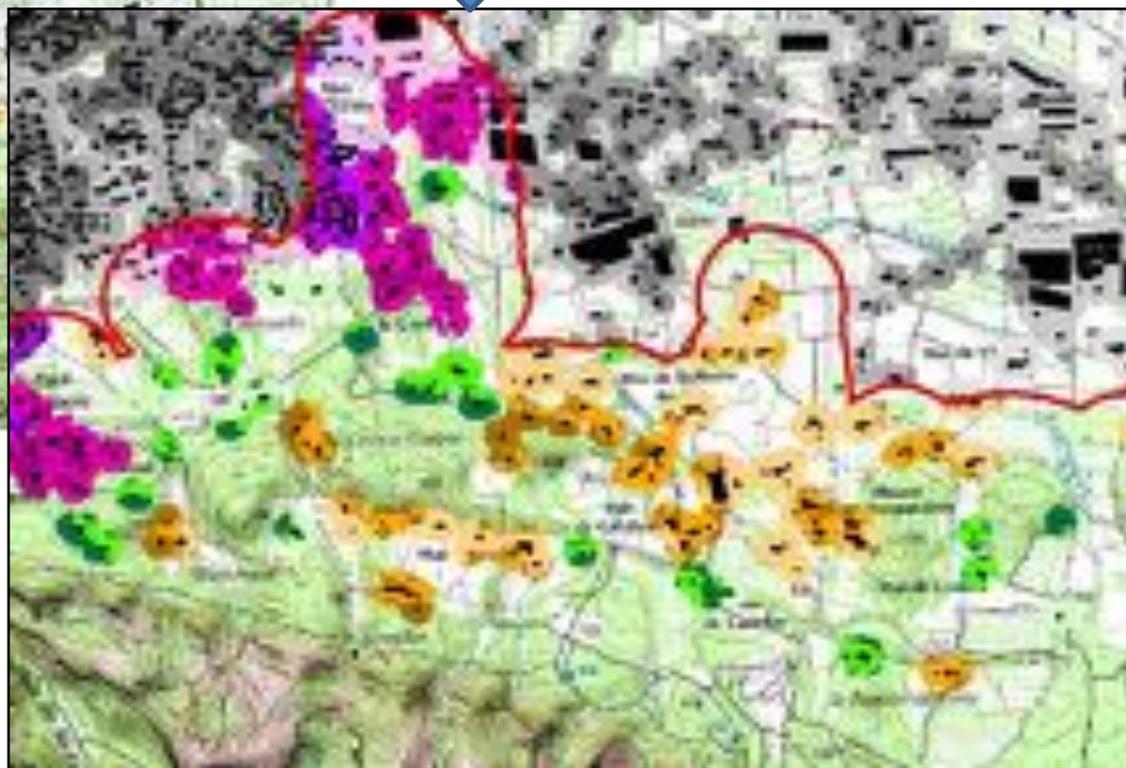
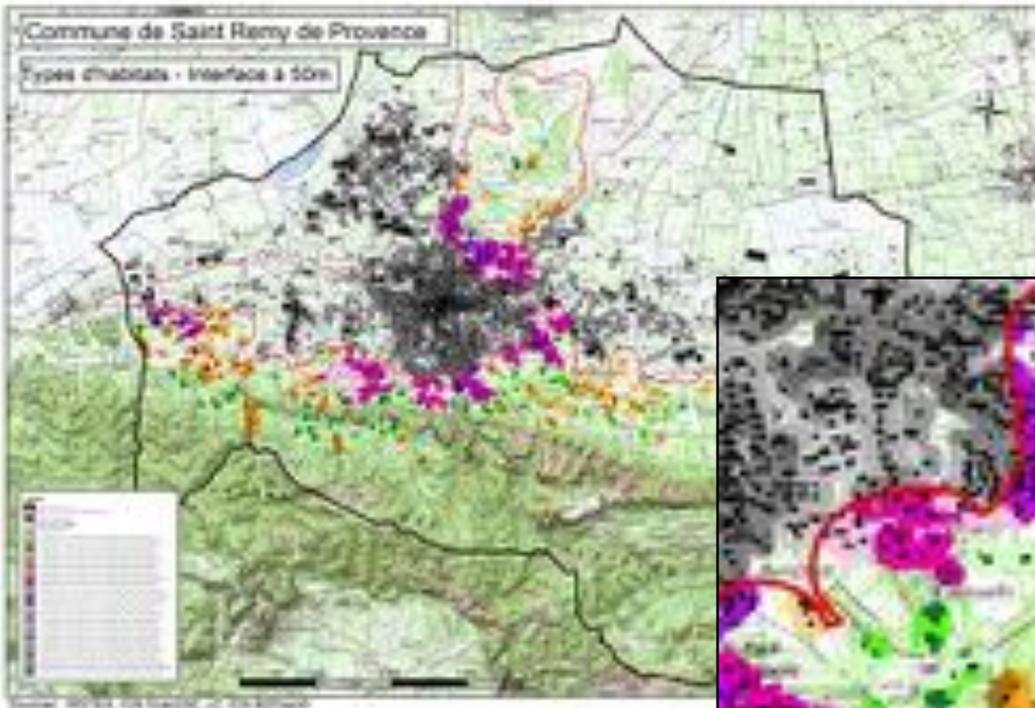
Municipality Les Matelles – RUI and issue map



Managing the territory

Prevention and brush clearing control

ST Remy-de-Provence municipality



© Source : C. Bouillon /IRSTEA/ IGN Scan25 © IGN BDTopo ©

Managing the territory

RUI map on building level

vegetation

- estimation of fire propagation
- brush clearing control



Managing the territory

Advising the homeowners : home and surroundings



Vegetation, burnable elements, materials...



mpin

3ouillon / C Lampin /



Managing the territory

Advising the stakeholders, firefighters

Prevention and equipment in the RUI, accessibility; hydrants

Brush clearing,
fuel breaks



Access



Water availability



Managing the territory

Advising the stakeholders, firefighters



Brush clearing as major prevention role even along urban area

Re open agriculture zones as fuel breaks



© Photo : C. Bouillon

Study cases

- Uses of RUI maps
- Collected information
- Questions, lacks, problems and propositions

Sinnai

Villaggio delle Mimose – Sardegna, Italy



Sinnai

Villaggio delle Mimose – Sardegna, Italy

Land use evolution – New RUI in natural area

1954

1977

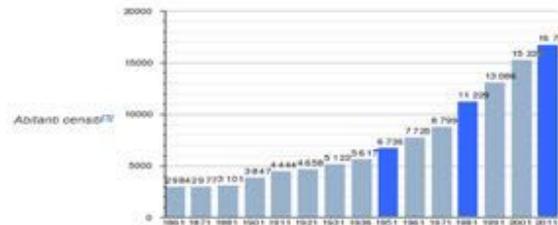
2010



Dati cartografici © Istituto Geografico Militare Italiano

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Sinnai
[Statistiche I.Stat - ISTAT](#);

Sinnai

Villaggio delle Mimose – Sardegna, Italy



RUI :432 ha

610 Buildings

30 isolated	5%	85 ha
200 scattered	33%	151 ha
208 dense	34%	151 ha
172 very dense	28%	45 ha

250 permanent inhabitants

In winter.

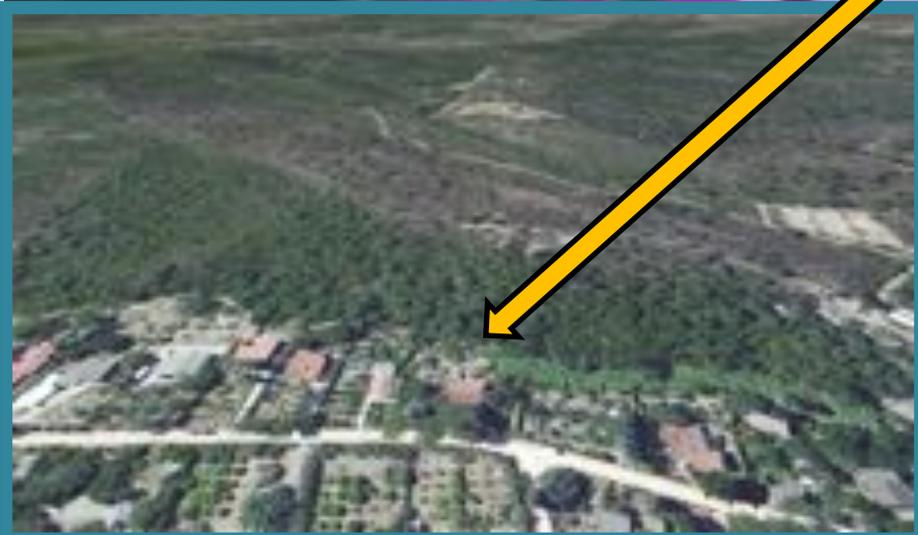
Up to 800 in summer



Sinnai

Villaggio delle Mimose – Sardegna, Italy

RUI map detail and situation



Legend	
0	No housing
11	Isolated housing AI nul
12	Isolated housing low AI
13	Isolated housing high AI
21	Scattered housing AI nul
22	Scattered housing low AI
23	Scattered housing high AI
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33	Dense clustered housing high AI
41	Very dense clustered housing AI nul
42	Very dense clustered housing low AI
43	Very dense clustered housing high AI

© Source : C. Bouillon / IRSTEA / Google Earth
RUI data : S. Cané

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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Villaggio delle Mimose – Sardegna, Italy

The 07/08/2013 fire

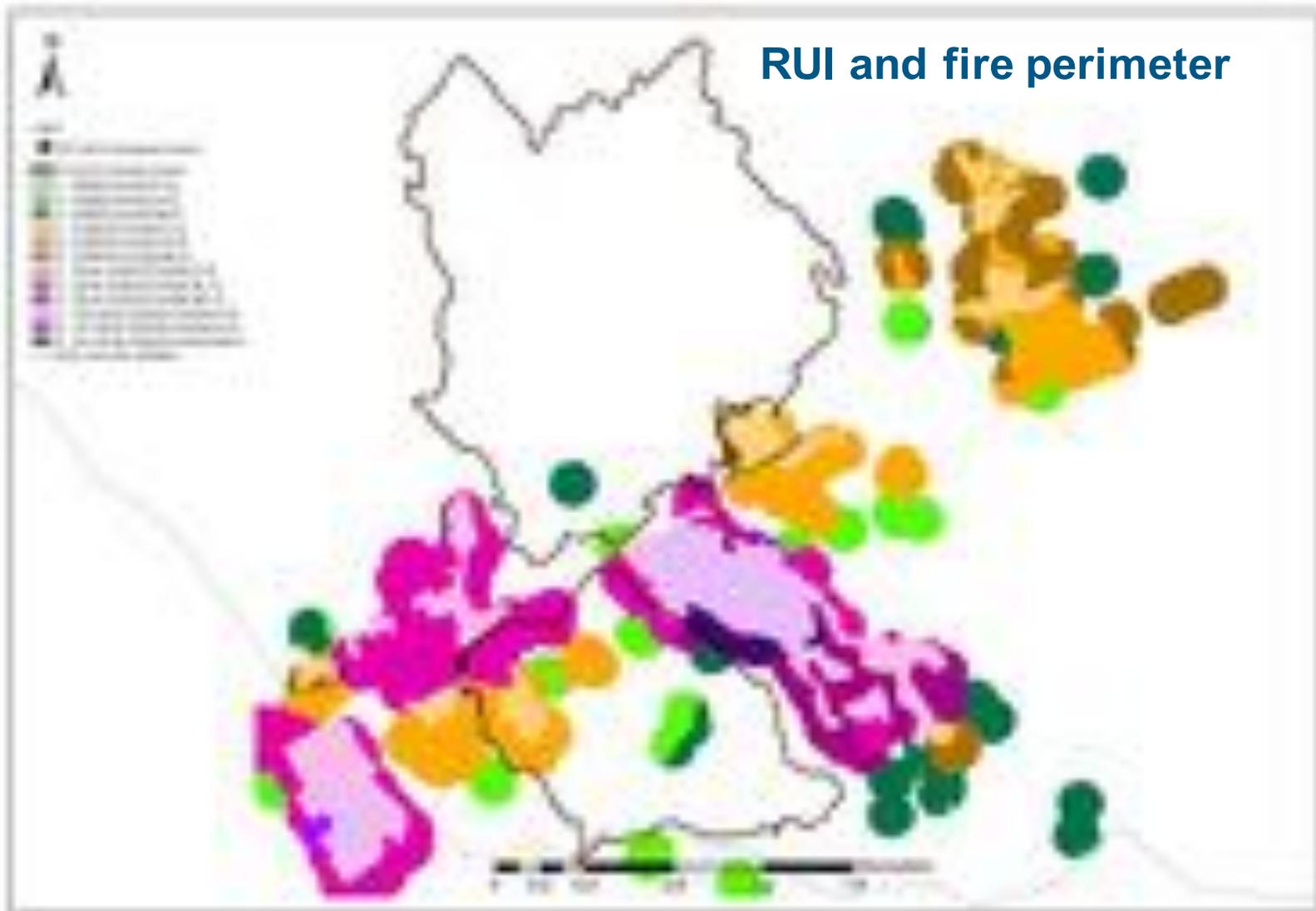


Photos : S. Cané / YouTube /

Sinnai

Villaggio delle Mimose – Sardegna, Italy

RUI and fire perimeter



© Source : Regione Autonoma della Sardegna /S.Cané/ C. Bouillon / IRSTEA

Sinnai

Villaggio delle Mimose – Sardegna, Italy



© Source : Google Earth

- Agriculture land on the western part of the settlement play a protection role of fuel break.
- No fuel break around all the settlements.
- Some lacks of brush clearing in private properties
- Vegetation Inside RUI area connected with large dense vegetation of the natural land.

- Possible propagation to a large wilderness area (20 000ha) with high quality ecosystems (Domaniel forest of Sette Fratelli 9000 ha)
- One exit street
- Tracks in the surrounded wildland to be improved



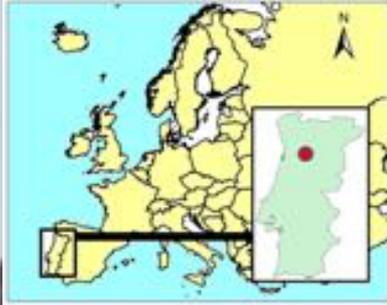
© Source : Google Earth



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Arouca

Aveiro district, Portugal



07/08/2016 30 000 ha

600 firefighters, 178 vehicles

© Source : Jornal de noticias,13 Agosto 2016, photo : C.Bouillon

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Arouca

Aveiro district, Portugal

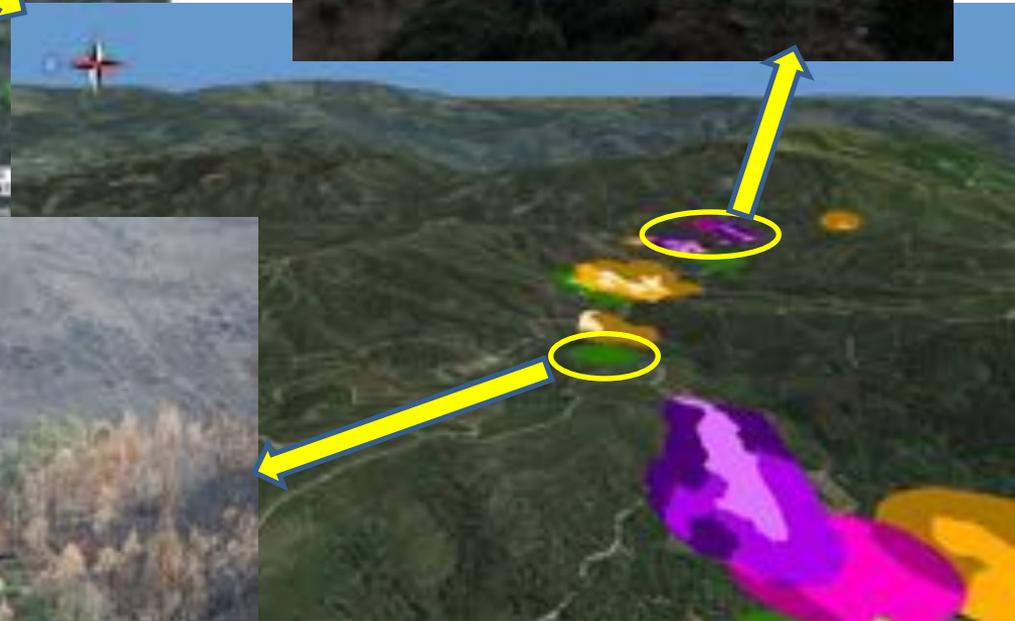
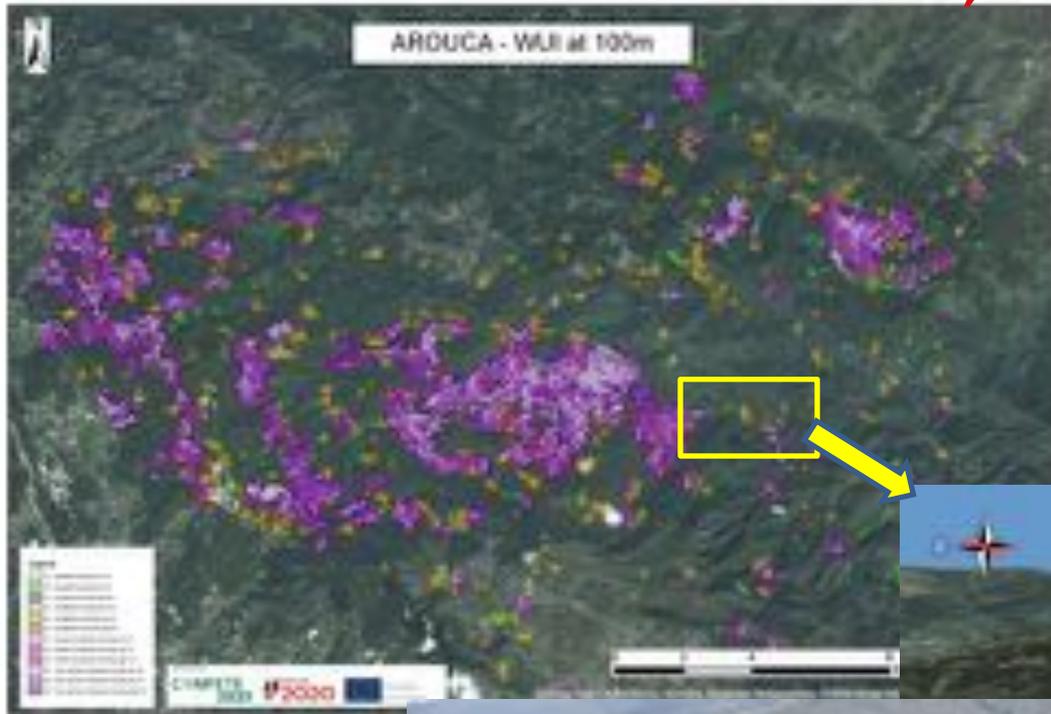


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Arouca

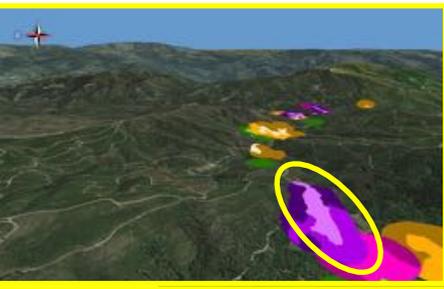
Aveiro district, Portugal

RUI in the fire perimeter



© Source : photos C. Bouillon / IRSTEA - Data Universidade do Porto / FIREXTR project

Arouca Aveiro district, Portugal RUI « Fundo da Vila »



Arouca

Aveiro district, Portugal



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Arouca

Aveiro district, Portugal



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Arouca

Aveiro district, Portugal

- On-going activities
- Interviews of inhabitants, stakeholders, firefighters.
- Research of new ways to improve resilience of the territory including people's experience, know-how, contact with researchers.
- To extend again gardens and agriculture around houses
- Prescribe burning decrease intensity and spread
- Defining improved interface map and definition adapted to Portugal

Rognac

Bouches-du-Rhône , France

10 june 2016 fire
2663 ha

- 1500 firemen - 180 vehicles – 7 airplanes – 1 helicopter
- 1000 evacuated people
- 14 km length by 3.5 km width wind :80 km/h gusts 100 km/h
- Max fire spread : 4,5km /h

© Source : C. Bouillon / IRSTEA–Data ONF

Rognac

Bouches-du-Rhône , France - RUI map



© Source : C. Bouillon / IRSTEA- IGN Bd Topo © , ONF

Rognac

Bouches-du-Rhône , France

Ignition point location

Interfaces vulnerability



© Photos : F. Guerra / Irstea

Rognac

Bouches-du-Rhône , France

10/08/2016



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Rognac

Bouches-du-Rhône , France

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Rognac

Bouches-du-Rhône , France

- RUI area = Increase of ignitions
- Rural and peri-urban fire increase risk of forest fire
- Planning plays role in land cover evolution in particular around urban zones increasing zones at fire risk.

Results & perspectives

✓ The main goal : Improving knowledge about RUI in area at risk

For stakeholders

- ✓ Urban planning and risk prevention
- ✓ Social analysis : living in RUI
- ✓ RUI historical dynamics
- ✓ Planning policy
- ✓ Cultural heritage
- ✓ Links with ecosystems services

For firefighters

- ✓ Quick territory access information
- ✓ Knowledge of vegetation connectivity (fire propagation)
- ✓ Access and position of buildings in RUI

To be developed

- ✓ Integration of data on people living in the area and mobility status
- ✓ Water availability (pools)

Conclusion

RUI maps : a challenge to the future and a way to collect data (People and mobility, water supply, surviving zone,....)

For

- defining and to prioritizing actions of prevention
- preparing firefighting : accessibility, defendability
- evaluating costs : brush clearing , water supply
- Improving planning and governance
- Informing and promoting the participation of residents

On going action

- **FIRE SMART TERRITORY project (Portugal) to construct a fire resilient territory.**

Thank you very much for your attention ! Grazie mille di avermi ascoltato!



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