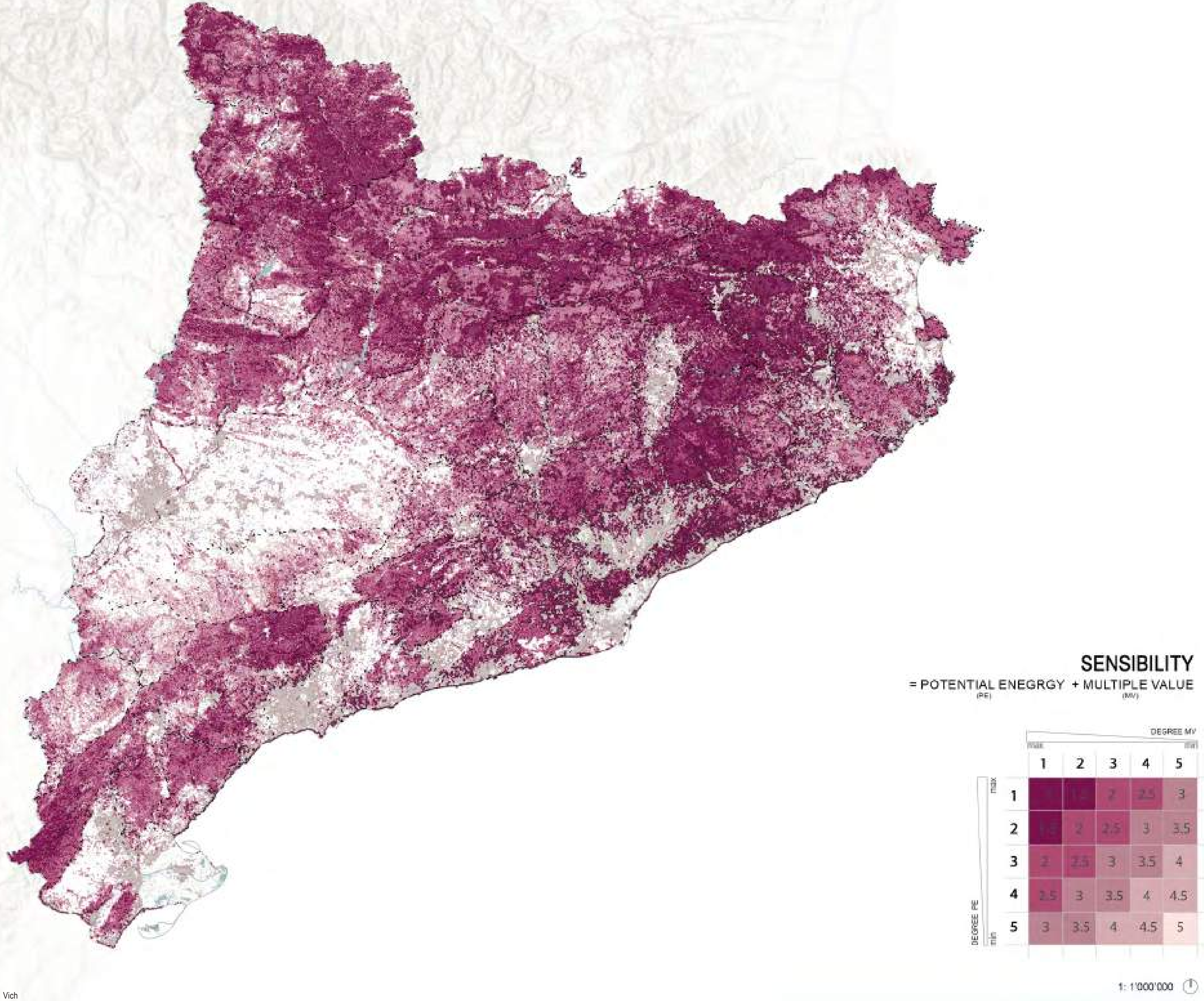
SENSIBILITY

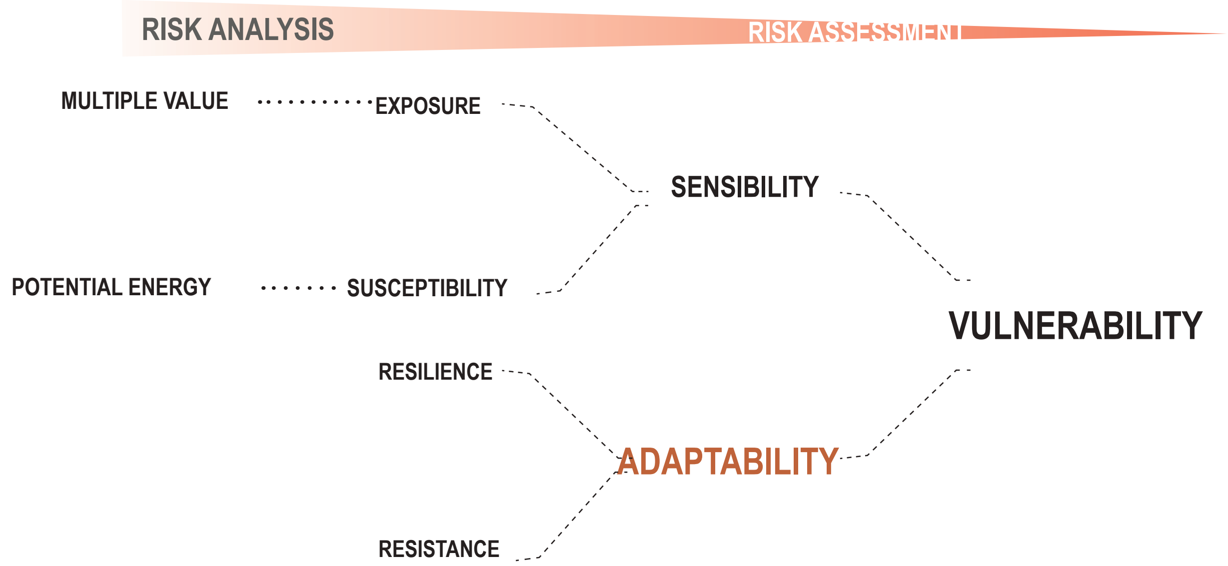


Own elaboration: P. Morán, G. Verduci, A. Vich

SENSIBILITY

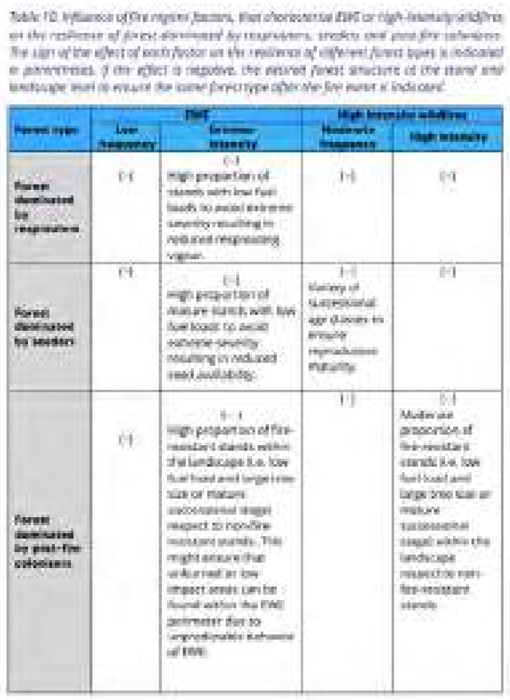
Own elaboration: P. Morán, G. Verduci, A. Vich

03C_Wildfire Landscape Assessment: Territorial Scale



C.6// Resilience

FIRE-RES interprets resistance as a measure of the degree to which the ecosystem or ecosystem variable is changed from its equilibrium state following

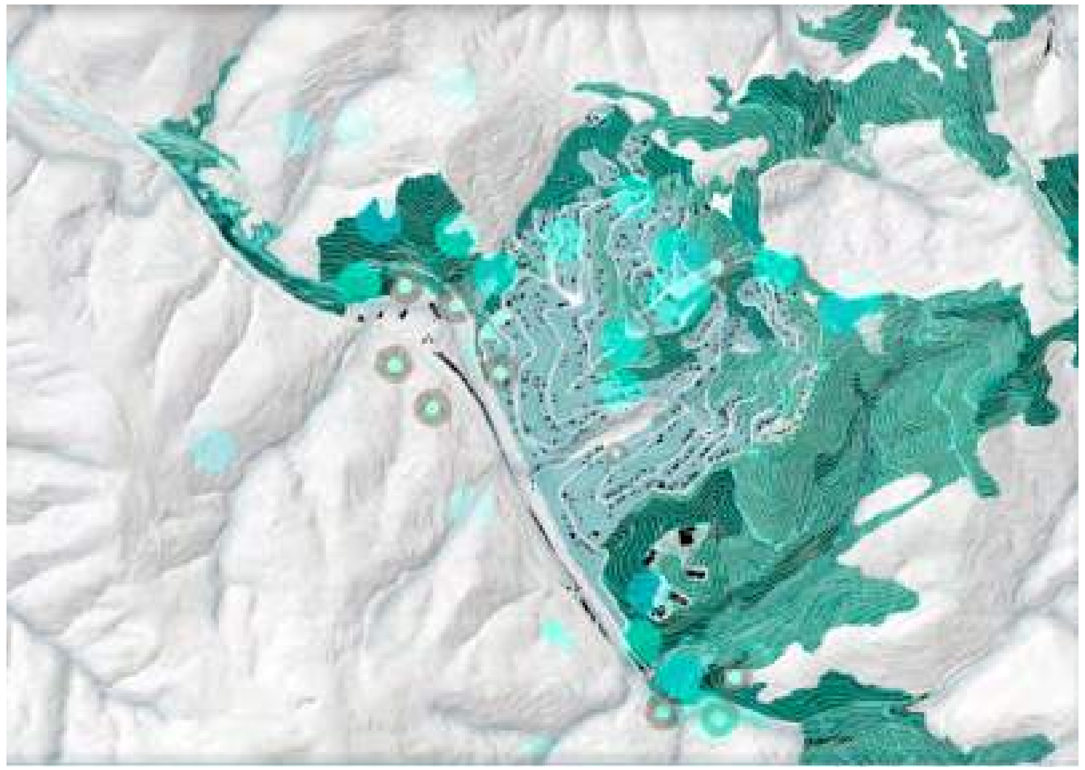


Deliverable Fire Res D1.11 ECOLOGICAL FACTORS DRIVING RESISTANT AND RESILIENT LANDSCAPES TO HIGH INTENSITY AND EXTREME WILDFIRE EVENTS

Por: Teresa Valor, CTFC; Lluís Coll, UdL / JRU CTFC-AGROTECNIO; Míriam Piqué, CTFC;Jean-Luc Dupuy, INRAE; Pere Casals, CTFC.

C.7// Adaptability

Ecosystem adaptation includes on the one hand the socio-ecological adaptive capacities, both of ecosystems and of the communities that make up these landscapes, including temporal processes and structural changes (Lavell et al. 2012; Birkmann et al. 2010) that allow the generation of strategies and measures for recovery and regeneration in the face of disturbances such as wildfires.
In hazards literature, this term refers to the ability of a household or community to cohesively respond to hazards by mediating risks, learning from past experiences, and recovering from losses.
Adaptive capacity involves the motivation and organizational ability to direct material and social resources toward reducing the long term, potential impacts of wildfire (Paveglio et al. 2012). High levels of adaptive capacity require high levels of social capital and cohesion. While increasing a community's adaptive capacity does not necessarily decrease risk of exposure to environmental hazards (Fischer et al. 2013), it indicates a community's ability to cope with and recover from these events by reducing the catastrophic impacts of some events. (Social Vulnerability and Wildfire in the Wildland-Urban Interface, 2019)
The following cartography represents landscape adaptation recognizing the resilient and resistant capacities of landscape representing in gradient the greater or lesser adaptation. (see Fire Res Deliverable D1.11 Ecological factors driving Resistant and Resilient Landscapes to high intensity and Extreme wildfire events)
The elements considered to have greater adaptation capacity are those that include a greater regeneration capacity in the face of forest fire impact and, however, a lesser loss of their capacities or a faster recovery. In this sense, the ecological habitats with greater ecosystem adaptation correspond to habitats that have already included forest fire disturbance or management in their development. This is the case of meadows, grasslands, crops or forest management areas. Areas of medium ecosystem adaptation correspond to habitats with a high regeneration capacity in the face of wildfire, such as sclerophyllous forests or Mediterranean woodlands and scrub. On the other hand, urbanized areas present a very low ecosystem adaptation, as do areas of community facilities or endowments. A more detailed assessment of the adaptive capacity of communities and social agents would be necessary to assess the social resilience of these areas.



ADAPTABILITAT ECOSISTÈMICA		
ELEMENT	VARIABLE	RANGS
ESTRUCTURA	RESISTÈNCIA DE L'ESTRUCTURA	Alta, Mitja, Baixa
ESTRATÈGIA	REBROT	Rebrota, No rebrota
	GERMINACIÓ	Germina, No germina

WUICOM: Pascale Vacca, A. Àgueda, Eulalia. Planas, David Caballero, Elsa Pastor CERTEC, UPC; Pepa Morán; Giuseppina Verduci; DUTP UPC; Israel Rodríguez-Giralt; Maria Cifre-Sabater (CareNet, IN3, UOC).
https://upcommons.upc.edu/bitstream/handle/2117/382871/ICFFR_Pastor.pdf?sequence=1

ADAPTABILITY

Own elaboration: P. Morán, G. Verduci, A. Vich

ADAPTABILITY

Own elaboration: P. Morán, G. Verduci, A. Vich

03C_Wildfire Landscape Assessment: Territorial Scale

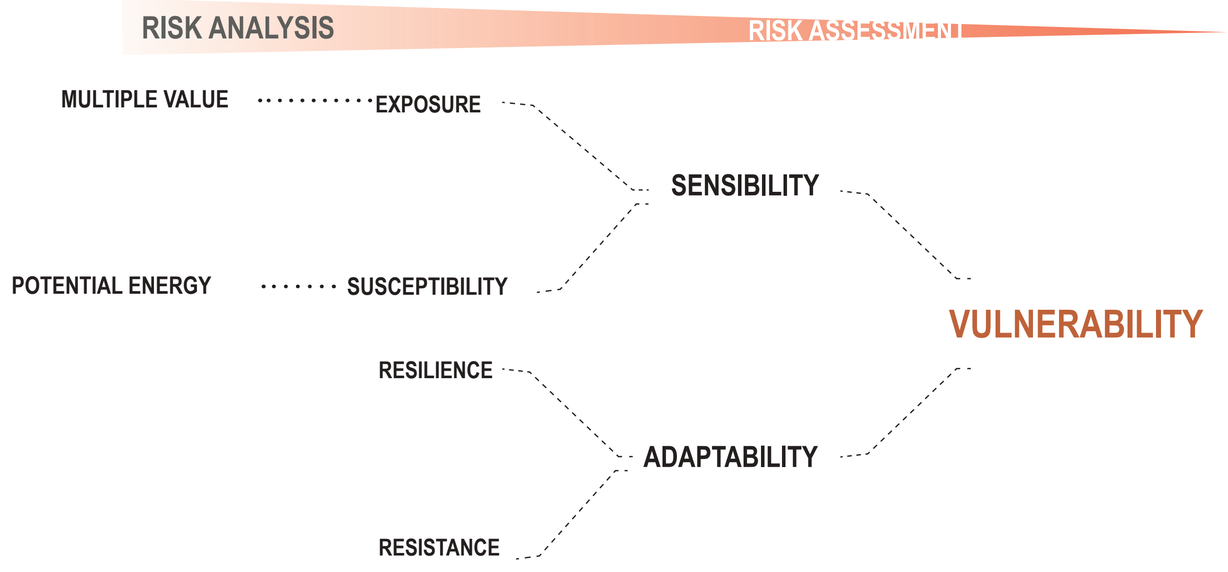
C.7// Vulnerability

Ecosystem vulnerability can be defined as the susceptibility of an ecosystem to be affected by fire. In this sense, both the adaptability and sensitivity of the ecosystem play a key role. In this way, the highest ecosystem vulnerability corresponds to those elements with maximum sensitivity (susceptible to fire) and minimum adaptive capacity (low capacity to respond positively after fire). Conversely, low vulnerability would correspond to ecosystems with low sensitivity and high adaptability. Vulnerability assessment is a vital component of forest fire management. This research focuses on the development of a framework to measure and map vulnerability levels in various areas within Mediterranean Europe, where forest fires are a major concern. The framework followed a stepwise approach to assess its main components, expressed in exposure, sensitivity, coping capacity and adaptation.

Vulnerability assessment provides particular tools for analyzing the potential for loss and has received increasing attention internationally (Cutter, 2015; WorldRiskReport, 2020). Previous efforts have been made to define the logic and coherent approaches of vulnerability assessment; some studies have focused specifically on the ecological dimension of wildfires (Aretano et al., 2015; Duguy et al., 2012; Ibarra et al., 2007), while others focused on socioeconomic aspects (Rodríguez et al., 2013; Roman et al., 2013). Holistic frameworks have also been tried, attempting to integrate the wide range of possible impacts and interactions of wildfires (Birkmann et al., 2013; Chuvieco et al., 2014; Ortega et al., 2012; Tedim et al., 2013).

The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.
Annotation: For positive factors which increase the ability of people to cope with hazards, see also the definitions of "Capacity" and "Coping capacity".(https://www.undrr.org/terminology).

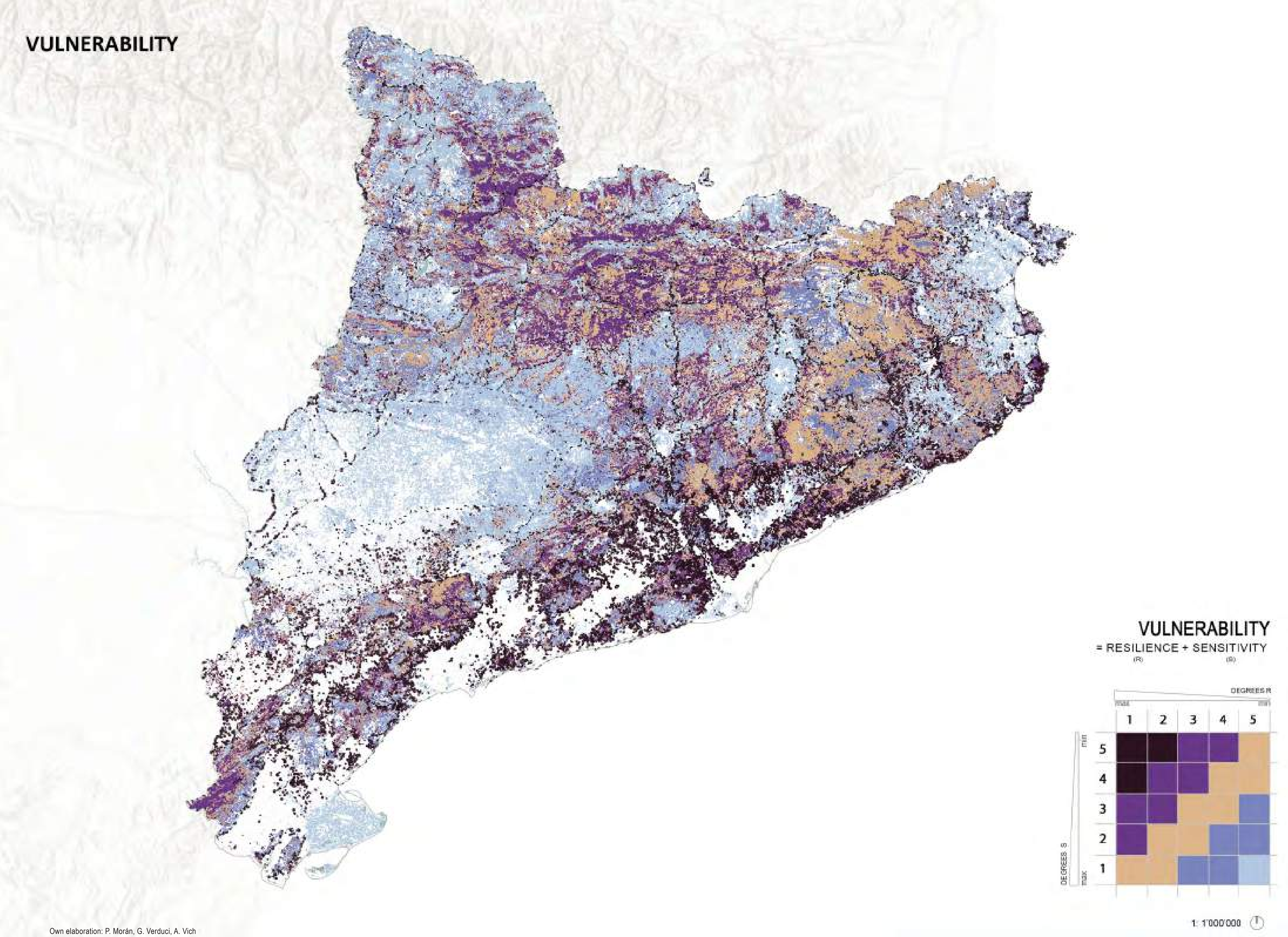
The vulnerability assessment framework integrated three main:
a) Exposure, representing the presence of assets (people, property, ecosystems) in areas where wildfires may occur (Aubrecht et al., 2013; Gallina et al., 2016; Salis et al., 2015, 2013; UNISDR, 2009).
b) Sensitivity, representing the degree to which these assets can be affected by a wildfire, linked to their predisposition to suffer certain type and magnitude of losses (Aretano et al., 2015; Birkmann et al., 2013; Cutter, 2011; Murthy et al., 2015);
c) Coping capacity, related to the measures applied to anticipate potential effects or to respond in case a fire occurs (Birkmann et al., 2013; Tedim et al., 2013), based on institutional practices within the several countries.



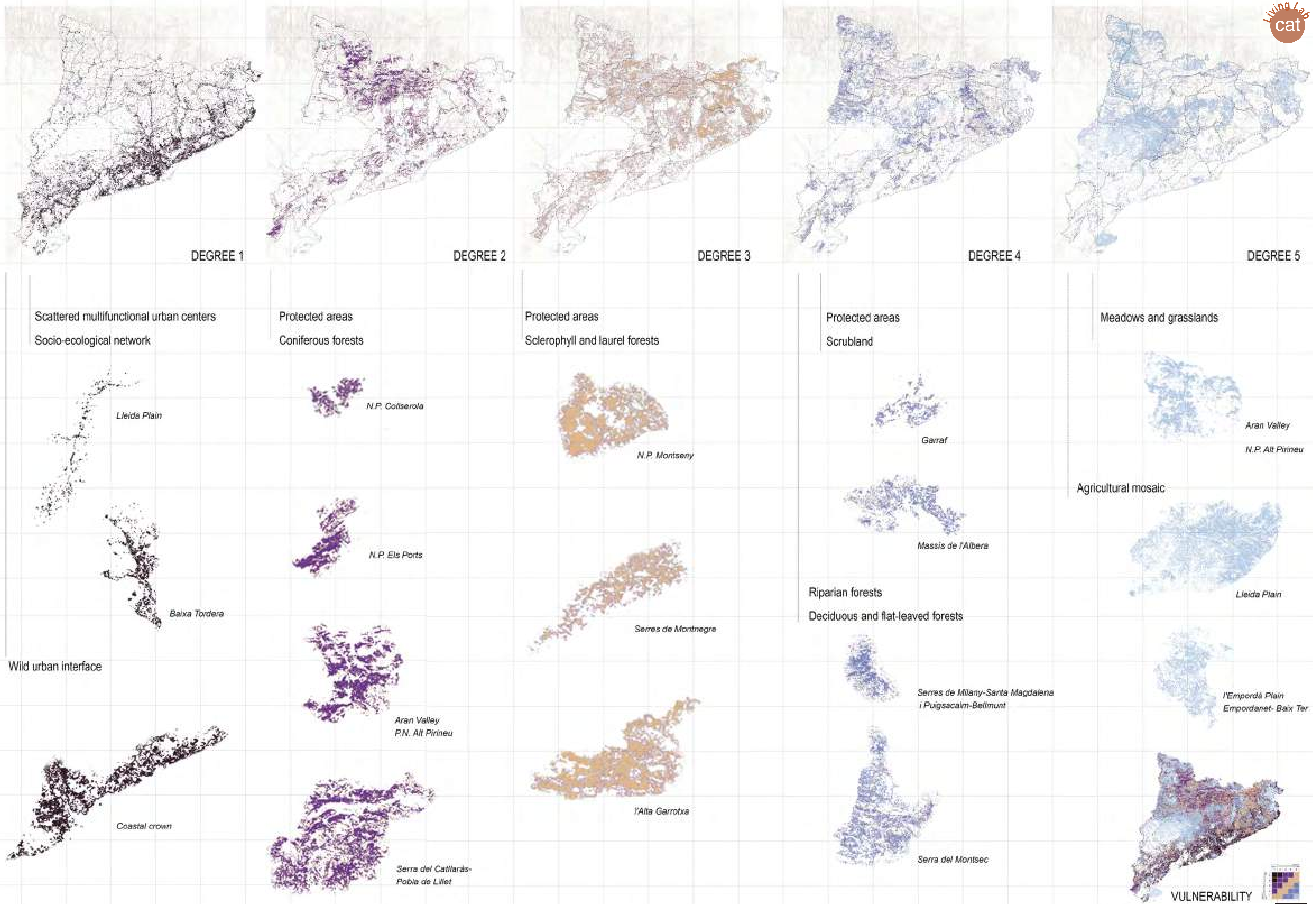
ECOSYSTEM VULNERABILITY max min

WUICOM: Pascale Vacca, A. Àgueda, Eulalia. Planas, David Caballero, Elsa Pastor CERTEC, UPC; Pepa Morán; Giuseppina Verduci; DUTP UPC; Israel Rodríguez-Giralt; Maria Cifre-Sabater (CareNet, IN3, UOC).
https://upcommons.upc.edu/bitstream/handle/2117/382871/ICFFR_Pastor.pdf?sequence=1

VULNERABILITY

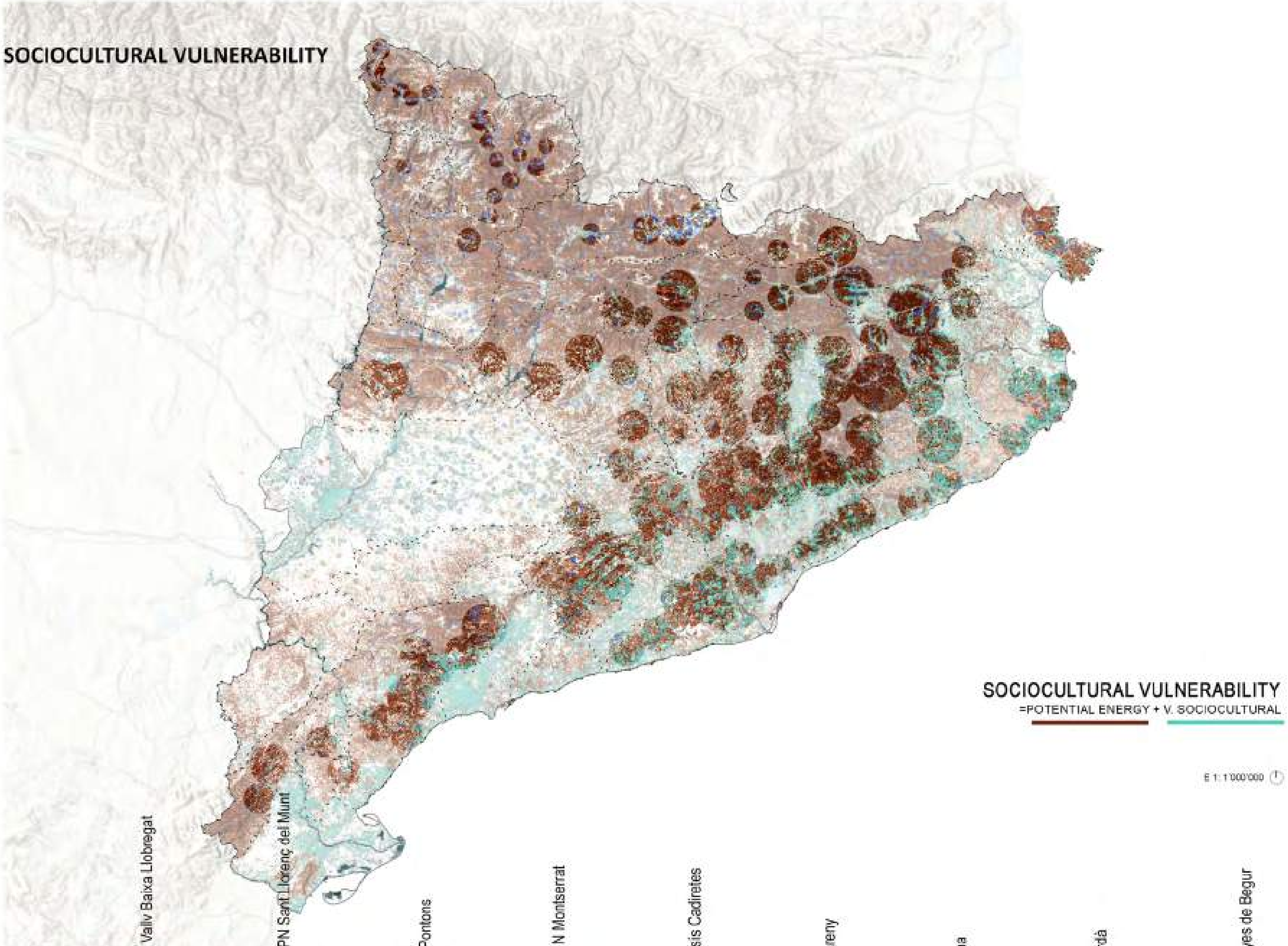


Own elaboration: P. Morán, G. Verduci, A. Vich



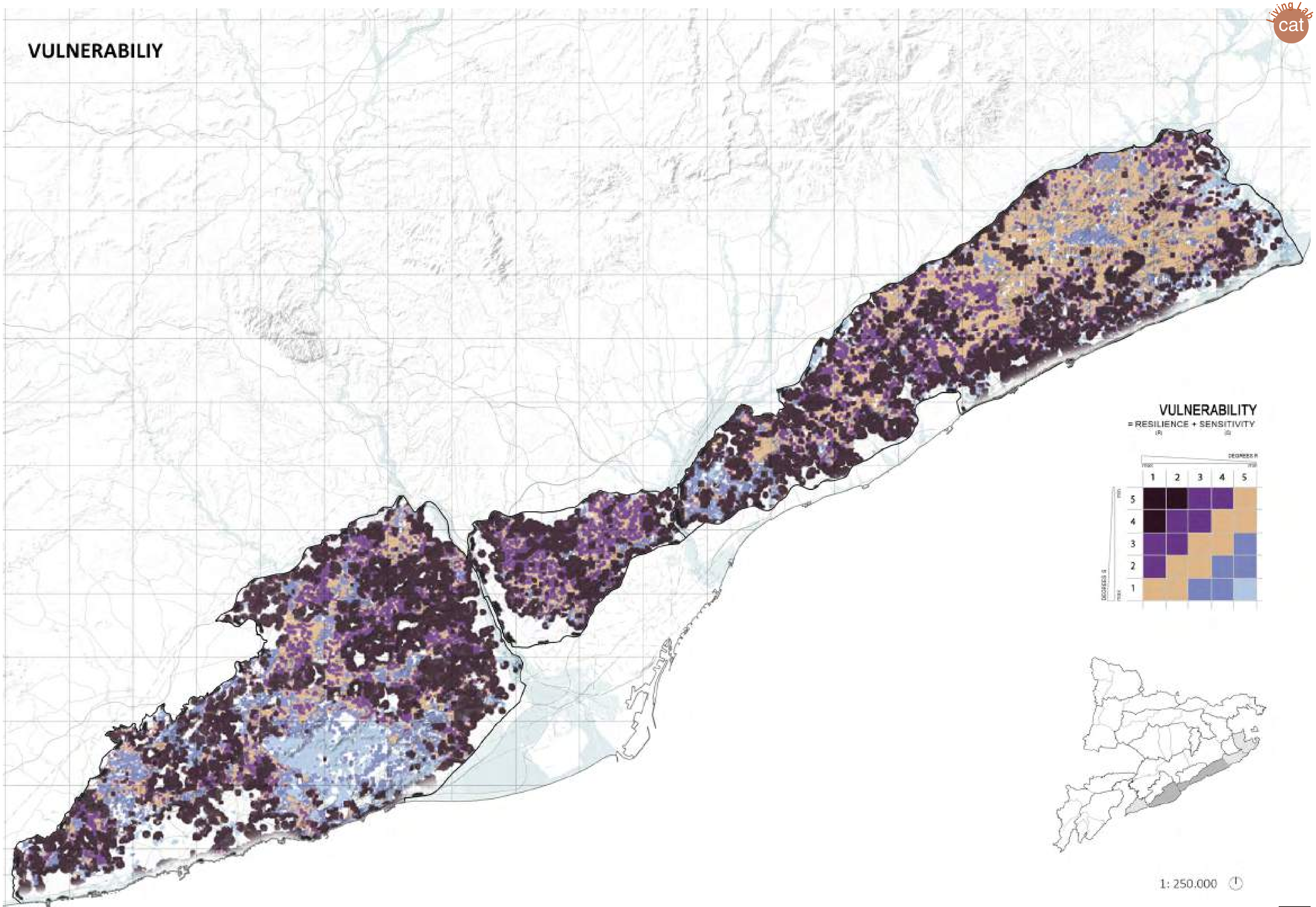
Own elaboration: P. Morán, G. Verduci, A. Vich

SOCIOCULTURAL VULNERABILITY



	Valiv Baixa Llobregat	PN Sant Llorenç del Munt	Pontons	P N Montserrat	Massis Cadiretes	Balsareny	Solsona	Puigcerdà	Muntanyes de Begur
Surface	41.367ha	40.087ha	38.933ha	28.681ha	15.207ha	13.149ha	9.534ha	6.681ha	5.780ha
Tn / kwa	8.086ha	21.750ha	14.116ha	9.341ha	2.944ha	4.482ha	4.484ha	2.119ha	920ha
Affected assets	33.280ha	18.337ha	24.816ha	19.340ha	12.262ha	8.666ha	5.049ha	4.562ha	4.860ha

Own elaboration: P. Morán, G. Verduci, A. Vich



Own elaboration: P. Morán, G. Verduci, A. Vich

03D_Wildfire Landscape Assessment: Local Scale

EWE UNITIES

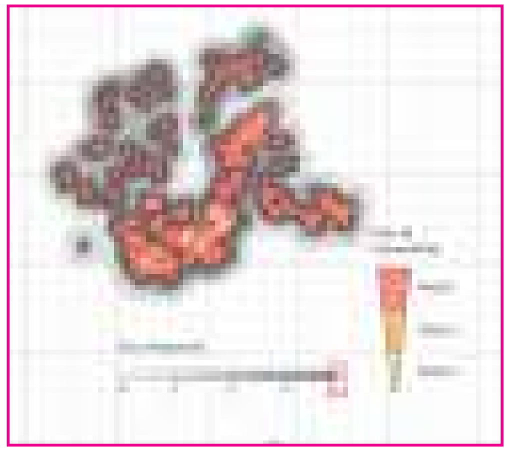
LOCAL SCALE

Categorization

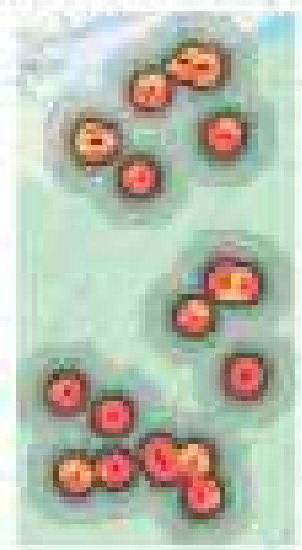
Choose your unity

Recognize the urban planning

VULNERABILITY



VULNERABILITY + urban planning



Per situacions d'emergències

PAM: Pla d'Actuació municipal
PAU: Plans d'autoprotecció

Mesures d'ordenació del territori i urbanisme

Planejament urbanístic:

-PDU plans directors urbanístics
-POUM Pla d'ordenació urbanística municipal
-PGO plans generals d'ordenació

Planejament urbanístic derivat:

-PPU plans parcials urbanístics
-PMU Plans de Millora urbana
-PEU Plans especials urbanístics

PPI PLA DE PREVENCIÓ D'INCENDIS FORESTALS 22-25

-DUPROCIM (document únic de protecció civil municipal)
-PAU
-PAM

PPP PERÍMETRES DE PROTECCIÓ PRIORITÀRIA

-PPU Programa de prevención de incendios forestales en urbanizaciones y núcleos de población (PPU)

Own elaboration: P. Morán, G. Verduci, A. Vich

03D_Wildfire Landscape Assessment: Local Scale

D.1// Local Scale assessment: EWE Units

The urban-forest interface (IUF) is understood as the area where forest land comes into contact with built-up areas. A simple definition for a complex reality, characterized by the multiple interactions and exchanges that develop between two territorial subsystems (the social/urban and the natural/forest) (Vince et al., 2005)
Thus, the territory of the interface is susceptible to being affected by forest fires, but at the same time it constitutes a source of danger, since it is an area where the probabilities of ignition by human causes are much more frequent (Vilar et al., 2008).

According to Luís Galiana, 2012, these methods allow the description and classification of interfaces to be approached in a more refined way based on the analysis of its main components: the intensity of human occupation (density and number of buildings) and the characteristics of the vegetation (horizontal continuity of the same), and their possible combinations (Lampin et al., 2006; Caballero et al., 2007)

1. Little consideration of risk as an element associated with scattered urbanization
2. The necessary sectoral approach to the problem
 Evidently, these are maps drawn up with other purposes (prevention and extinguishing of fires), which do not meet the requirements of spatial planning.
3. The technical difficulties for its treatment and the need for new approaches

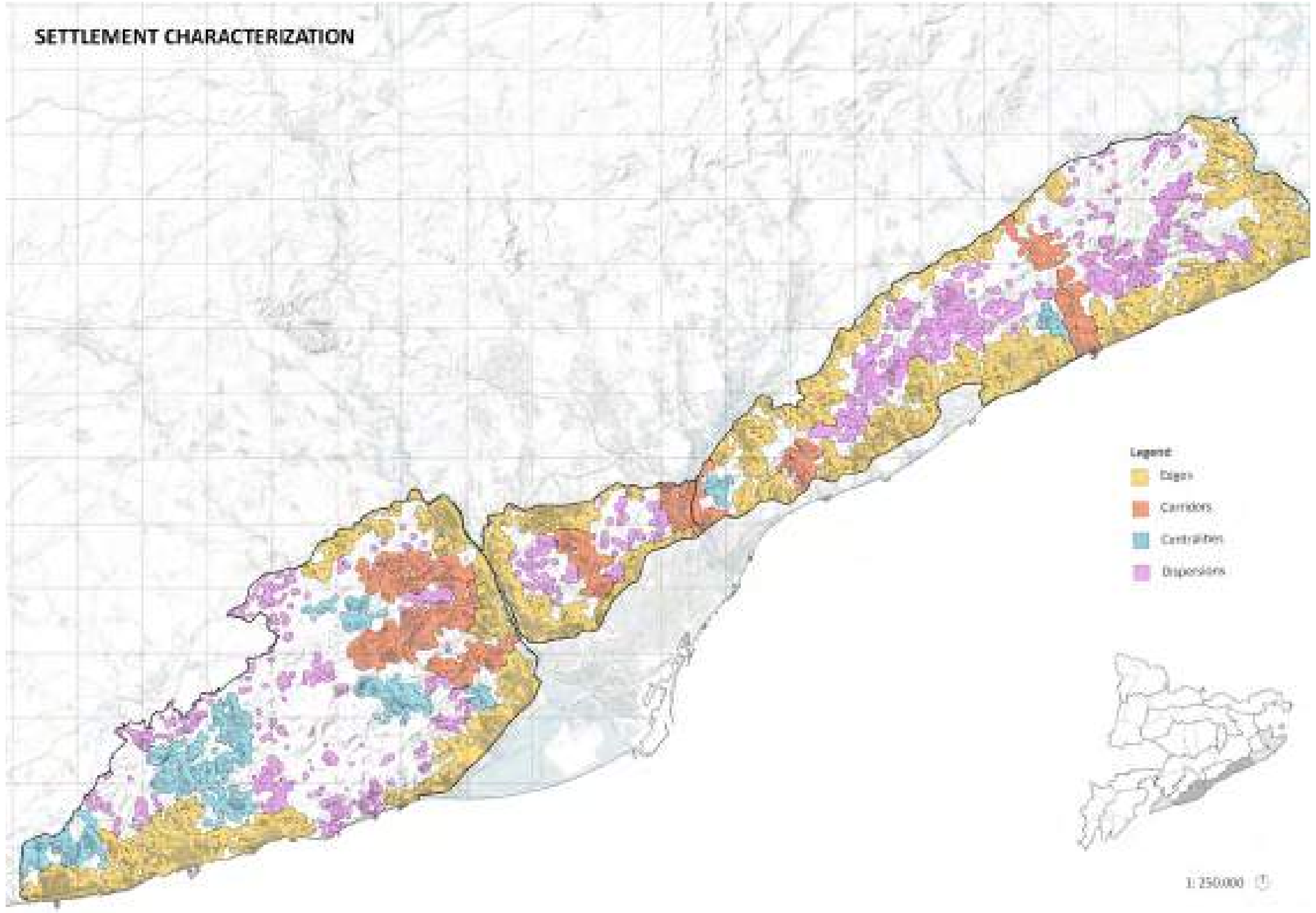
CONFIGURATION OF SETTLEMENTS:

EDGES

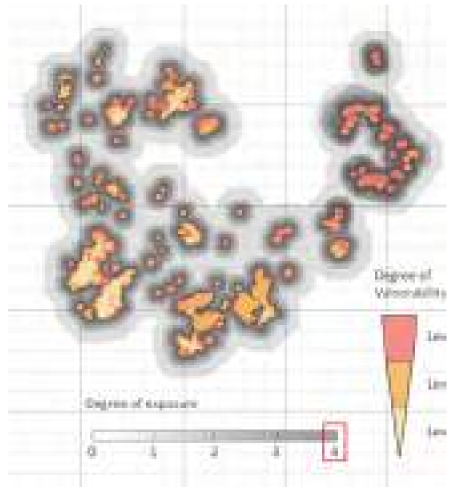
CORRIDORS

CENTRALITIES

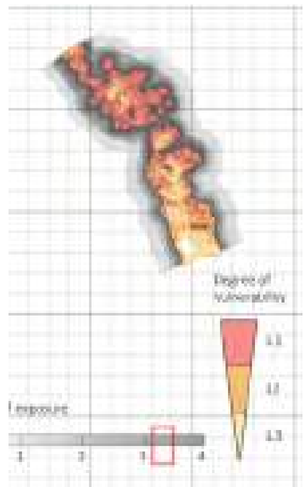
DISPERSIONS



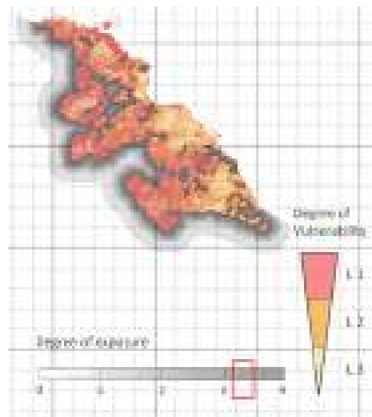
DISPERSIONS



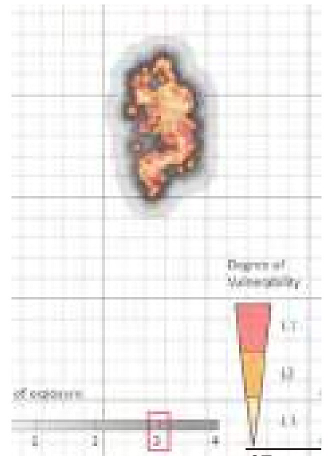
CORRIDORS



EDGES



CENTRALITIES

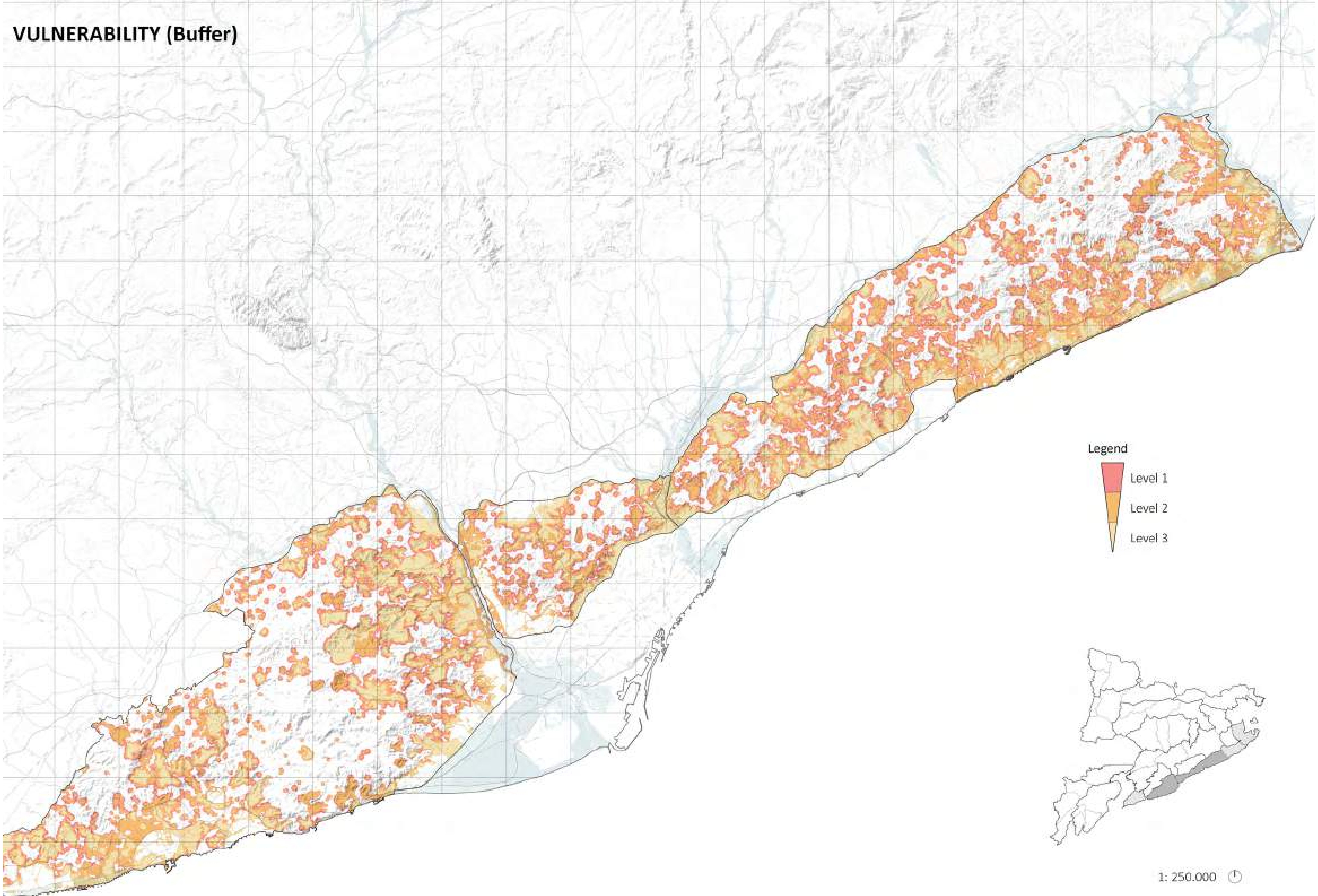


Own elaboration: P. Morán, G. Verduci, A. Vich

CORONA LITORAL

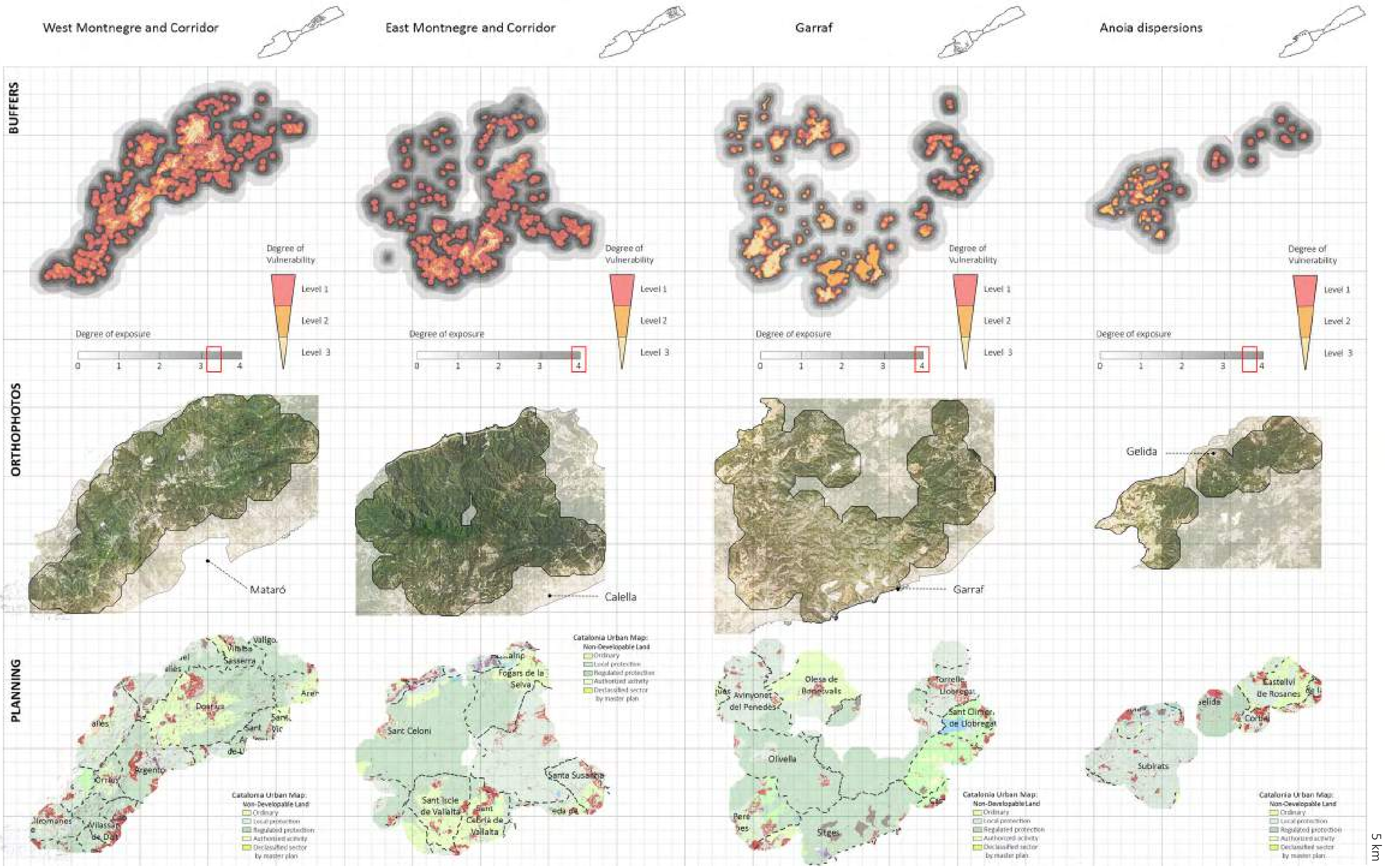
Own elaboration: P. Morán, G. Verduci, A. Vich

VULNERABILITY (Buffer)



Own elaboration: P. Morán, G. Verduci, A. Vich

DISPERSIONS



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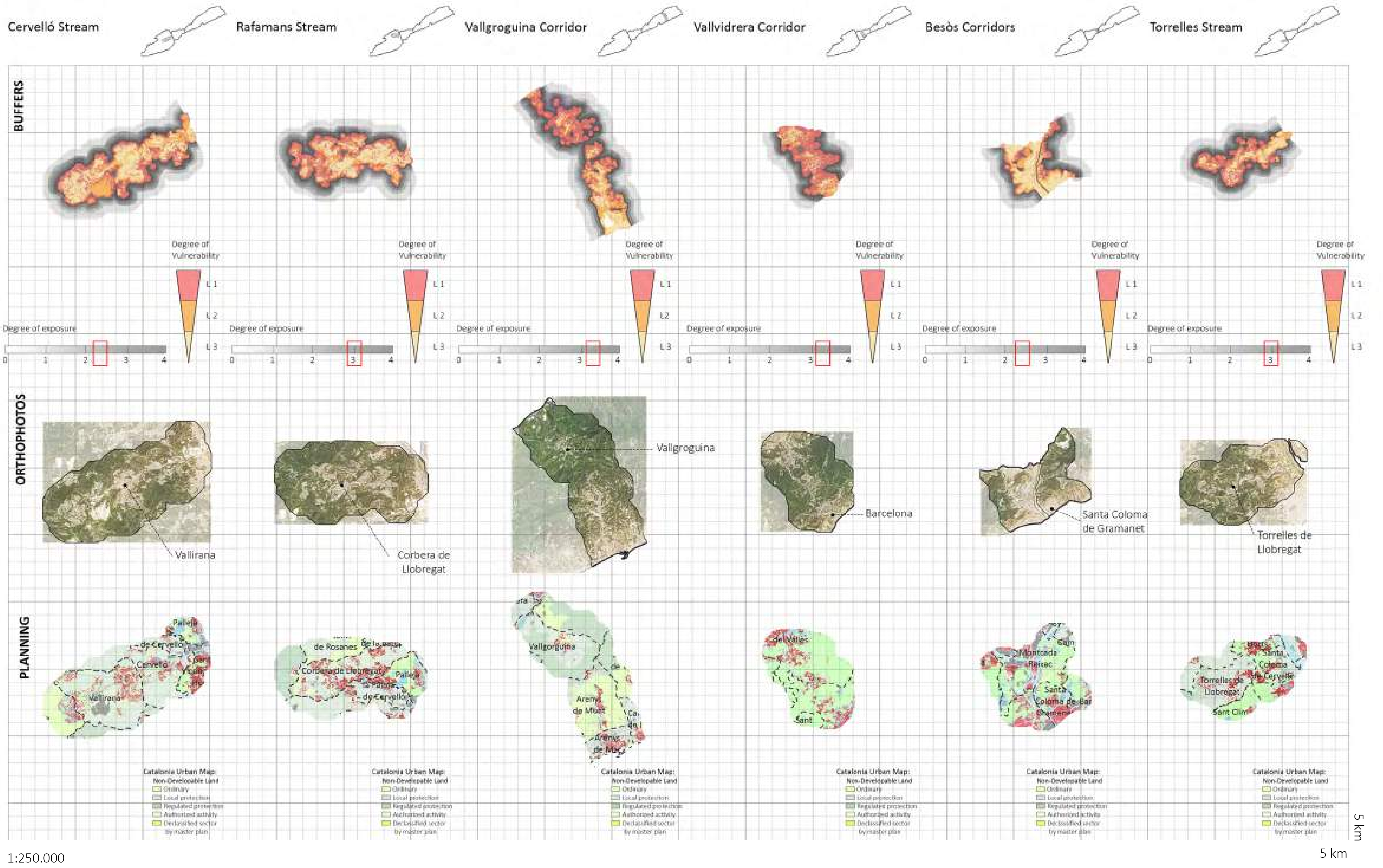
5 km

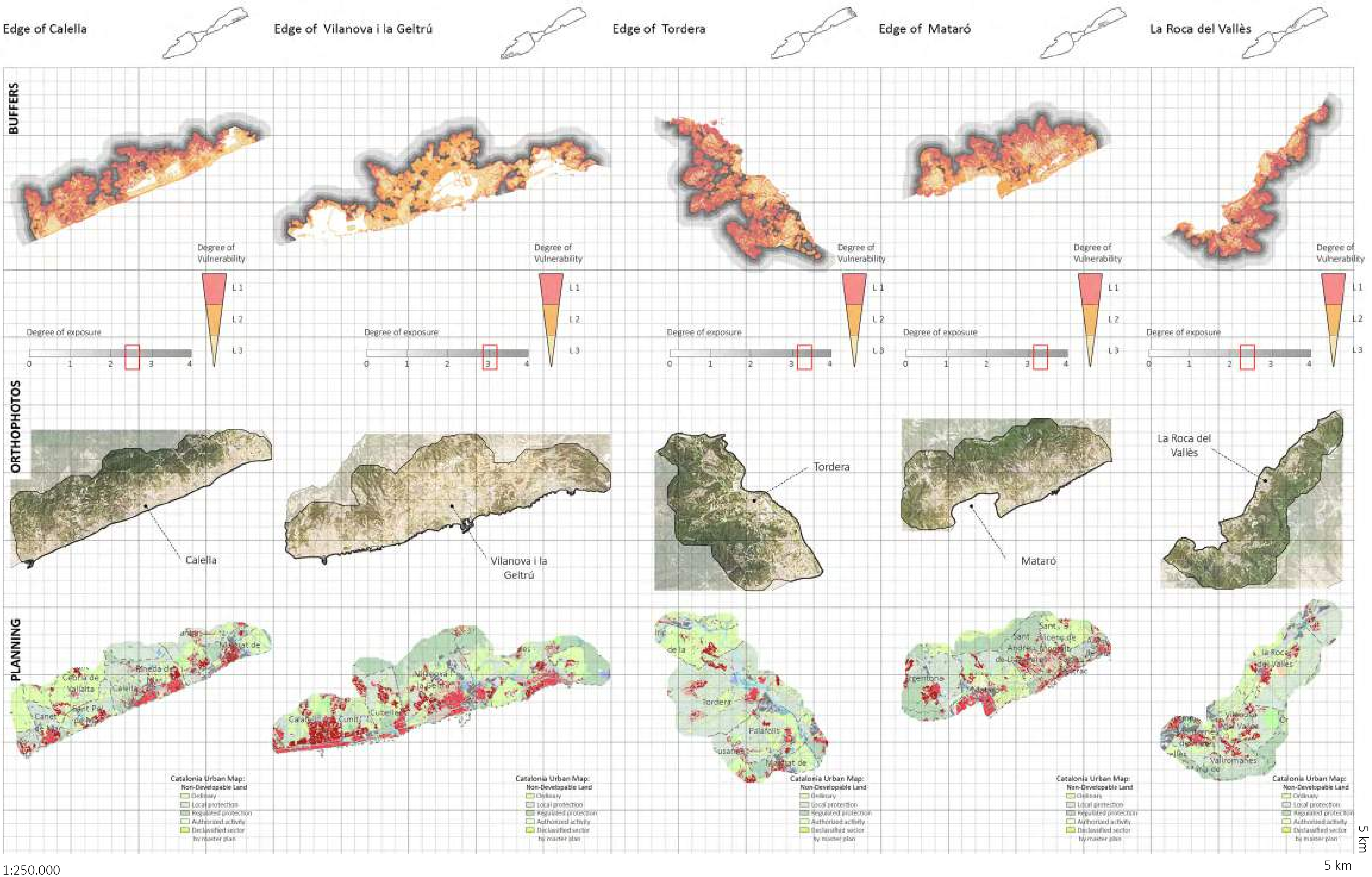
Own elaboration: P. Morán, G. Verduci, A. Vich

CORRIDORS



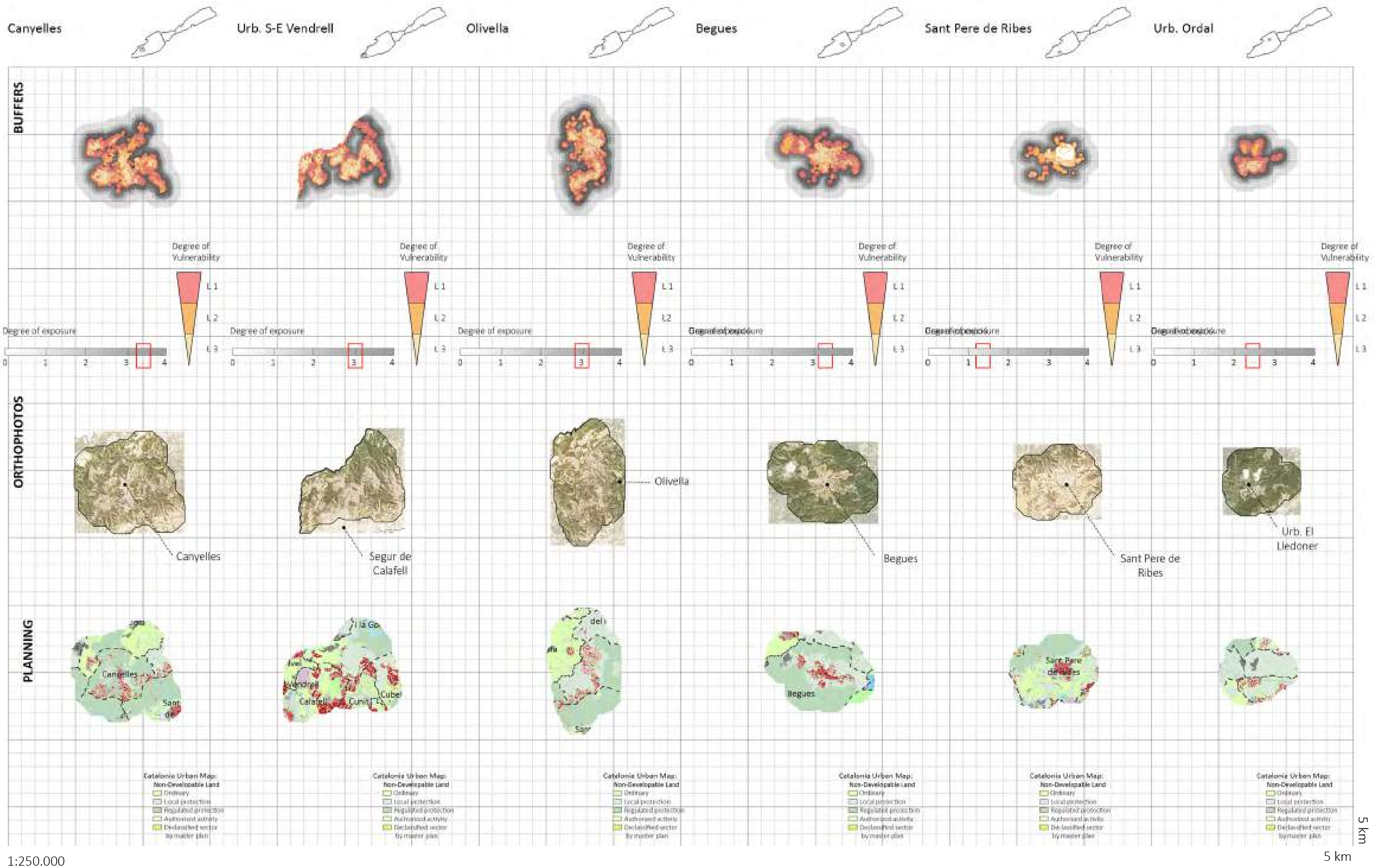
Own elaboration: P. Morán, G. Verduci, A. Vich

EDGES



Own elaboration: P. Morán, G. Verduci, A. Vich

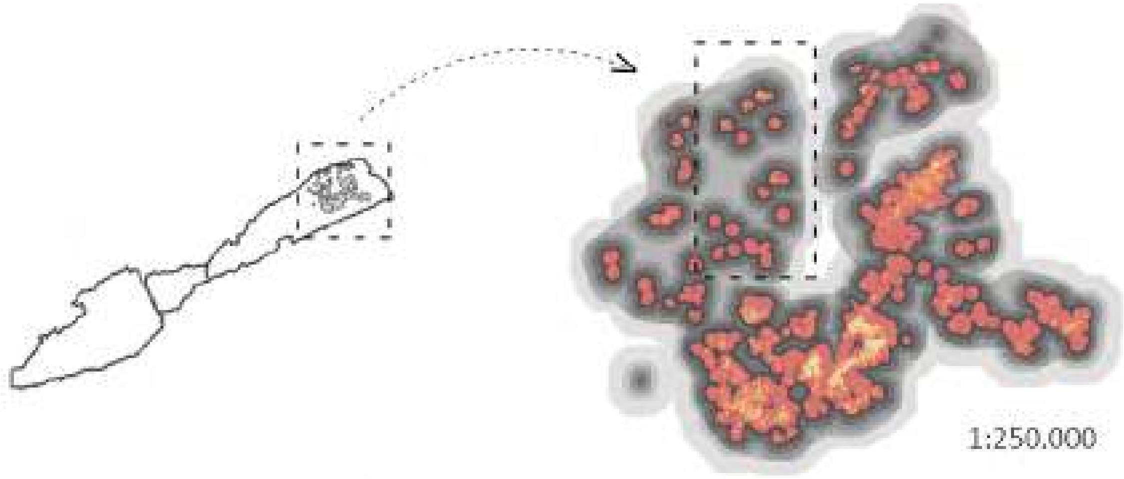
CENTRALITIES



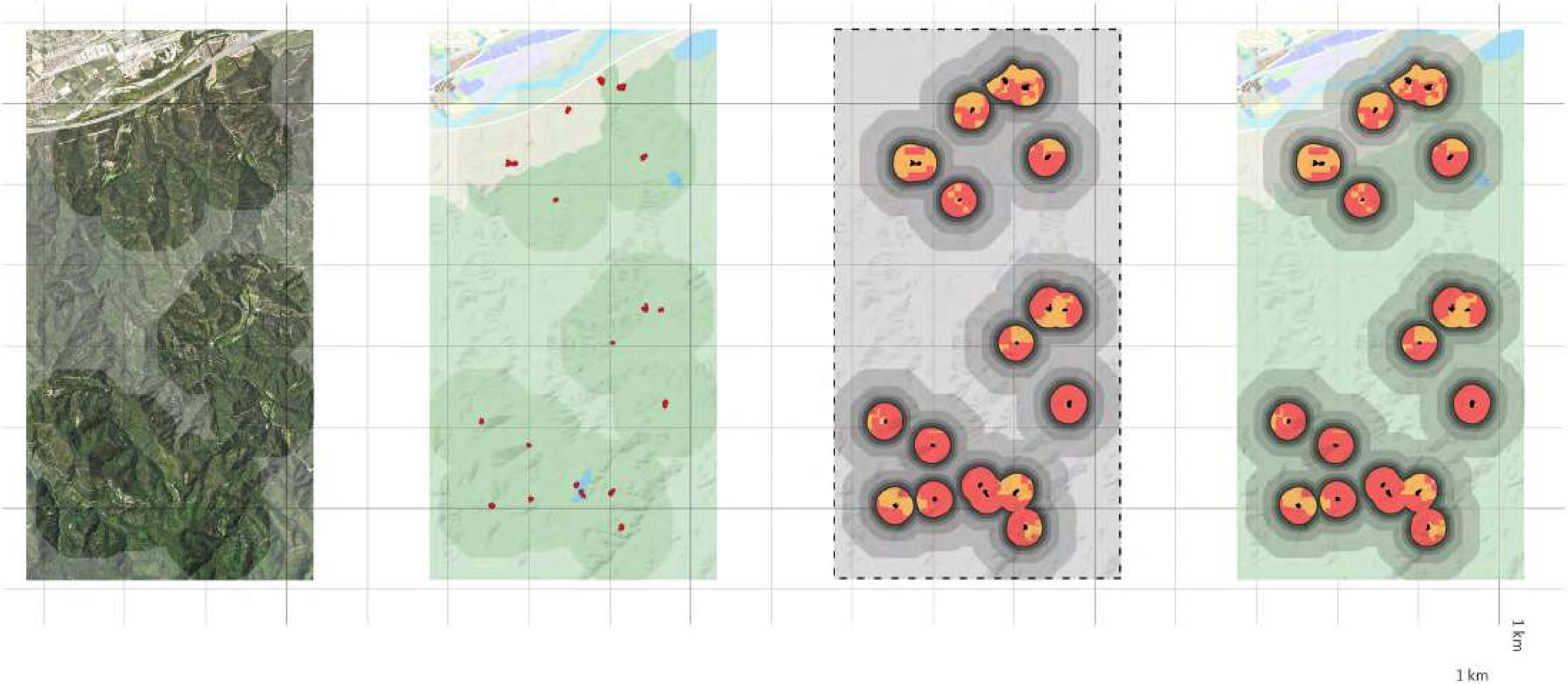
Own elaboration: P. Morán, G. Verduci, A. Vich

DISPERSIONS

East Montnegre and Corridor



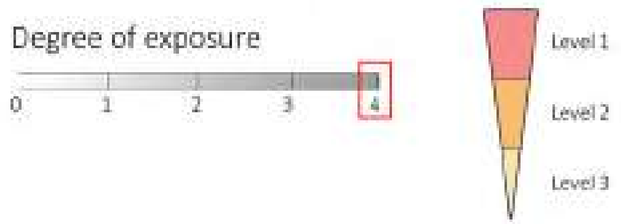
Orthophoto | Planning | Vulnerability | Planning+ Vulnerability



Catalonia Urban Map:
Non-Developable Land
- Ordinary
- Local protection
- Regulated protection
- Authorized activity
- Declassified sector by master plan

Degree of exposure

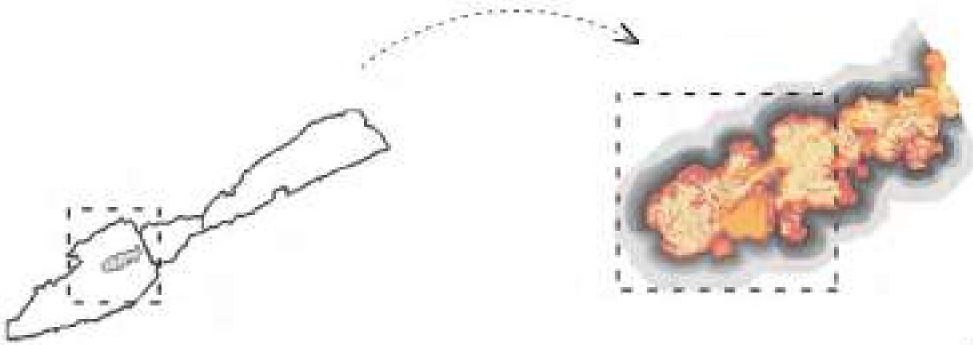
Degree of Vulnerability

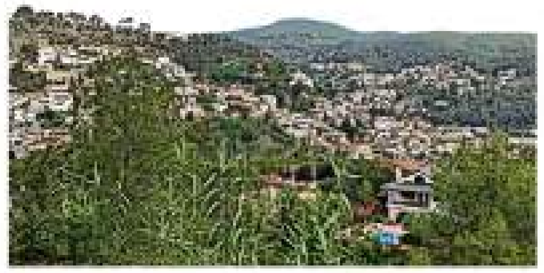


Own elaboration: P. Morán, G. Verduci, A. Vich

CORRIDORS

Cervelló stream





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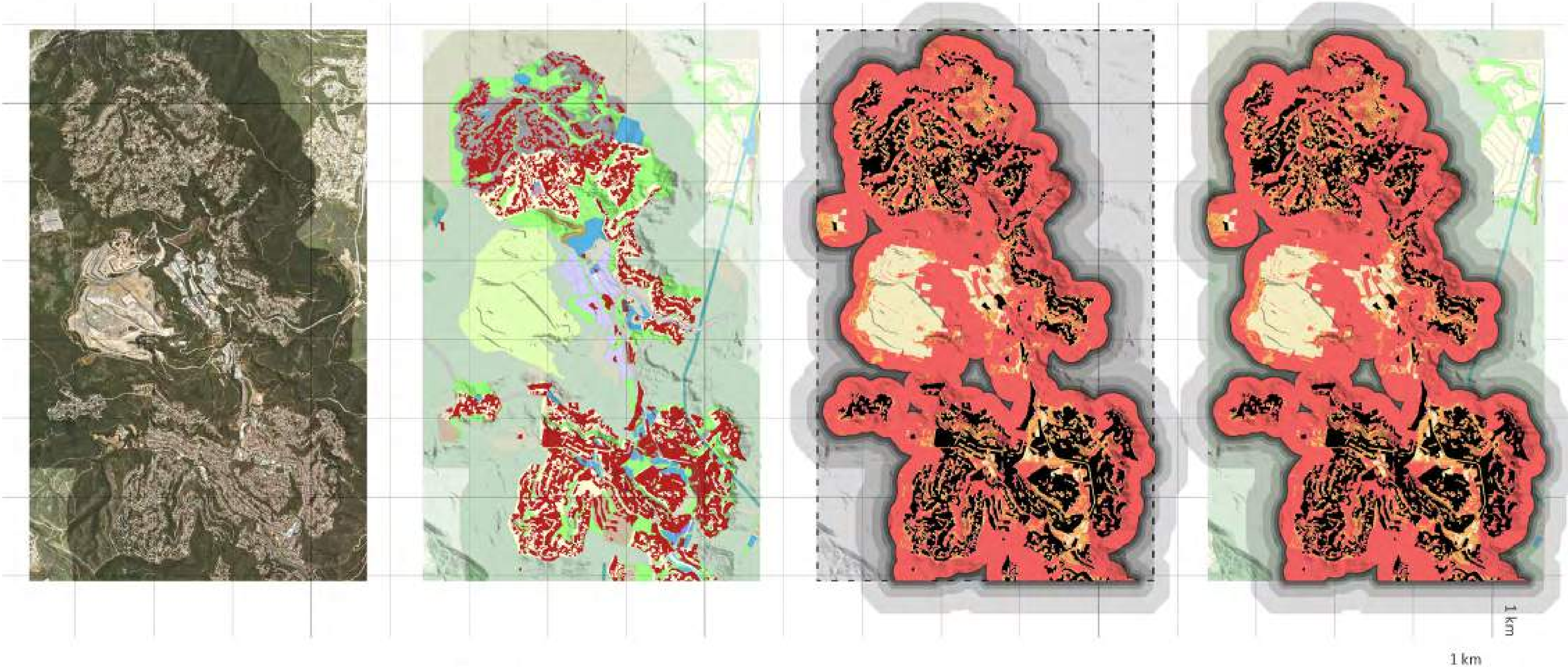
Orthophoto | Planning | Vulnerability | Planning+ Vulnerability



Catalonia Urban Map:
Non-Developable Land
- Ordinary
- Local protection
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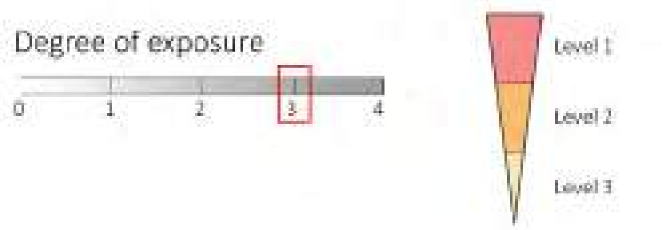
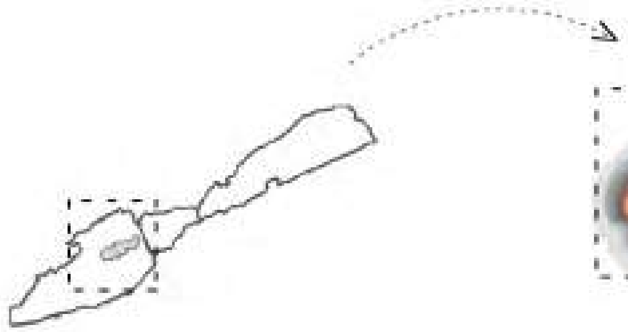
Degree of Vulnerability

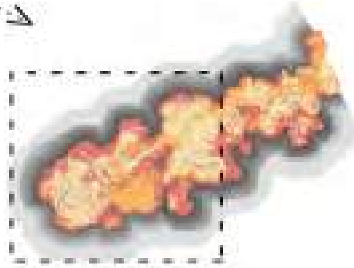


Own elaboration: P. Morán, G. Verduci, A. Vich

CORRIDORS

Cervelló stream





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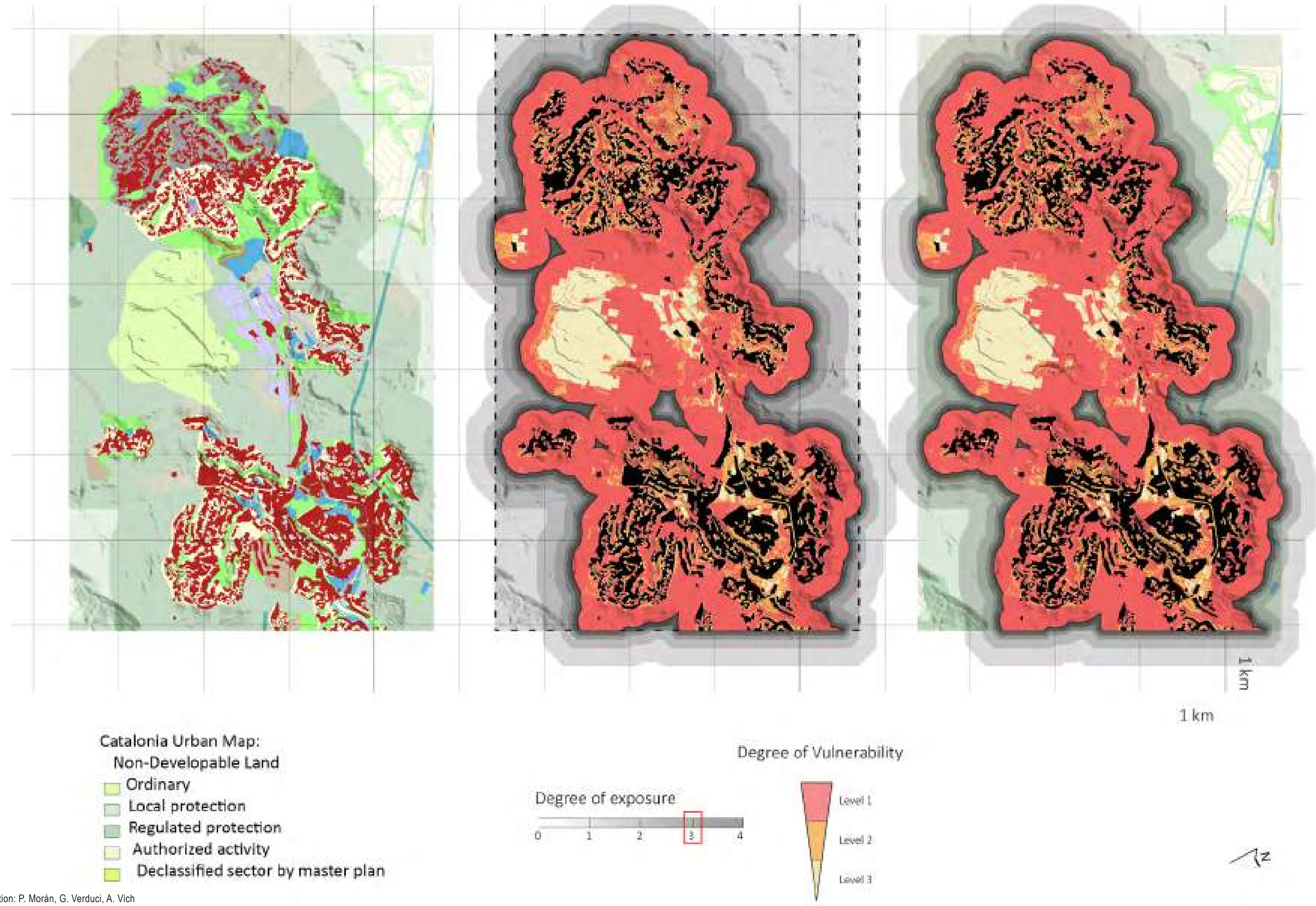


Territorial and Urban Planning Measures

Urban Planning:

- PDU_Urban Development Master Plans
- POUM_Municipal Urban Development Plan
- PGO_General Urban Development Plans

Derived Urban Planning:

- **PPU_Partial Urban Development Plans**
- **PMU_Urban Improvement Plans**
- **PEU_Special Urban Development Plans**

PPI – FOREST FIRE PREVENTION PLAN 2022–2025

- **DUPROCIM (Single Municipal Civil Protection Document)**
- **PAU_Emergency Action Plan-PAM_ Municipal Action Plan**

PPP_PRIORITY PROTECTION PERIMETERS

- **PPU_Forest Fire Prevention Program in Urbanizations and Population Centers**

Own elaboration: P. Morán, G. Verduci, A. Vich

04_Landscape planning strategies

04A_Landscape and urban planning: the wildfire planning tools

The wildfire planning framework

This framework focuses on a holistic planning approach, which creates consistency across locally applicable plans, and the policies and public investment programs that are used to implement them. It focuses on planning interventions in three categories:

1. Plans

Plans are instruments that identify priorities, set goals, and define actions to achieve those goals in a specific timeframe. The planning process engages the public and allows for collaborative work with a range of community stakeholders. When it comes to addressing hazards, the planning process can be important to building community.

2. Regulations

Land-use regulations, including the zoning ordinance and subdivision regulations, create the regulatory framework for development within a community. They are the primary tools for advancing the goals and policies in the comprehensive plan and other community plans. As a result, they are important tools for addressing and mitigating hazard risk.

3. Public/Green infrastructures and common goods

Public infrastructures has been defined as "A strategically planned network of natural and semi-natural areas with other environmental features, designed and managed to deliver a wide range of ecosystem services, while also enhancing biodiversity."(European Parlament, 2013)

They can become protective infrastructures towards wildfire when they intregrate wildfire protection into their planning and design.

In Spain recently it has been aproved a National Green Infrastructure, Connectivity and Ecologic Restauration Strategy, 2021, which regulates the implementation and development of Green Infrastructure in Spain, establishing a harmonized administrative and technical framework for the entire Spanish territory.

La Estrategia [estatal de infraestructura verde y de la conectividad y restauración ecológicas] sienta las bases para establecer un nuevo modelo de **planificación y gestión territorial** *donde se integren el desarrollo económico y social, la garantía del mantenimiento de los servicios ecosistémicos y la conservación de la biodiversidad" (Valladares et al. 2017).*

04A_Landscape and urban planning: the planning tools

A.1//Plans

Landscape and urban plans provide an opportunity to integrate wildfire hazard into their contents.

For example, specific plans, which are useful for planning large projects whose development may be phased over time, can set a schedule for infrastructure improvements, fuel modification and landscape maintenance requirements, or other development standards or requirements to address and mitigate wildland f ire hazards and associated risks throughout the phases of each development.

Community plans and masterplans that have areas which overlap with wildfire-prone areas can integrate risk into the planning process.

regional

Territorial and urban plans

Regional Plans or strategies are a coodinated approach to looking at territorial policies, in terms of urban development, ecosystem protection or infrastructures among others. Green infrastructures at the regional scale, allow communities to look at opportunities to mitigate hazard risk in concert with other priorities, including conservation and protection of land, natural and nature-based systems and green stormwater infrastructure including open space preservation, access to recreational opportunities, and economic development.

General plan

All cities and counties are required by state law to adopt a general plan, which sets forth a long-term vision of a community's future. The format and content of general plans can vary, and there is no mandatory structure or maximum number of "elements" or topics that a general plan must include.

local

Masterplan

Materplans may focus on multifunctional planning, including different strategies interlinked, such as infrastructure, facilities, recreation, open space, etc.
They set forth a long-range vision for improvement and in some cases growth and development.
The masterplan has a 20- to 30-year planning horizon and a broad scope. It looks at existing conditions within the community and analyzes trends. It defines a vision for the community, and includes goals, objectives, and policy statements to address future growth and change.

Specific plan

Is the most detailed of plan types and acts as a tool for sustematic implementation of the general plan os a portion of a local agency's planning area.

community

Community plan

Is similar to a community plan, but the level of detail and scope can vary based on the needs of the plan and the neighborhood area.

Community wildfire protection plan

Is a policy document that sets a vision for growth or improvement within a defined area, such as a particular community or neghborhood. They don't include zoning regulations or development standards.
They need to be collaboratively developed by local and state government agencies with input from stakeholders, including representatives of federal agencies and other interested parties (e.g., home owners associations, water districts, environmental organizations).

neigborhood

Hazard mitigation plan

Hazard mitigation plans, sometimes referred to as multihazard mitigation plans, allow communities to take action before a disaster strikes. Mitigation planning focuses on developing long-term strategies that help communities minimize the risks associated with hazards. Through the preparation of a hazard mitigation plan, communities identify, assess, and understand risks and develop strategies that will mitigate the impact of those risks on the community.

Open space plan

These plans generally look at parks and open spaces as multifunctional—that is, areas that may provide important environmental or ecological functions while serving as places for recreation and community gatherings, and providing economic development potential.

Neighborhood plan

Neighborhood plans are used to plan for specific subareas of a community. The further advance and develop the goals and policies in the comprehensive plan. They provide a greater level of granularity and often focus on shorter planning horizons than the comprehensive plan.

site +

Site plan

Plans of development on the parcel(s) include configuration of buildings and open space, parking, street access, etc. Site design standards and site plan review can further require special review of site plans in high hazard areas.

- scale

Living Lab cat

MAIN TERRITORIAL, FORESTRY AND URBAN PLANNING:

TERRITORIAL AREA: CATALONIA

-General Territorial Plan of Catalonia 2035
-Sectoral territorial plans
-General Forestry Policy Plan (Sectoral Territorial Plans)

TERRITORIAL AND MUNICIPAL AREA

-Partial territorial plans and territorial master plans, developed just for the Alt Penedès

Urban planning:

-PDU urban master plans
-POUM Municipal urban planning plan
-PAUM Municipal urban action program
-PGO general planning plans

Derived urban planning:

-PPU partial urban plans
-PMU Urban Improvement Plans
-PEU Special urban plans

Forest planning:

-PORF Forest resources management plan
-IOF Forest management instruments

SPECIAL PLAN EMERGENCIES:

-INFOCAT Special emergency plan for forest fires in Catalonia

FIRE PREVENTION PLANS:

-PPI FOREST FIRE PREVENTION PLAN 22-25
-DUPROCIM (single municipal civil protection document)
-PAU
-PAM
-PPP PRIORITY PROTECTION PERIMETERS
-PPU Forest fire prevention program in urban areas and population centers (PPU)

04A_Landscape and urban planning: the planning tools

CARTOGRAPHIC BASES AND PLANS

PLAN /CARTOGRAPHY | SCALE | DEFINITION | NORMATIVE / NON-NORMATIVE

INFOCAT

TERRITORIAL | MUNICIPAL TERM

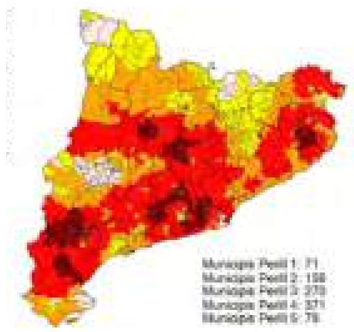
(https://interior.gencat.cat)

EMERGENCIES

The Special Forest Fire Emergency Plan of Catalonia (INFOCAT) constitutes a special plan with the purpose of having an emergency plan that allows to effectively deal with and manage incidents and emergencies due to forest fires that occur within the territorial scope of Catalonia.

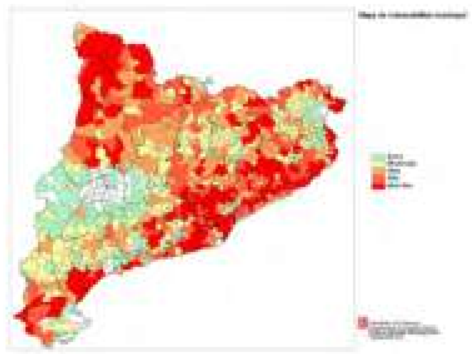
FOREST FIRE HAZARD MAPS

Basic forest fire hazard map produced by the General Director of Forest and Environmental Management with a new methodology that incorporates climate change prospecting scenarios.



VULNERABILITY MAPS

For this first global analysis of Catalonia, vulnerable elements located "within" the forest mass or less than 500 meters from this mass have been defined and worked on. Five groups of elements are established: population, particularly dangerous elements, infrastructures, protected natural areas and type of fuel.



ANNUAL PLAN FOR THE PREVENTION, SURVEILLANCE AND EXTINGUISHING OF FOREST FIRES OF THE GENERALITY OF CATALONIA

(https://interior.gencat.cat)

EMERGENCIES/PREVENTION

TERRITORIAL

The objective of the forest fire prevention, monitoring and extinguishing plan in Catalonia is to relate the measures to be carried out by the competent public administrations in the field of prevention and emergencies.

PRIORITY PROTECTION PERIMETERS

Limit of priority protection perimeters for forest fire prevention planning.

Each priority protection perimeter will have the corresponding strategic infrastructure project to be able to deal with the maximum guarantees for the prevention and extinguishing of forest fires.

HOMOGENEOUS REGIME ZONES (ZHR)

The ZHR comprise territories with a rotation of fires and types of large homogeneous potential forest fires, in which the Type Fires described by Castellnou (2009), the Design Fires (reference fires for planning) and the synoptic situations that are predicted to be more problematic for the massif can be specified, as explained by Lloret (2003).

PREVINCAT

TERRITORIAL

(https://previncat.ctfc.cat/)

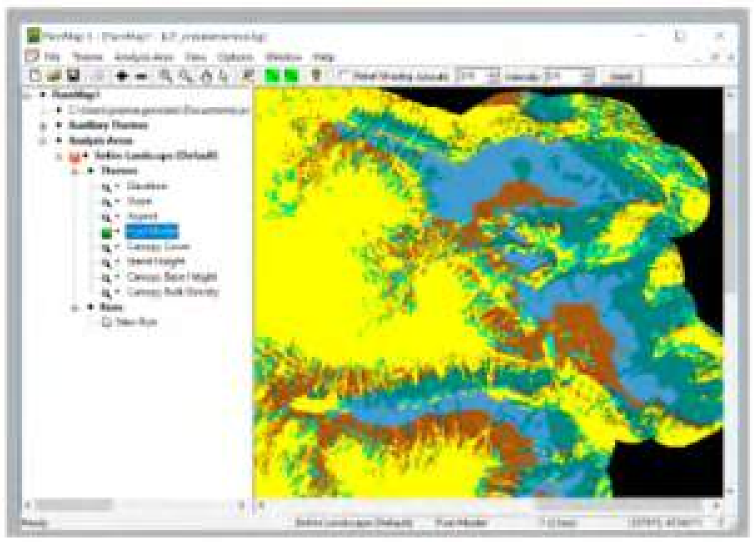
EMERGENCIES/PREVENTION

It is a server that offers the necessary information to plan forest management actions that allow the prevention of large forest fires in Catalonia.

Module 1: Vegetation mapping server (forest landscape and fuel models).

Module 2: Meteorological scenarios, allows simulations of forest fires in any part of the territory of Catalonia, using a wide range of simulators (FARSITE, FlamMap, WilfireAnalyst, etc.).

Module 3: is used to define priority management areas, with regard to the prevention of large forest fires and other criteria that are defined as priorities.



04A_Landscape and urban planning: the planning tools

CARTOGRAPHIC BASES AND PLANS

PLAN /CARTOGRAPHY	SCALE	DEFINITION	NORMATIVE / NON-NORMATIVE
FOER FILES	TERRITORIAL	MUNICIPAL TERM	

EMERGENCIES/ PREVENTION

The initiative to prepare the current version of the multi-agency FOER files for residential urbanizations in the face of forest fires was launched in 2017 from the vision of extinction and the need to have documentary tools that improve the level of information available at the time of operational intervention.

It was clear, from the extinction system, that the technical documents drawn up by the different planning systems and the different instruments designed from the prevention and protection of residential urbanizations, did not provide an important practical utility, a clear added value, at the time of the operational management of the fire/emergency. At least for the operative bodies.

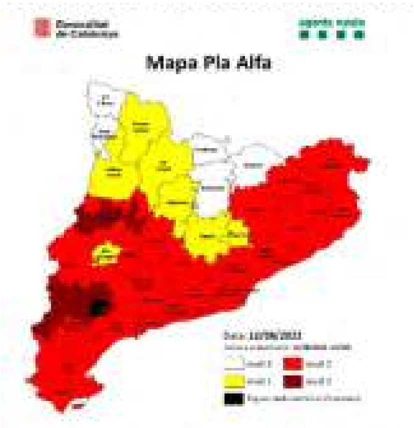
PLAN /CARTOGRAPHY	SCALE	DEFINITION
ALPHA PLAN	TERRITORIAL	COUNTY AND MUNICIPAL TERM

EMERGENCIES

Map prepared by the General Directorate of Rural Agents based on the daily fire danger map of the Forest Fire Prevention Service of the Department of Climate Action, Food and Rural Agenda, as well as other analysis tools. It is updated at 00.00 and at 9.30 or punctually if necessary.

The Alpha Plan is the operational procedure established by the Rural Agents body that defines the actions of forest fire surveillance and prevention troops deployed on the territory, in the face of forest fire danger situations that may occur.

This plan is valid throughout the year and assesses the danger situations daily on a scale of 5 operational levels, ranging from 0 for low danger to 4 for extreme danger.



PLANNING INSTRUMENTS

DUPROCIM

MUNICIPAL EMERGENCY PLAN

EMERGENCIES/ PREVENTION

Self-protection is the set of measures (procedures, systems and organization) implemented in a certain area (buildings, facilities, residential areas, plots, activities, centers, etc.) exposed to one or several risk situations, intended to foresee, prevent and control the risk, provide an adequate response to emergencies and guarantee the integration of these actions with those of the public system.

SELF PROTECTION PLAN

EMERGENCIES/ PREVENTION

Self-protection is the set of measures (procedures, systems and organization) implemented in a certain area (buildings, facilities, residential areas, plots, activities, centers, etc.) exposed to one or several risk situations, intended to anticipate, prevent and control the risk, provide an adequate response to emergencies and guarantee the integration of these actions with those of the public system.

MUNICIPAL ACTION PLAN

EMERGENCIES/ PREVENTION

Self-protection is the set of measures (procedures, systems and organization) implemented in a certain area (buildings, facilities, residential areas, plots, activities, centers, etc.) exposed to one or several risk situations, intended to anticipate, prevent and control the risk, provide an adequate response to emergencies and guarantee the integration of these actions with those of the public system.

04A_Landscape and urban planning: the planning tools

A.2///Regulations

Landscape and urban regulations provide an opportunity to integrate wildfire hazard into their contents.

They are the primary tools for advancing the goals and policies in the comprehensive plan and other community plans. As a result, they are important tools for addressing and mitigating hazard risk.
Regulations are mainly mandatory, as laws, decrees or agreements. Other instruments as instructions, or manuals and guidelines can be non mandatory.

Laws and decrees

National legislation on wildfires generally deals with the following matters:
-general firefighting measures, making it an obligation for the government departments or agencies to combat or help in wildfire extintion.
-demarcation of the authority of responsible officers at both national and grassroots levels, for maximum control and efficiency in firefighting operations;
-identification of special protection measures and the responsibility for them in situations of fire or fire risk, to protect the public and the environment;
-compensation mechanism(s) for damage suffered by those involved in firefighting and incentive measures to ensure that potentially risky situations are reported in a timely manner;
-the restoration of forest lands affected by wildfires.(Mosoti, Mekouar, 2015)

regional

Territorial custody

It is a set of legal strategies or techniques through which the owners and users of the territory become involved in the conservation and use of natural, cultural and landscape values and resources.

local

Voluntary agreements

These agreements with the owners and users of natural resources will be carried out within the scope of the planning and management of protected natural areas and endangered species. Natural resource management plans must determine the general and specific limitations regarding uses and activities that must be established based on the conservation of the components of natural heritage and biodiversity.

community

Defensive space regulations

Defensible space regulations are focused on creating a buffer between structures and wildlands in order to reduce the likelihood of structural damage from flames and increase the likelihood that the structure will withstand a wildfire. Defensible space regulations define zones for the removal of vegetation and debris around the structure, and vegetation spacing and treatments to create a buffer between the structure and the surrounding wildlands.

Manuals and guidelines

Recommendations and information on wildfire assessment and protection measures. Non mandatory. Awareness and information as a decission-making tool for assessment and planning. They usually include study cases and best practices.

Urban and WUI Codes, standards and ordinances

A WUI code is intended to promote safer building and development within the wildland-urban interface in order to address protection of life and property from wildfire by preventing wildland fire from spreading to structures and structural fires from spreading to surrounding wildlands. It establishes minimum regulations related to the density and location of structures, allowable building materials, and vegetation management, as well as emergency vehicle access and water supply. The WUI code generally supplements local building and fire codes It is intended to supplement local building and fire codes.

neigborhood

Transfer of Development Rights

Transfer of Development Rights (TDR) programs permanently preserve and protect open space or other ecologically important areas in exchange for higher density development in other areas of the community.

Complementary technical instructions

Technical information and instructions adressed to technicians and designers who are responsible to stablish prevention measures towards wildfires in specific development projects like housing, urban development, industry, camping and leasure areas among others.

- scale +

REGULATIONS:
TERRITORIAL AREA CATALONIA

_Decree 64/1995, of March 7, which establishes measures to prevent forest fires.

_Law 5/2003, of 22 April, on measures to prevent forest fires in urban areas, population centres, buildings and installations located on forest land.

_Royal Decree 2267/2004, of 3 December, approving the Fire Safety Regulations in Industrial Establishments (RSCIEI).

_Decree 123/2005, of 14 June, on measures to prevent forest fires in urban areas without immediate continuity with the urban fabric.

_Law 3/2010, of 18 February, on fire prevention and safety in establishments, activities, infrastructures and buildings.

_Law 2/2014, of 27 January, on fiscal, administrative, financial and public sector measures.

_ITC-SP 109:2012 safety conditions in buildings with an evacuation height greater than 50 meters, approved by Order INT/323/2012, of October 11, which approves the complementary technical instructions of the Basic Safety Document in the event of Fire (DB SI) of the Technical Building Code (CTE).

_ITC-SP 113:2009 sufficient maneuvering space on roads with a single access, approved by Order INT/324/2012, of October 11, which approves the generic complementary technical instructions for prevention and safety in matters of fires in establishments, activities, infrastructures and buildings.

_ITC-SP 120:2010 Fire hydrant systems for the exclusive use of firefighters approved by Order INT/324/2012, of October 11.

_ ITC-SP 141:2021 Fire water supply in isolated activities.

_ITC-SP 142:2021 Safety conditions in the event of fire in camping establishments and motorhome reception areas.

04A_Landscape and urban planning: the planning tools

A.3///Green and protective infrastructures towards RWL (Resilient Wildfire Landscapes)

As a creative discipline, landscape architecture brings expertise on Nature Based Solutions, technological innovation, and strategic thinking that deliver for nature and people.
A range of further EU policies support **nature-based solutions and green infrastructure** and harness their potential, such as agriculture and forestry, climate change mitigation and adaptation, disaster prevention and risk reduction.

Green infrastructure has been defined as "A **strategically planned network of natural and semi-natural areas with other environmental features, designed and managed to deliver a wide range of ecosystem services, while also enhancing biodiversity."**(European Parlament, 2013)

Such services include, for example, water purification, improving air quality, providing space for recreation, as well as helping with climate mitigation and adaptation. This network of green spaces improves the quality of the environment, the condition and connectivity of natural areas, as well as improving citizens' health and quality of life. Developing green infrastructure can also support a green economy and create job opportunities.(https://environment.ec.europa.eu/topics/nature-and-biodiversity/green-infrastructure_en)

Green infrastructures can become protective infrastructures towards wildfire when they intregrate wildfire protection into their planning and design. **The reduction of the amount and connectivity through landscape design and management of fuels** would reduce fire growth rate, increase the potential for fire suppression, and mitigate fire damage. Afforestation, reforestation and forest management should incorporate these aims, including species selection considering flammability, fire resistance and resilience and the adoption of silvicultural practices that decrease fire hazard. (Duane, Brotons, Castellnou, 2021)

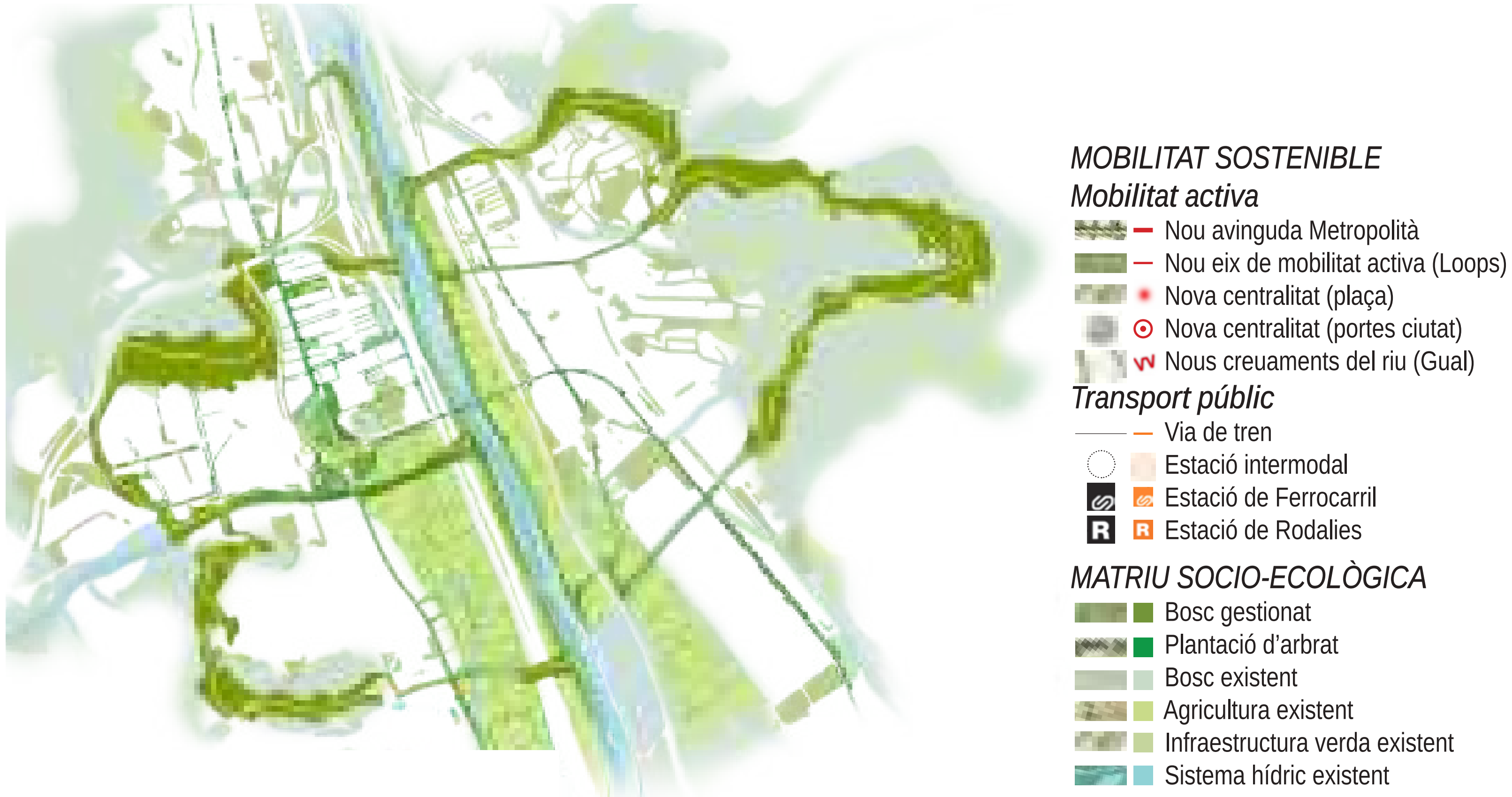
In Catalonia we can find unique examples of green infrastructure proposals that integrate the reduction of vulnerability to forest fires in their functions.
Among them we can highlight projects such as Ramats de Foc, Life Montserrat or Boscos del Vallès, among others.

Nature Based solutions

Some countries are considering the promotion of **economic value chains of forest products and nature based solutions** as a way to incentivize sustainable forest management (Verkerk et al. 2018), while other regions advocate for an **agricultural landscape mosaic and** silvopasture practices as a way to reduce the risk of large, intense fires (Moreira et al. 2020)

Ecoystem services are the benefits that flow from nature to people. They can be provisioning (e.g. supply of food, clean air, water and materials), regulating (e.g. water and climate regulation, nutrient cycling, pollination, formation of fertile soils), or cultural (e.g. recreation opportunities, inspiration we draw from nature). Natural ecosystems can provide a wide range of these services simultaneously. This **multi-functionality is one of the key attractions of green infrastructure.** Our societies and economies depend on healthy ecosystems and their services. A network of healthy ecosystems provides alternatives to traditional 'grey' infrastructure, often at a fraction of their cost.

Wildfire as an ecosystem service driver. Enhanced provisioning of some ecosystem services can even result from wildfires particularly under non-extreme conditions, including e.g. improved natural disease and pest control, enhanced pollinator activity, or alleviation of water shortages.



Green infrastructure and public space. (*Nussos i cruïlles* AMB competition. Team: P. Morán; A. Noguera; Sinob, 2019)

04B_Strategies towards RWL (Resilient Wildfire Landscapes)

B.1// Multifunctional infrastructures

Multifunctional infrastructures can contribute, to add social and cultural value as well as to enhance resistence towards wildfires through management. Green infrastructures can become protective infrastructures, protective infrastructures can become green infrastructures, enhancing resilience.
Landscapes characterized with cultural diversity and biodiversity can become more resilient and resistent towards wildfires, especially if the cultural diversity includes landscape management, diversity of activites and knowledges.

B.2// Selfsufficient communities

Some countries are considering the promotion of economic value chains of forest products and naturebased solutions as a way to incentivize sustainable forest management (Verkerk et al. 2018),
Other regions advocate for an agricultural landscape mosaic and silvopasture practices as a way to reduce the risk of large, intense fires (Moreira et al. 2020)
Energy communities enable collective and citizen-driven energy actions to support the clean energy transition, managing forest can become a selfsufficiency tool enhancing resilience and resistance towards wildfires.

B.3// Urban and housing liveability

Social vulnerabilities such as poverty, lack of access to transportation and housing liveability are closely related to hazard vulnerabilities such as wildfire.Codes, regulations or standards can become a tool to increase liveability as well as protection towards wildfires.

B.4// Self-protection

Landscape and environments with social and cultural facilities and networks with multifunctional values including firewise constructions enhance selfprotection towards wildfires.Wildfires can affect quality of life and health of communities by wildfire smoke, reduction of ecosystem services in certain cases.
The reduction of wildfire vulnerability and severity can enhance quality of live and health.

B.1.1// **Mosaics**

B.1.2// **Corridors**

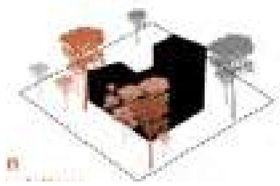
B.2.1// **Energetic communities**

B.2.2// **Food production communities**

B.3.1// **urban liveability**

B.3.2// **housing liveability**

B.4.1// **firewise facilities**



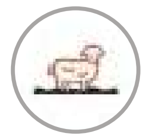
_Management practices

Wildfire low intensity 

Forestry management 

Prescribed burning 

Agriculture 

Grazing 

Materials resistance 

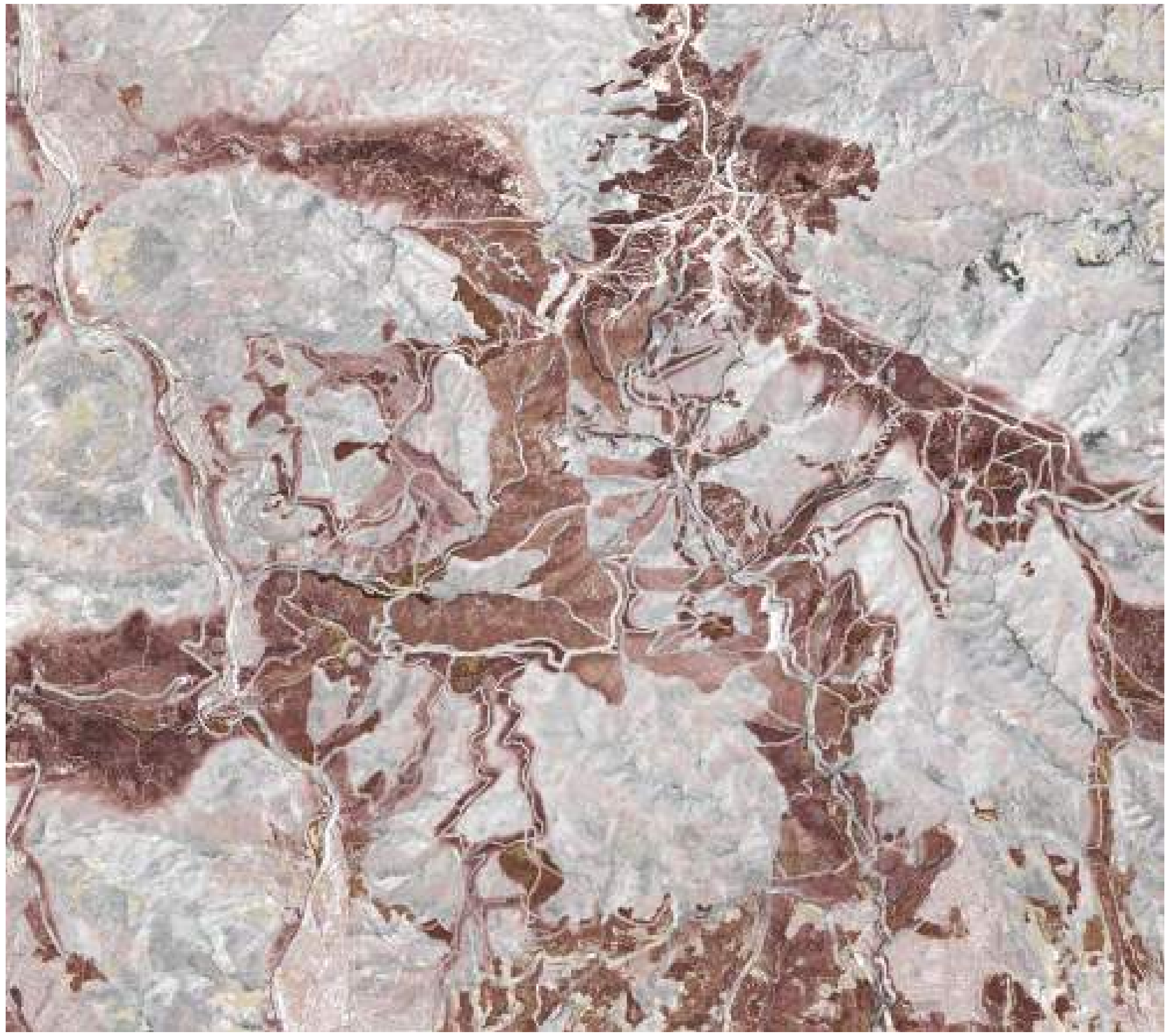
Urban/private clearing 

04B_Strategies towards FRL (Fire-resilient Landscapes)

B.1//Multifunctional infrastructures towards FRL

B.1.1// Mosaics

Multifunctional infrastructures can contribute, to add social and cultural value as well as to enhance resistence towards wildfires through management.Green infrastructures can become protective infrastructures, protective infrastructures can become green infrastructures, enhancing resilience.Landscapes characterized with cultural diversity and biodiversity can become more resilient and resistent towards wildfires, especially if the cultural diversity includes landscape management, diversity of activites and knowledges.



PN Montseny Masterplan; MBlandarch_UPC_PR1 2020 (Roy Quila, Meritxell Montserrat, Alejandra Jurado et al.)

_Values and benefits

//Better risk assessment

// Landscape-urban planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

//Bioeconomy

E.7//Cross-governmental processes

_Study cases

SC13_UN NUEVO PLAN DE MANEJO DEL FUEGO EN LA VAL D'ARAN (PIRINEOS) BASADO EN LA COEXISTENCIA CON EL FUEGO
2022. **Catalunya**
By CTFC, GRAF, UPC, CREAF, CSIC, Pompièrs Emergéncies Conselh Generau d'Aran

SC15_LIFE TAIGA.FIRE BRINGS NEW LIFE TO WOODS
2015 -2020. Sweden
By J. Wretenberg, N. Bergius, J. Carlsson

SC16_EASTERN MOURNES WILDFIRE PROJECT
2012. Northern Ireland
By Mourne Wildfire Group

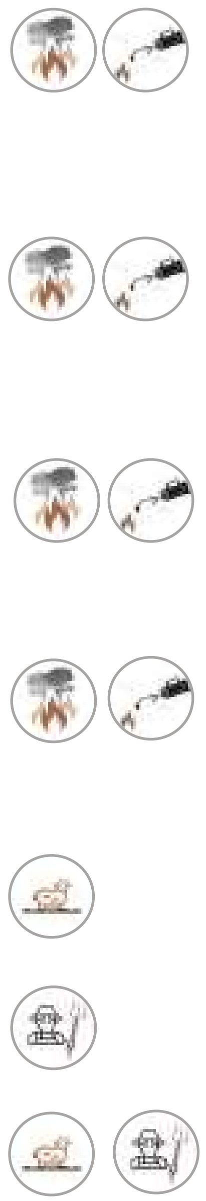
SC19_THE WORLD'S BEST FIRE MANAGEMENT SYSTEM IS IN NORTHERN AUSTRALIA, AND IT'S LED BY INDIGENOUS LAND MANAGERS
2020. Austalia

SC20_RAMATS DE FOC
2020. Spain, Catalonia

SC21_VINYES DE FOC
2020. Spain, Catalonia

SC22_LIFE MONTSERRAT
2014. Spain, Catalonia

_Tools



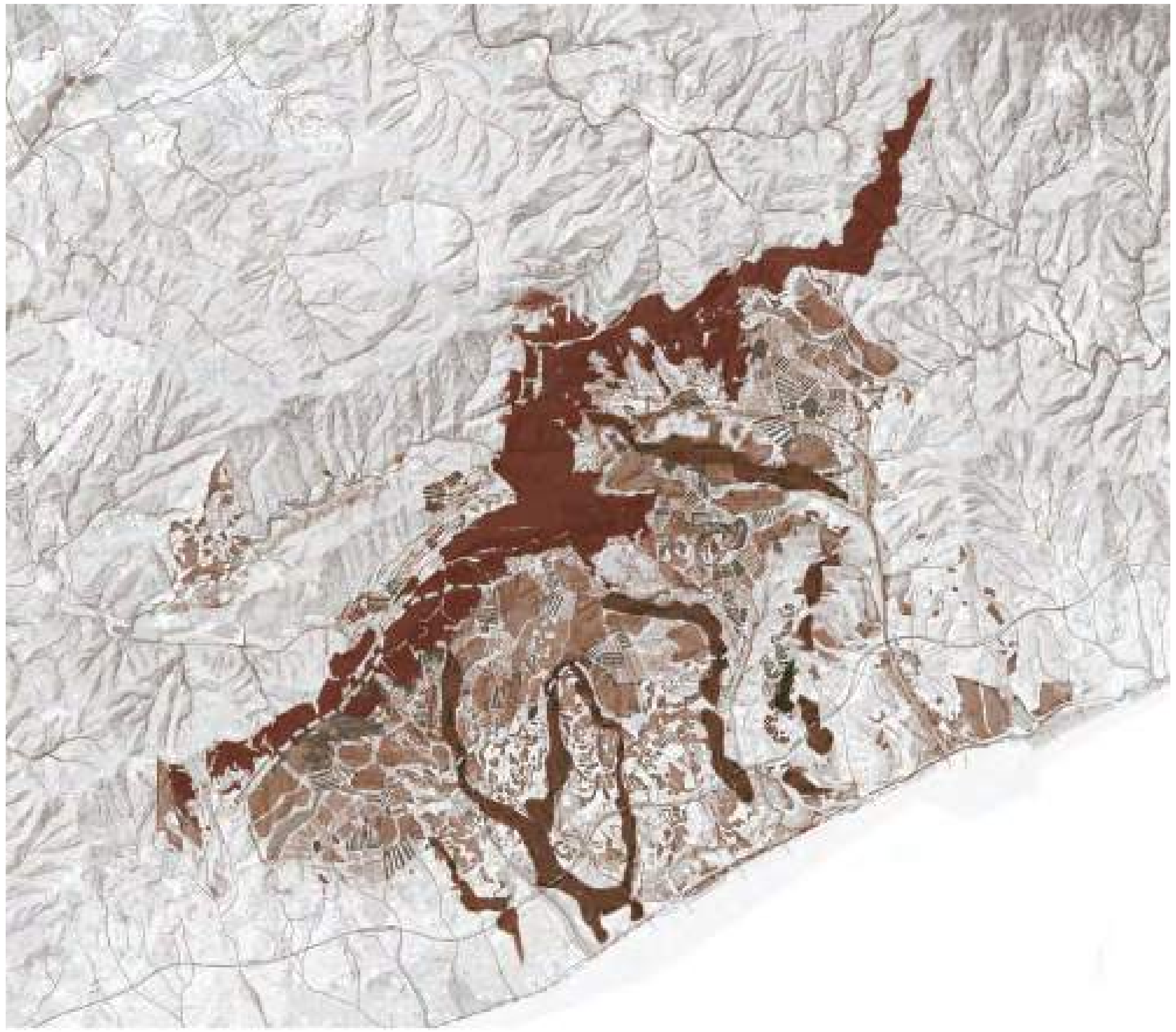
Study case references at 05A_Best practices

04B_Strategies towards FRL (Fire-resilient Landscapes)

B.1//Multifunctional infrastructures towards FRL

B.1.2// Corridors

Multifunctional infrastructures can contribute, to add social and cultural value as well as to enhance resistence towards wildfires through management.Green infrastructures can become protective infrastructures, protective infrastructures can become green infrastructures, enhancing resilience.Landscapes characterized with cultural diversity and biodiversity can become more resilient and resistent towards wildfires, especially if the cultural diversity includes landscape management, diversity of activites and knowledges.



Montnegre Corredor Masterplan; MBlandarch_UPC_PR1 2019 (Andrea Canepa, Carolina Zegarra, Jordi Clarisó)

_Values and benefits

//Better risk assessment

// Landscape-urban planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

//Bioeconomy

E.7//Cross-governmental processes

_Study cases

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2022. Catalunya
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SC15_LIFE TAIGA.FIRE BRINGS NEW LIFE TO WOODS
2015 -2020. Sweden
By J. Wretenberg, N. Bergius, J. Carlsson

SC16_EASTERN MOURNES WILDFIRE PROJECT
2012. Northern Ireland
By Mourne Wildfire Group

SC1_THE CROSBY ARBORETUM
1998. Picayune, Mississippi
By Andropogon Associates, W. Platt and Ed Blake

Living Lab C
SC10_RAMATS DE FOC
2020. Spain, Catalonia

SC21_VINYES DE FOC
Living Lab C
2020. Spain, Catalonia

SC24_LANDA CARSICA
2014. Italy

_Tools

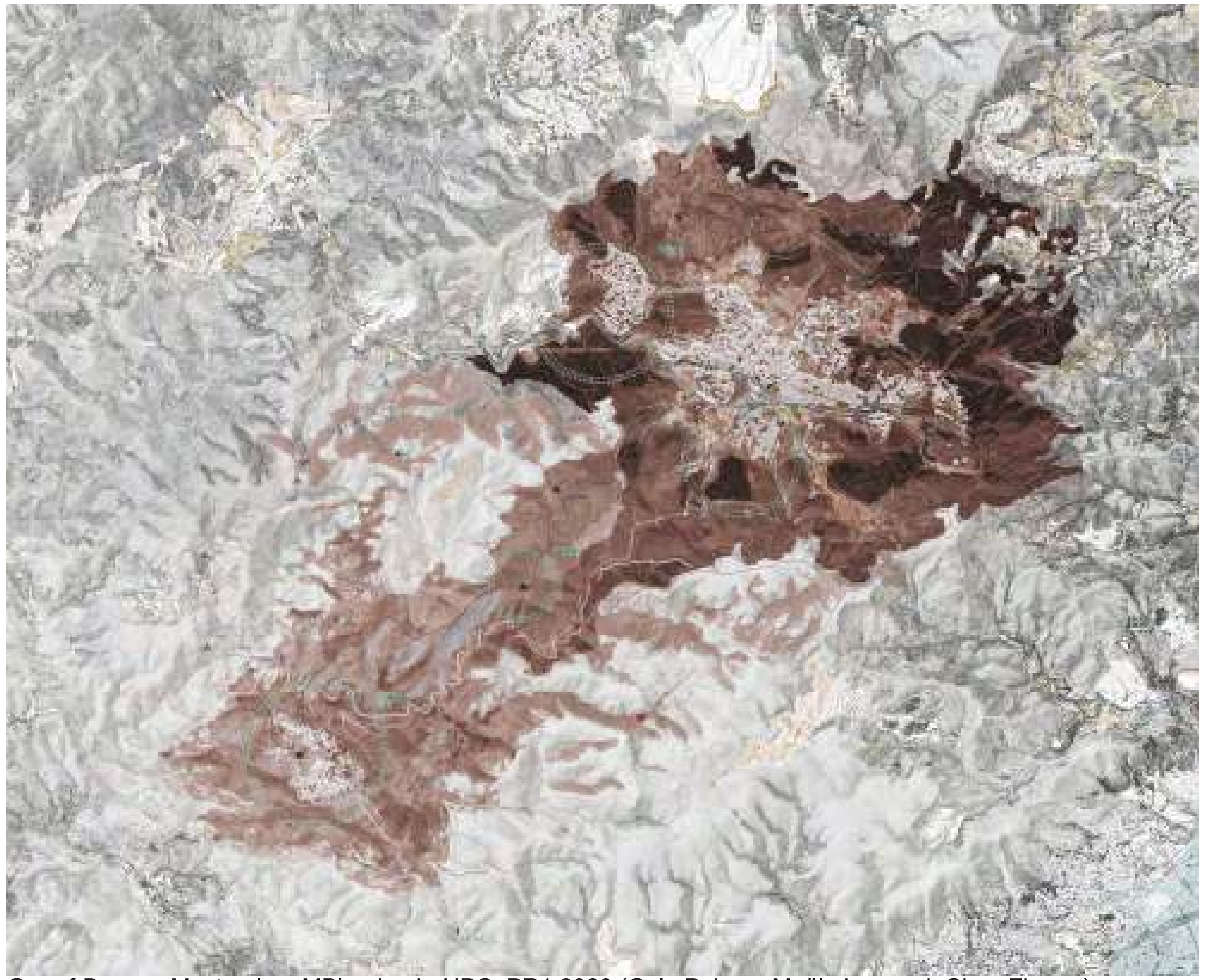
Study case references at 05A_Best practices

04B_Strategies towards FRL (Fire-resilient Landscapes)

B.2//Selfsufficient communities towards FRL

B.2.1// Energetic communities

Some countries are considering the promotion of **economic value** chains of forest products and naturebased solutions as a way to incentivize sustainable forest management (Verkerk et al. 2018),
Other regions advocate for an agricultural landscape mosaic and silvopasture practices as a way to reduce the risk of large, intense fires (Moreira et al. 2020)
Energy communities enable collective and citizen-driven energy actions to support the clean energy transition, managing forest can become a selfsufficiency tool enhancing resilience and resistance towards wildfires.



Garraf-Begues Masterplan; MBlandarch_UPC_PR1 2020 (Galo Pujana, Maëla Legrand, Chen Zhang)

_Values and benefits

//Better risk assessment

// Landscape-urban planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

//Bioeconomy

E.7//Cross-governmental processes

_Study cases

SC1_THE CROSBY ARBORETUM
1998. Picayune, Mississippi
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SC15_LIFE TAIGA.FIRE BRINGS NEW LIFE TO WOODS
2015 -2020. Sweden
By J. Wretenberg, N. Bergius, J. Carlsson

SC7_GENERAL MILLS SCULPTURE GARDEN
1991. Minneapolis, Minnesota.
By Michael Van Valkenburgh Associates Inc

SC17_ALDEAS MODELO
2021-2022. Galicia (Spain)

SC18_ALDEIA SEGURA PESSOAS SEGURAS
2012. Portugal
By Mourne Wildfire Group

SC23_BOSCOS DEL VALLÈS
2012. Spain, Catalonia

Study case references at 05A_Best practices

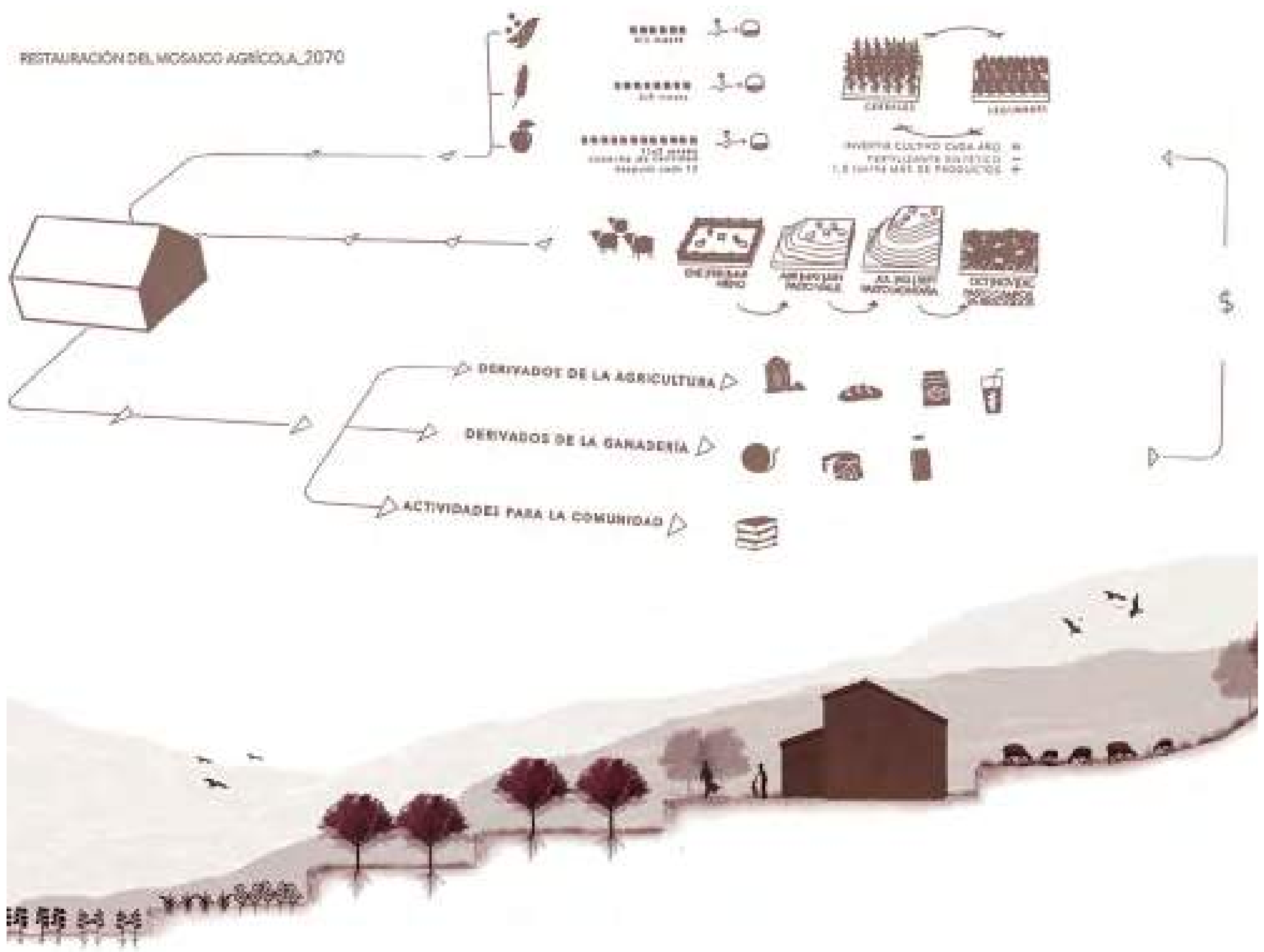
_Tools

04B_Strategies towards FRL (Fire-resilient Landscapes)

B.2//Selfsufficient communities towards FRL

B.2.1// Food production communities

Self-sufficient communities can be an opportunity to contribute to the generation of landscapes resilient to forest fires, through the generation of a link with the landscape in which they are inserted and the management of this landscape for multifunctional purposes such as food production and the reduction of vulnerability as a highly valuable collateral effect.



PN Montseny Masterplan; MBlandarch_UPC_PR1 2021 (Giussepina Verduci,et al.)

_Values and benefits

//Better risk assessment

// Landscape-urban planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

//Bioeconomy

E.7//Cross-governmental processes

_Study cases

SC5_LANDSCAPE WATER CONSERVATION AND FIRE PROTECTION ORDINANCE
2020. City of Malibu, Northern California

SC19_THE WORLD'S BEST FIRE MANAGEMENT SYSTEM IS IN NORTHERN AUSTRALIA, AND IT'S LED BY INDIGENOUS LAND MANAGERS
2020. Austalia

SC15_LIFE TAIGA.FIRE BRINGS NEW LIFE TO WOODS
2015 -2020. Sweden
By J. Wretenberg, N. Bergius, J. Carlsson

SC3_UPPER RIDGE COMMUNITY PLAN
2021. Butte County, Northern California

SC17_ALDEAS MODELO
2021-2022. Galicia (Spain)

SC18_ALDEIA SEGURA PESSOAS SEGURAS
2012. Portugal
By Mourne Wildfire Group

_Tools

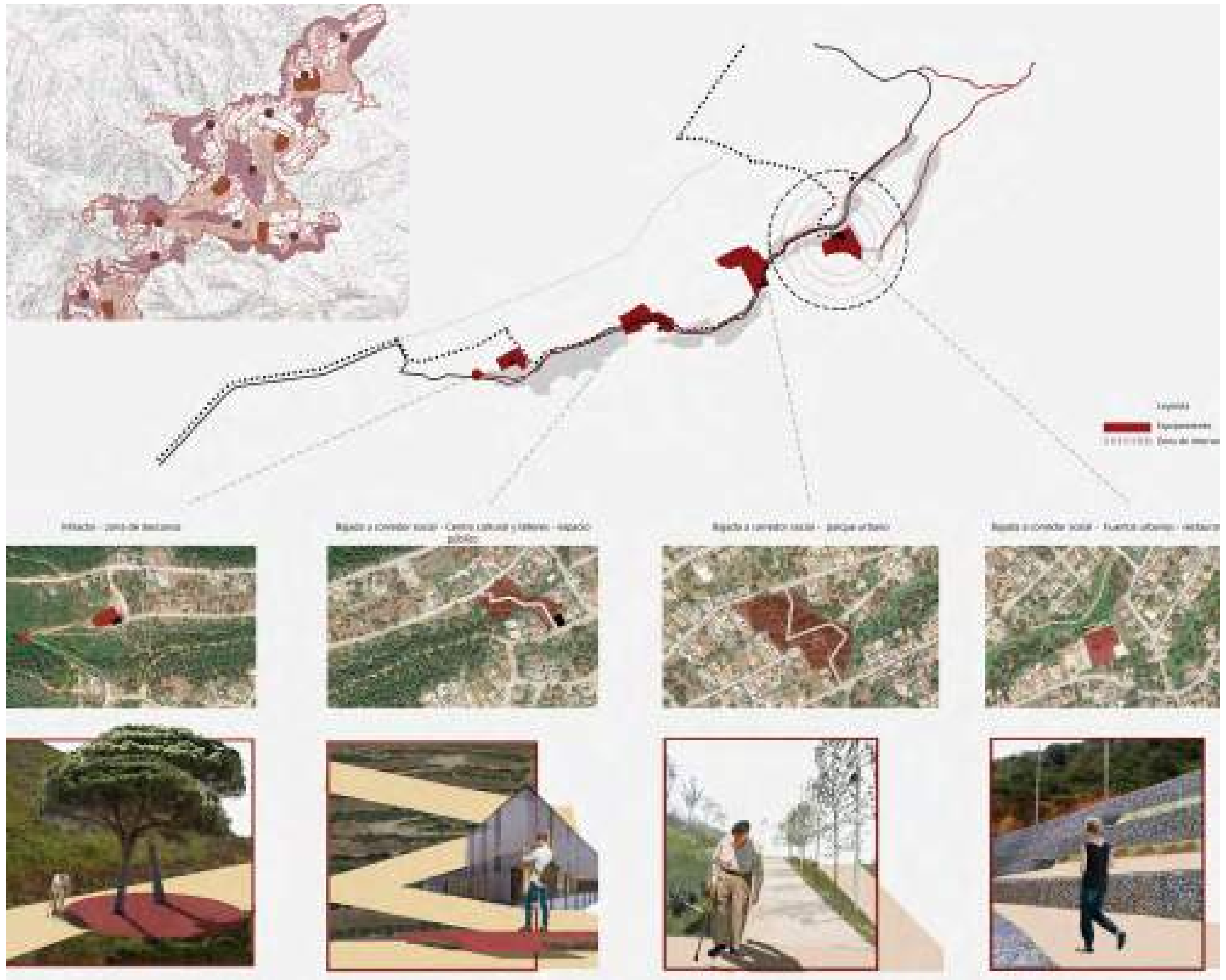
Study case references at 05A_Best practices

04B_Strategies towards FRL (Fire-resilient Landscapes)

B.3//Urban and housing liveability towards FRL

B.3.1// Urban liveabiliaty

Social vulnerabilities such as poverty, lack of access to transportation and housing liveability are closely related to hazard vulnerabilities such as wildfire.Codes, regulations or standards can become a tool to increase liveability as well as protection towards wildfires.
ncorporate wildfire risk into codes and standards for buildings and infrastructure, working with regional or national authorities where relevant. Incorporate wildfire-resilient design, materials and siting into codes for new buildings and promote the implementation of retrofitting measures in existing buildings. These codes can apply either to buildings and infrastructure in areas identified as high risk or more broadly.



PN Corredor Montnegre Masterplan; MBlandarch_UPC_PR1 2019 (Patricia Flores; Isabel Rodríguez)

_Values and benefits

//Better risk assessment

// Landscape-urban planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

//Bioeconomy

E.7//**Cross-governmental processes**

_Study cases

SC10_WILDLAND FIRE SUPPRESSION ASSESSMENT DISTRICT
2007 (update20--). City of Santa Barbara, California

SC11_PARTICIPATORY MAPPING TO FOSTER COMMUNITY-BASED DISASTER RISK REDUCTION: THE CASE OF MONCHIQUE IN PORTUGAL
2022. Monchique. Portugal
By M.Partidário, G.Saad, M.B.Monteiro, J.Dias, R.Martins, I.Loupa Ramos, H.Ribeiro, M.Teixeira, M.de Belém Costa Freitas, C. Antunes

SC12_REINFORCING CIVIL PROTECTION CAPABILITIES INTO MULTI HAZARD RISK ASSESSMENT UNDER CLI MATE CHANGE (RECIPE)
2021. Catalunya
By CTFC, Pau Costa Foundation, PCF, DGPC CAT, FVA, CIMA,

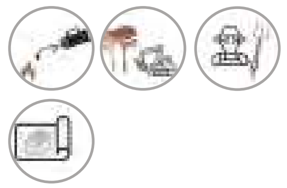
SC8_RANCH PLAN FIRE PROTECTION PROGRAM
2007 (update2013).Orange County, California

SC14_WUICOM. COMUNITATS D'INTERFÍCIE RESILIENTS AL FOC DE BARCELONA
2021-2023. Barcelona (Spain)
By H. Ballart, (PCF), G. Canaleta (PCF), I. Rodríguez (UOC), M. Arenas (UOC), D. Caballero (UPC), P. Morán (PCF), E. Pastor (UPC), E. Planas (UPC), P. Vacca (UPC)

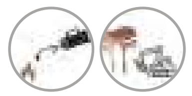
SC7_GENERAL MILLS SCULPTURE GARDEN
1991. Minneapolis, Minnesota.
By Michael Van Valkenburgh Associates Inc

SC4_CITY LANDSCAPE MANUAL
2016. Carlsbad, Northern California

SC17_ALDEAS MODELO
2021-2022. Galicia (Spain)



SC18_ALDEIA SEGURA PESSOAS SEGURAS
2012. Portugal
By Mourne Wildfire Group



Study case references at 05A_Best practices

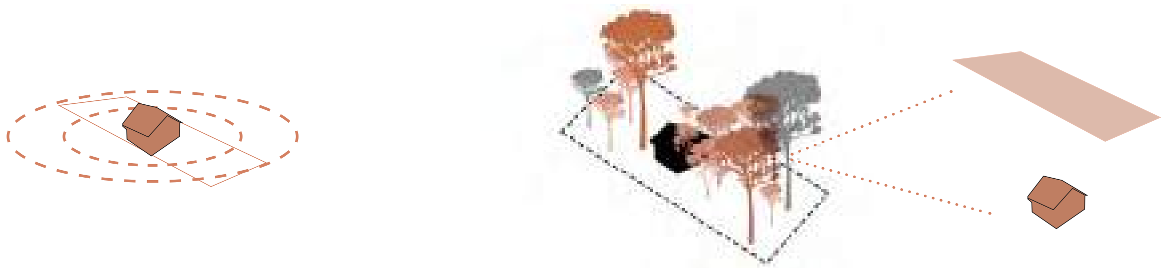
_Tools

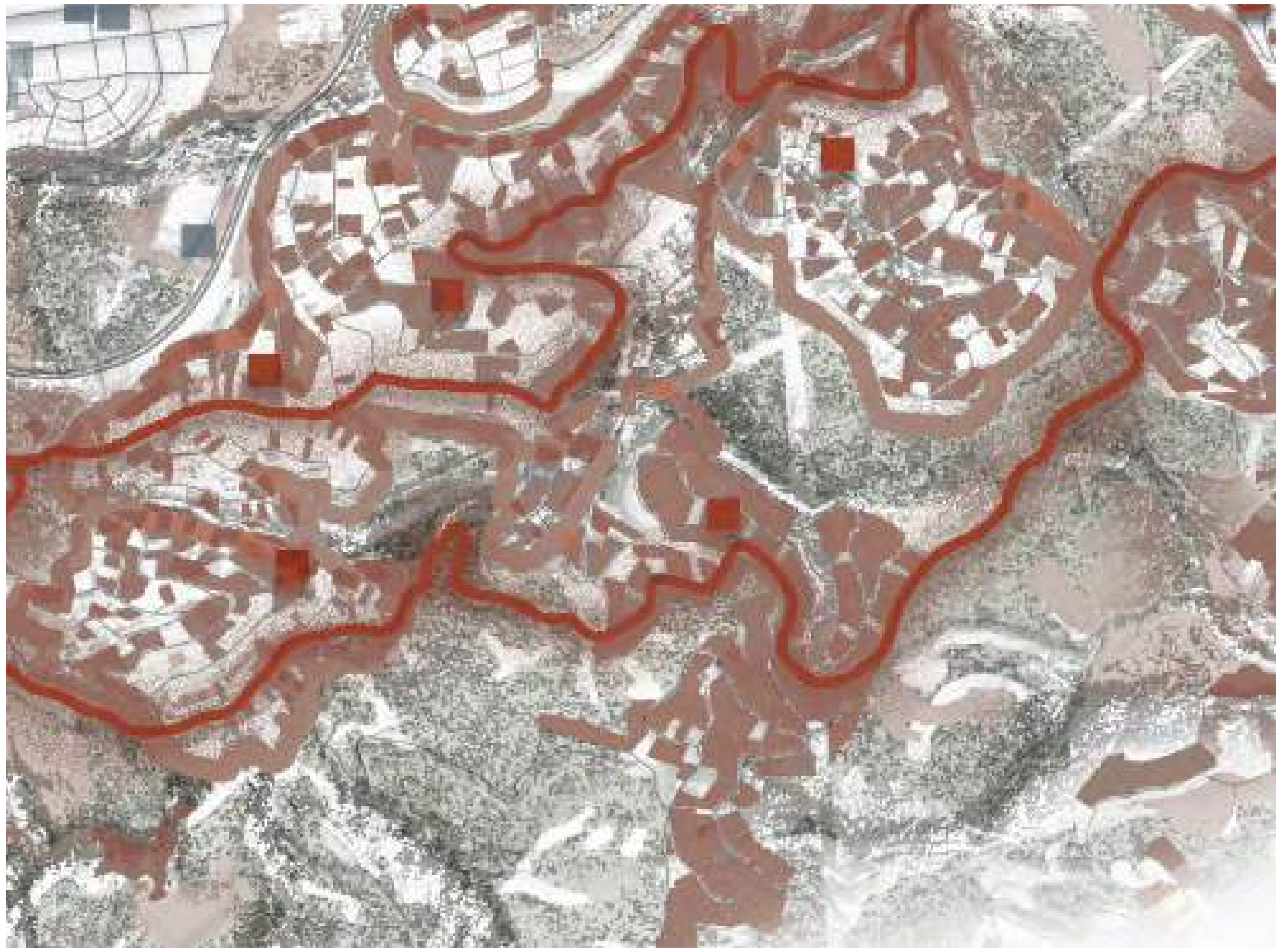
04B_Strategies towards FRL (Fire-resilient Landscapes)

B.3//Urban and housing liveability towards FRL

B.3.2// Housing liveabiliaty

The International Wildland-Urban Interface Code provides a model code which can be adopted or adapted; understanding that over 60% of current structures (and rising) are within a 1.5 mile radius of the WUI.3 Use voluntary programmes and incentives and consider requiring the disclosure of wildfire risk to homebuyers to encourage uptake. In the United States, the disclosure of wildfire risk is currently required in only two states, California and Oregon, whereas 29 states require flood disclosure, such as whether the property sits on a flood plain or the cost of flood insurance, as part of a sale.

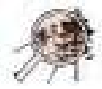




PN Corredor Montnegre Masterplan; MBlandarch_UPC_PR1 2019 (Patricia Flores; Isabel Rodríguez)

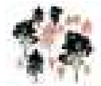
_Values and benefits

//Better risk assessment



// Landscape-urban planning and regulations

//Green&protective infrastructure design



//Fuel management

//Adaptative management

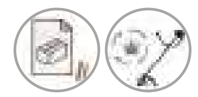
//Bioeconomy

E.7//Cross-governmental processes

_Study cases

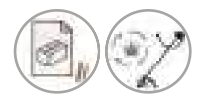
SC10_WILDLAND FIRE SUPPRESSION ASSESSMENT DISTRICT
2007 (update20--). City of Santa Barbara, California

SC8_RANCH PLAN FIRE PROTECTION PROGRAM
2007 (update2013).Orange County, California

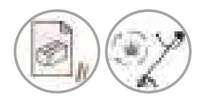


SC14_WUICOM. COMUNITATS D'INTERFÍCIE RESILIENTS AL FOC DE BARCELONA
2021-2023. Barcelona (Spain)
By H. Ballart, (PCF), G. Canaleta (PCF), I. Rodríguez (UOC), M. Arenas (UOC), D. Caballero (UPC), P. Morán (PCF), E. Pastor (UPC), E. Planas (UPC), P. Vacca (UPC)

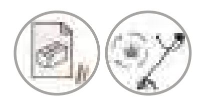
SC4_CITY LANDSCAPE MANUAL
2016. Carlsbad, Northern California



SC17_ALDEAS MODELO
2021-2022. Galicia (Spain)



SC18_ALDEIA SEGURA PESSOAS SEGURAS
2012. Portugal
By Mourne Wildfire Group



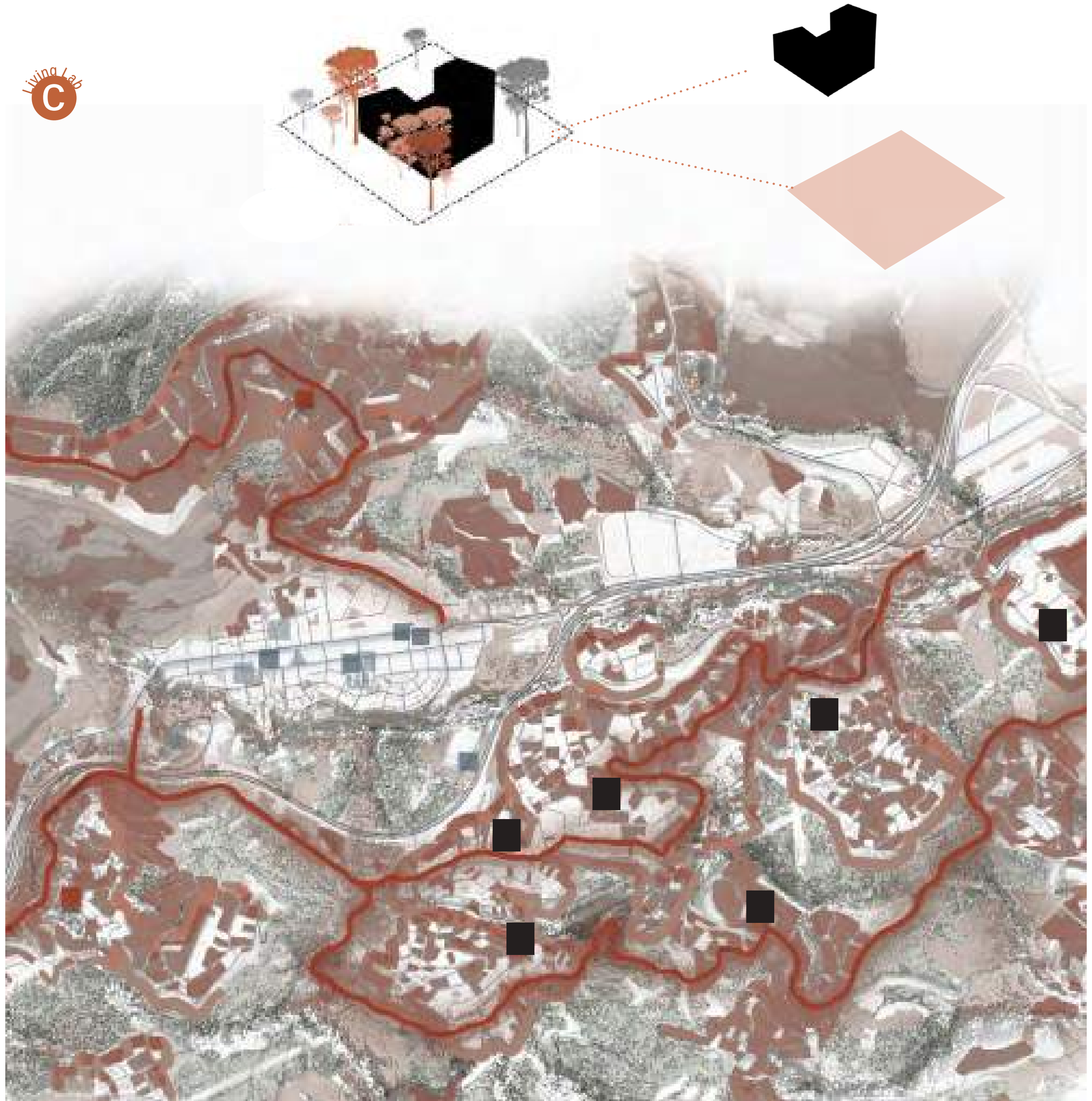
_Tools

Study case references at 05A_Best practices

B.4//Selfprotection towards RWL

B.4.1// Firewise facilities

Landscape and environments with social and cultural facilities and networks with multifunctional values including firewise constructions enhance selfprotection towards wildfires.Wildfires can affect quality of life and health of communities by wildfire smoke, reduction of ecosystem services in certain cases.
The reduction of wildfire vulnerability and severity can enhance quality of live and health.



PN Corredor Montnegre Masterplan; MBlandarch_UPC_PR1 2019 (Patricia Flores; Isabel Rodríguez)

_Values and benefits

//Better risk assessment

// Landscape-urban planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

//Bioeconomy

E.7//Cross-governmental processes

_Study cases

SC10_WILDLAND FIRE SUPPRESSION ASSESSMENT DISTRICT
2007 (update20--). City of Santa Barbara, California

SC8_RANCH PLAN FIRE PROTECTION PROGRAM
2007 (update2013).Orange County, California

SC14_WUICOM. COMUNITATS D'INTERFÍCIE RESILIENTS AL FOC DE BARCELONA
2021-2023. Barcelona (Spain)
By H. Ballart, (PCF), G. Canaleta (PCF), I. Rodríguez (UOC), M. Arenas (UOC), D. Caballero (UPC), P. Morán (PCF), E. Pastor (UPC), E. Planas (UPC), P. Vacca (UPC)

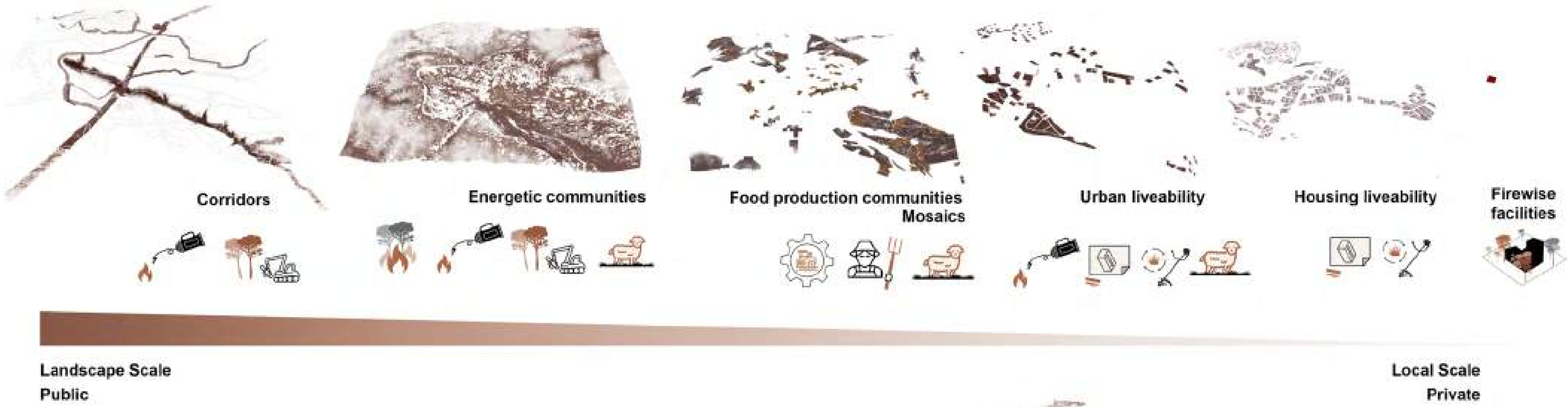
SC17_ALDEAS MODELO
2021-2022. Galicia (Spain)

SC18_ALDEIA SEGURA PESSOAS SEGURAS
2012. Portugal
By Mourne Wildfire Group

_Tools

Study case references at 05A_Best practices

04B_Strategies towards FRL : Case study "Les rovires, Santa Coloma de Cervelló



Case study
"Les Rovires" in Santa Coloma de Cervelló.

Proposal for the integration of strategic lines for the reduction of wildfire vulnerability.

Trans-scalar proposal: from landscape scale to local scale, through proposals in the public sphere or public domain, such as green infrastructures or agricultural activation models, as well as from the local scale, through the improvement of habitability (urban and housing) and self-protection.

05_Best practices and planning tools

05A_Best practices

SC1_THE CROSBY ARBORETUM

1998. Picayune, Mississippi
By Andropogon Associates, W. Platt and Ed Blake

The project introduces the use of fire to establish and maintain specific native plant communities, a key tool in its ecological management strategy. A program of prescribed burns of varying intensities and at different times of year is used to foster a richer mosaic of prairie and pine savanna types.
By strategically burning under controlled conditions, the arboretum achieves these goals and mitigates the risk of uncontrolled wildfires.

It represents a unique approach to ecological restoration and research. By combining traditional cultural practices with scientific research, the project is creating a new landscape ecologically valuable that expresses and reveals the qualities of the place.

//Better risk assessment

// Landscape planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes

PLANNING TOOLS

TYPOLOGY_ Masterplan / fire management plan (PLANNING)

DEVELOPER_ Landscape architect, Mississippi State University, Local fire department

REGULATION_ Not Mandatory

WILDFIRE

TYPOLOGY_ Wildfire

TEMPORARY PHASE_ Integration of fire, Mitigation, Preventions

SCALE

Local_ 680 ha

GOVERNANCE

TYPOLOGY_ Adaptive governance

AGENTS/NETWORKS_ Firefighters, Researchers

ASSESSMENT

LANDSCAPE INFORMATION_ Vegetation type, Ecological succession, Land use, Topography, Infraestructures, Open spaces

FIRE HAZARD INFORMATION_ Fuel loads, Historical fires, Safety measures

SOCIAL INFORMATION_ Social perception of the burned filds aesthetic

STRATEGY

TYPOLOGY_ Integrating prescribed burning as a design tool to restore and maintain the native vegetation ecosystem
_Reduce the risk of wildfires by managing fuel loads.
_Habitat management techniques to promote biodiversity within the savanna by encouraging the native plants and animals that thrive with fire

ACTION LINES_ Develop a prescribed burn plan
_Conduct controlled burns under appropriate weather conditions with trained personnel.
_Monitor the post-burn effects on vegetation composition, wildlife populations, and soil health.
_ Develop educational programs to raise public awareness about the ecological importance of fire in pine savannas

IMPLEMENTATION MEASURES

PHASES_ Programming prescribed burns, burning, maintenance

RESOURCES_ Public funding
_ Technical expertise from fire professionals and planners

COMUNICATION_ Online platform
_ Events

REFERENCES

_P. Moran (2020). “Paisajes Disruptivos. La representación de los incendios forestales en el paisaje mediterráneo “. PhD thesis
_ M. Potteiger, J. Purinton (1998). “Landscape Narratives: Design Practices for Telling Stories”. John Wiley & Sons Inc
_ http://www.crosbyarboretum.msstate.edu/
_ https://www.researchgate.net/publication/300460717_Crosby_Arboretum_Picayune_Mississippi_A_Natural_World_for_All

05A_Best practices

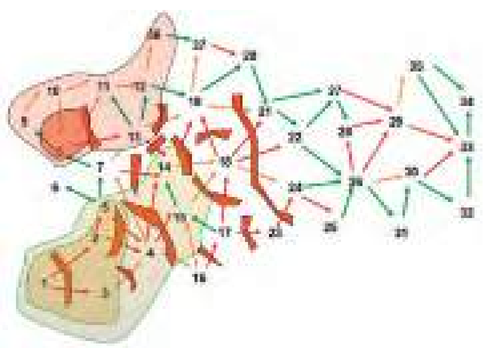
SC2_DEMOCRATIZING DECISION-MAKING ON WILDFIRES AND ADAPTING TO CLIMATE CHANGE IN THE MONTSENY BIOSPHERE RESERVE

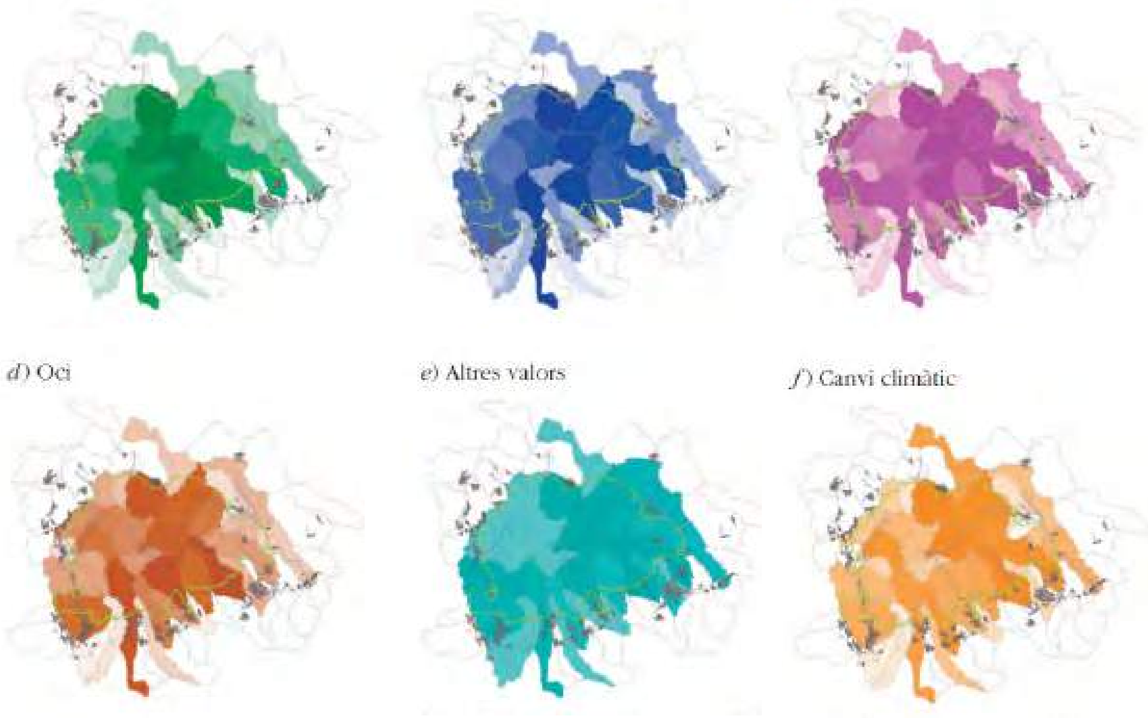
2019. Montseny, Catalunya

By I.Otero,G.Gamboa, C.Bueno, G.Canaleta, G.Tolosa, H.Ballart, L.Camprubí, O.Vilalta, E.Arilla, M.Castellnou

This paper presents a method to democratize decision-making on wildfires and discover how to transform a landscape and to build resilience in a context of climate change in the study region is the Montseny Biosphere Reserve. The method combines knowledge on wildfire regime, participatory mapping of landscape values, multi-criteria prioritization, and preparation of a wildfire management strategy that protects priority areas. Results show a large amount and diversity of values at stake (biodiversity, socioeconomic activities, heritage, leisure). A selection of areas where management could reduce wildfire impacts on these values is proposed.

//Better risk assessment





a) Biodiversitat b) Activitats socioeconòmiques c) Patrimoni d) Oci e) Altres valors f) Canvi climàtic

//Fuel management

//Adaptative management

E.7//Cross-governmental processes

PLANNING TOOLS

TYPOLOGY_ Participatory mapping of values (DIAGNOSIS)

DEVELOPER_ Regional entity and associations, local entity and associations and citizens

REGULATION_ Not mandatory

WILDFIRE

TYPOLOGY_ Wildfire

TEMPORARY PHASE_ Preventions

SCALE

Territorial_ 50.167 ha

GOVERNANCE

TYPOLOGY_ Collaborative & Networks and participatory governance

AGENTS/NETWORKS_ Public entity, local communities, landowners, firefighters, researchers, environmental NGOs

ASSESSMENT

LANDSCAPE INFORMATION_ Land uses, Vegetation composition, topography,

FIRE HAZARD INFORMATION_ Historical fires, Fuel loads, Characterization of the wildfire regime, Study of fire types, Polygons and Propagation model

SOCIAL INFORMATION_ Associations, University and local comunity paretcipation

STRATEGY

TYPOLOGY_ Communize fire management decisions by involving various stakeholders.
_Adapt fire management strategies to climate change by considering its impact on fire risk and to minimize the loss of values.
_Promote a collaborative approach that integrates local knowledge and scientific expertise.

ACTION LINES_ Develop a participatory process for decision-making on fire prevention actions.
_Multicriteria method to prioritize management actions.

IMPLEMENTATION MEASURES

PHASES_ 1. Characterization of the forest fire regime (meeting with regional actors)
2. Participatory mapping of values (Meetings with local actors and citizens)
3. Prioritization of the territory (Meetings with local actors and citizens)
4. Elaboration of a forest fire management strategy (Meetings with local actors and citizens)

RESOURCES_ Implement data collection and monitoring systems to assess the effectiveness of fire management actions.

COMUNICATION_ Establish a platform for communication and collaboration among stakeholders, local and regional actors
_Adopt a collaborative approach.

REFERENCES

Article_
https://interior.gencat.cat/web/.content/home/030_arees_dactuacio/bombers/foc_forestal/jornades_recerca_cooperacio_internacional/articles_de_recerca_en_foc_forestal/articles_incendis_forestals/2019_OTERO_democratitzar-presa-decisions-IF-i-adaptarse-al-CC-al-Montseny_ICAE.pdf

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6191092/

05A_Best practices

SC3_UPPER RIDGE COMMUNITY PLAN
2021. Butte County, Northern California

This case study was selected as a WUI Planning Best Practice because it exemplifies a holistic approach toward wildfire resilience planning in the County's Upper Ridge Community Plan. The case study also highlights an innovative land use strategy (TDR program) to potentially minimize future wildfire risk to the community. Finally, the plan development process incorporated a strong public outreach component despite the challenges associated with long-term displacement of residents following the Camp Fire.

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities". 2022

//Better risk assessment

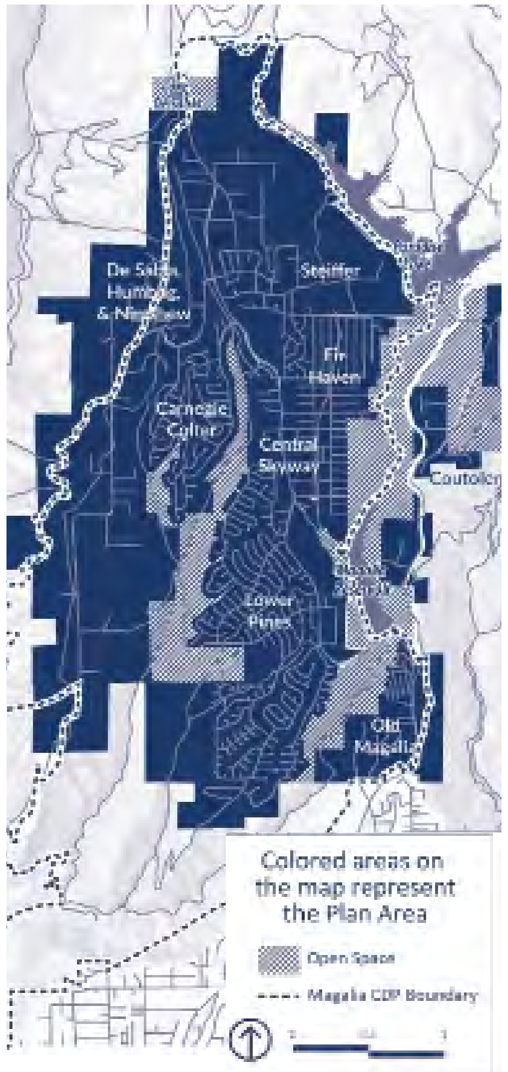
// Landscape planning and regulations

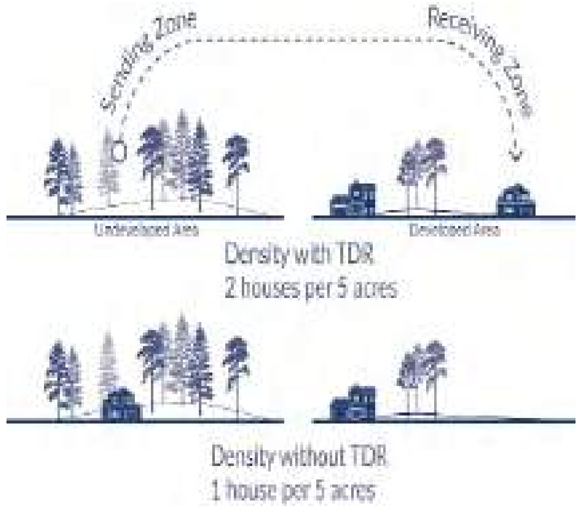
//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes





PLANNING TOOLS

TYPOLOGY_ Community Plan , Post-Disaster Recovery Plan (PLANNING)

DEVELOPER_ Regional entity, local entity, fire departments and Community organizations

REGULATION_ Mandatory

WILDFIRE

TYPOLOGY_ Wildfire in WUI. Prescribed burning

TEMPORARY PHASE_ Preventions, Mitigation and Post-fire

SCALE

Territorial_ 47'400ha

GOVERNANCE

TYPOLOGY_ Collaborative & Networks and participatory governance

AGENTS/NETWORKS_ Public authorities, local communities, firefighters, community NGOs

ASSESSMENT

LANDSCAPE INFORMATION_ Land uses, Vegetation composition, Topography, Natural resources, Ecological values, Open space corridors and parks

FIRE HAZARD INFORMATION_ Historical fires, Fuel loads, Infrastructure accessibility, Fire patterns

SOCIAL INFORMATION_ Local comunity paretcipation and wildfire awerness, Demographics and community needs, Economic considerations and social equity

STRATEGY

TYPOLOGY_ Develop a wildfire risk reduction program:
Land Use planning policy direction
Building codes and standards
Vegetation management
Infrastructure improvements
Public education

ACTION LINES_ Fire-safe practices for future development
_ Enforces fire-resistant building materials and design principles
_ Fuel reduction, defensible space creation, and prescribed burn
_ Upgrades water supply systems and emergency access routes
_ Community education and training programs

IMPLEMENTATION MEASURES

PHASES_ Short-term, mid-term, and long-term implementation goals (meeting with regional entity, local actors and citizens)

RESOURCES_ Funding from various sources like federal, local grants, state programs
_ Technical expertise from fire professionals and planners
_ Community involvement and volunteer participation

COMUNICATION_ Public meetings, workshops, and outreach materials.
_Collaboration with local media for information dissemination.
_Online platforms and social media

REFERENCES

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities" 2022
_https://www.buttecounty.net/460/Upper-Ridge-Community-Plan
_ https://opr.ca.gov/news/2022/08-17.html




SC4_CITY LANDSCAPE MANUAL
2016. Carlsbad, Northern California

This case study shows a well-established approach by a local planning agency administering a landscaping ordinance that achieves multiple objectives, including the incorporation of a wildfire risk reduction strategies. The case study also highlights a collaborative approach with the fire department and the incorporation of specialized expertise from a landscape architect. Finally, this example includes helpful illustrations of landscaping and fuel modification requirements that accommodate a flexible application in different terrain and vegetation types

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities". 2022

//Better risk assessment

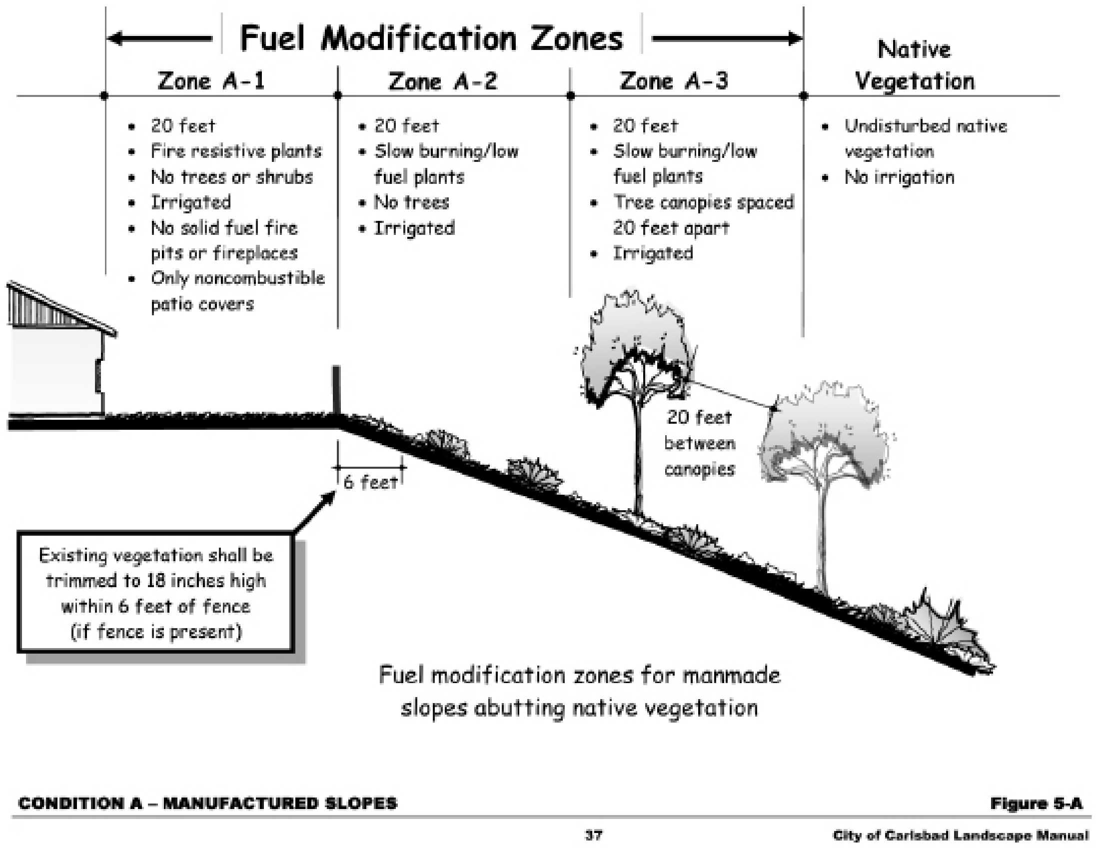
// Landscape planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes



PLANNING TOOLS

TYPOLOGY_ City Landscape Manual (GUIDELINE FOR PLANNING)

DEVELOPER_ City Planning Department, Parks Department, Landscape Review Board and Fire Departments

REGULATION_ Mandatory by local ordinance

WILDFIRE

TYPOLOGY_ Wildfire in WUI

TEMPORARY PHASE_ Preventions, Mitigation

SCALE

Local_ 10'100 ha

GOVERNANCE

TYPOLOGY_ Polycentric & Networks and participatory governance

AGENTS/NETWORKS_ Local entity, firefighters, architects and planners

ASSESSMENT

LANDSCAPE INFORMATION_ Land uses, Vegetation type, Fire-resistant plants Topography, Soil analysis

FIRE HAZARD INFORMATION_ Historical fires, Fuel loads, Infrastructure accessibility,

SOCIAL INFORMATION_best practices for ensuring fire safety

STRATEGY

TYPOLOGY_ Integrate fire management principles into landscape design
_ Standards based on site-specific conditions.
_ Implementing the project with fire-resistant plants
_Establishing defence buffers space around structures.
_Integrating firebreaks using appropriate vegetation and maintenance practices.

ACTION LINES_ Plant selection criteria based on fire resistance and water needs.
_Guidelines for plants distribution from structures and using fire resistant mulch.
_Design recommendations for fuel modification zones, firebreaks, including width, vegetation composition, and maintenance.

IMPLEMENTATION MEASURES

PHASES_

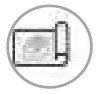
RESOURCES_ Funding from state programs

COMUNICATION_ Educational design tool for planners.
_Collaboration with local media for information dissemination.
_Online platforms and social media

REFERENCES

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities" 2022
_ https://www.carlsbadca.gov/departments/community-development/planning/landscape-plans
_ https://opr.ca.gov/news/2022/08-17.html




SC5_LANDSCAPE WATER CONSERVATION AND FIRE PROTECTION ORDINANCE

2020. City of Malibu, Northern California

The case study gives an overview of how the community quickly took action to adopt a fire-resistant landscape ordinance following a wildfire. The local ordinance also highlights different natural resource and fire experts working with residents to create science-based mitigation strategies that navigate other complex planning requirements, such as the LCP. Finally, this case study includes equitable approaches to the recovery process by offering permitting assistance options to homeowners to ensure they were not impacted financially by the new ordinance.

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities". 2022

//Better risk assessment

// Landscape planning and regulations

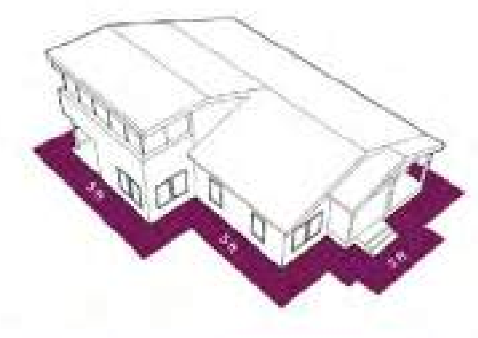
//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes

New palm trees, which are especially difficult for fire fighters to extinguish once ignited, are prohibited from being planted within the city limits. Image: San Bernardino County Fire



Under the new ordinance, flammable materials including shredded bark, pine needles, and artificial turf are prohibited within five feet of a structure.

PLANNING TOOLS

TYPOLOGY_ Landscape Manual, Post Disaster Recovery Ordinance (PLANNING)

DEVELOPER_ City Planning Department, Fire Departments, Arborists and Biologists

REGULATION_ Mandatory

WILDFIRE

TYPOLOGY_ Urban-interface Wildfire and Post Wildfire

TEMPORARY PHASE_ Mitigation, Post fire recover

SCALE

Local_ 5'154 ha

GOVERNANCE

TYPOLOGY_ Collaborative & Networks and participatory governance

AGENTS/NETWORKS_ Local entity, firefighters, planners, biologist and community

ASSESSMENT

LANDSCAPE INFORMATION_ Land uses, Vegetation type, Fire-resistant plants

FIRE HAZARD INFORMATION_ Fuel loads, Vegetation type

SOCIAL INFORMATION_ Practics for ensuring fire safety

STRATEGY

TYPOLOGY_ Promote fire-resistant landscapes through regulations
_Introducing new fire protection standards to reduce fire hazard and spread
_ Community resilience

ACTION LINES_ Plant selection criteria based on fire resistance and water needs.
_Regulation for plants distribution from structures and using fire resistant mulch.
_ Minimizing the fuels available to wildfires, such as restricting or prohibiting trees, shrubs, and ground cover.
_Design recommendations for fuel modification zones, type of materials and siting for fences and walls

IMPLEMENTATION MEASURES

PHASES_

RESOURCES_ Funding from state programs
_ Helps for the residents to prepare for wildfire
_Technical expertise and planners

COMUNICATION_ Educational design regulation for planners.
_Collaboration with community for information awareness
_Online platforms

REFERENCES

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities" 2022
_https://www.malibucity.org/1035/Fire-Resistant-Landscaping
_ https://opr.ca.gov/news/2022/08-17.html

05A_Best practices

SC6_WILDFIRE PLAN ALIGNMENT

2021(update2024). Mariposa County, California

It shows how different plans at local and countywide scales can incorporate wildfire resilience through topics such as land use planning, TEK, fire adaptation, parks and recreation planning, and forest health. This case study also offers an example of how the county aligns multiple plans to reinforce a holistic approach to wildfire mitigation and preparedness. Finally, this case study illustrates the importance of stakeholder collaboration as a key component in the development and ongoing implementation of wildfire resilience planning activities across the County.

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities". 2022

//Better risk assessment

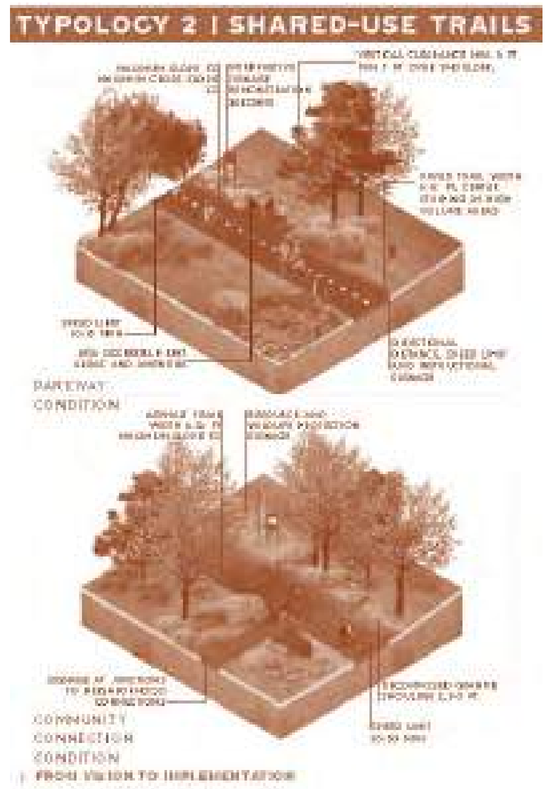
// Landscape planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes



Schematic renderings of proposed shared use trail sections as part of the Recreation and Resiliency Master Plan. Image: Mariposa County Planning Department

PLANNING TOOLS

TYPOLOGY_ Community Wildfire Protection Plan, Masterplan (PLANNING)

DEVELOPER_ Planning Department, Fire Department, Fire Safe Council and Resource Conservation District. (Advisory Committee)

REGULATION_ Mandatory

WILDFIRE

TYPOLOGY_ Wildfire, Prescribed burn

TEMPORARY PHASE_Prevention, Mitigation

SCALE

Territorial/ Local_ 378'900 ha

GOVERNANCE

TYPOLOGY_Collaborative & Networks and participatory governance

AGENTS/NETWORKS_ Local and state government representatives, firefighters, entities responsible for forest management and community

ASSESSMENT

LANDSCAPE INFORMATION_ Land uses, Vegetation type, Fire-resistant plants

FIRE HAZARD INFORMATION_ Fuel loads, Risk assessment mapping

SOCIAL INFORMATION_Practics for ensuring fire safety

STRATEGY

TYPOLOGY_ Identify and prioritize areas for hazardous fuel treatments
_Recommending measures for reducing structural ignitability
_ prescribed burn program

ACTION LINES_ Plant selection criteria based on fire resistance and water needs.
_Regulation for plants distribution from structures and using fire resistant mulch.
_ Minimizing the fuels available to wildfires, such as restricting or prohibiting trees, shrubs, and ground cover.
_Design recommendations for fuel modification zones, type of materials and siting for fences and walls

IMPLEMENTATION MEASURES

PHASES_

RESOURCES_ Funding from state programs
_ Technical expertise from fire professionals and planners
_ Collaboration with American Indian Council for traditional practices

COMUNICATION_Educational design regulation for planners.
_Collaboration with community for information awareness
_Online platforms and online community forums

REFERENCES

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities" 2022
_ https://www.mariposacounty.org/2448/Community-Wildfire-Protection-Plan
_https://storymaps.arcgis.com/stories/4cb3ffc20ce646a8b3e59d273634c156
_ https://opr.ca.gov/news/2022/08-17.html

05A_Best practices

SC7_GENERAL MILLS SCULPTURE GARDEN

1991. Minneapolis, Minnesota.

By Michael Van Valkenburgh Associates Inc

The prject is pioneer in its approach to managing a meadow through controlled burning, for an unconventional aesthetic experience. This technique introduced the concept of fire as a design element and a potential representation of the company's progressive image.

However, the project faced challenges. Ten years later, in 2000, it was removed. The burned meadow's unconventional beauty, while ecologically beneficial and promoting vegetation renewal, clashed with traditional aesthetics.

This project highlights the cultural difficulty of embracing change and impermanence, even when presented through a striking design.

// Landscape planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

PLANNING TOOLS

TYPOLOGY_ Park Masterplan (PLANNING)

DEVELOPER_ Landscape architect (MVVA), Prairie Restorations consultant agency

REGULATION_ Not Mandatory- private project

WILDFIRE

TYPOLOGY_ Prescribed burn

TEMPORARY PHASE_ Integration of fire

SCALE

Neighborhood_ 3'000 ha

GOVERNANCE

TYPOLOGY_ Adaptive governance

AGENTS/NETWORKS_ Planners, Ecology experts, **(**firefighters?)

ASSESSMENT

LANDSCAPE INFORMATION_ Vegetation type (native prairie)- ecological succession

FIRE HAZARD INFORMATION_ Fuel loads,

SOCIAL INFORMATION_ Social perception of the burned meadow aesthetic

STRATEGY

TYPOLOGY_ Introducing fire as a management tool for ecological benefit
_ Prescribed burn meadow program to encourage vegetation cycle
_ Introducing new cultural aesthetics values
_ Integrate the concept of change over time

ACTION LINES_ Planning the controlled burns considering fire safety and the desired aesthetic outcome.
_Documenting the burning process through photographs.
_Maintaining the burned meadow to achieve the design intent.

IMPLEMENTATION MEASURES

PHASES_ Programming prescribed burns, burning, maintenance

RESOURCES_ Funding from private company
_ Technical expertise from fire professionals and planners

COMUNICATION_ Online platform

REFERENCES

P. Moran (2020). "Paisajes Disruptivos. La representación de los incendios forestales en el paisaje mediterráneo ". PhD thesis
_ https://mvvainc.com/projects/general-mills-sculpture-garden

05A_Best practices

SC8_RANCH PLAN FIRE PROTECTION PROGRAM

2007 (update2013).Orange County, California

This case study highlights how master-planned communities can be developed and implemented with fire protection requirements that address hazardous vegetation, structural vulnerabilities, public safety, emergency access, and more. This case study also shows how the design of this fire protection plan took an adaptive management approach to accommodate changes at the state and local levels. Finally, this case study shows the success of communication and collaboration between a developer, fire authority, and county department to achieve shared outcomes of fire resilience and risk management.

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities". 2022

//Better risk assessment

// Landscape planning and regulations

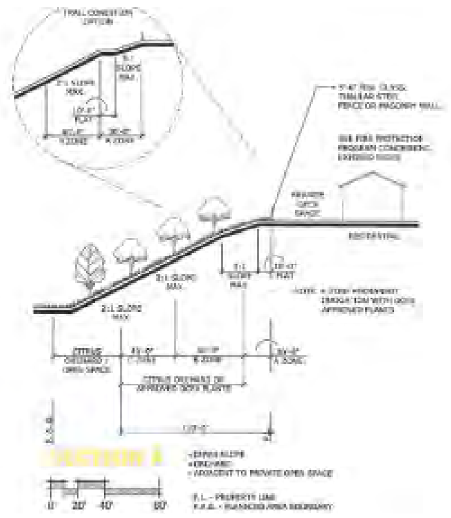
//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes

CONCEPTUAL FIRE MASTER PLAN AND FUEL MODIFICATION PLAN



PLANNING TOOLS

TYPOLOGY_ Fire Protection Plan (PLANNING)

DEVELOPER_ Planning Department, Fire Department, Public Works Departmentv

REGULATION_ Mandatory

WILDFIRE

TYPOLOGY_ Wildland-urban interface fires

TEMPORARY PHASE_ Prevention, Mitigation

SCALE

Territorial/ Local_ 245'500 ha

GOVERNANCE

TYPOLOGY_ Collaborative & Networks governance

AGENTS/NETWORKS_ Local and state government representatives, firefighters, and owners

ASSESSMENT

LANDSCAPE INFORMATION_ Land uses, Infrasyructure accessibility Vegetation type, Fire-resistant plants, water conservation

FIRE HAZARD INFORMATION_ Using the existing fire risk maps to identify vulnerable areas where developments are planned

SOCIAL INFORMATION_type of development areas

STRATEGY

TYPOLOGY_ Encouraging fire-resistant landscaping with plant selection and maintenance guidelines
_Recommending measures for reducing structural ignitability
_ Guidlines for fuel modification zones
_ Alternative development standards exist for road and street layoutsand

ACTION LINES_ Plant selection criteria based local climate and fire risk
_Regulation for plants distribution from structures and maintenance practices
_Design recommendations for fuel modification zones, type of materials and siting for fences and walls
_ Educational resources on fire safety practices for residents

IMPLEMENTATION MEASURES

PHASES_ Planning, Construction, Maintenance and Inspection

RESOURCES_ Funding from state programs
_ Technical expertise from fire professionals and planners

COMUNICATION_ Educational designr egulation for planners.
_Collaboration with community for information awareness
_Online platforms

REFERENCES

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities" 2022
_ https://ocds.ocpublicworks.com/service-areas/oc-development-services/planning-development/land-development/ranch-plan-documents

05A_Best practices

SC9_FIRE HAZARD ABATEMENT ORDINANCE

2019. Napa County, California

This case study illustrates a proactive and science-based approach to mitigating wildfire threats to structures, including ember ignitions within the zone closest to a structure. In addition, the success of these regulations is based on close collaboration among multiple county departments. Finally, this case study also shows how other voluntary wildfire risk reduction programs can work in tandem to support regulatory approaches.

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities". 2022

//Better risk assessment

// Landscape planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes

Chipping programs can incentivize community members to complete their annual vegetation management work. Image: Steve Cook

PLANNING TOOLS

TYPOLOGY_ Fire Protection Plan (PLANNING)

DEVELOPER_ Planning, Building, and Environmental Services Department, Fire Department and Community organizations,

REGULATION_ Mandatory

WILDFIRE

TYPOLOGY_ Wildland-urban interface fires

TEMPORARY PHASE_ Prevention, Mitigation

SCALE

Territorial/ Local_ 204'400 ha

GOVERNANCE

TYPOLOGY_ Collaborative & Networks and participatory governance

AGENTS/NETWORKS_ Local and state government representatives, firefighters, and owners

ASSESSMENT

LANDSCAPE INFORMATION_ Land uses, Vegetation type

FIRE HAZARD INFORMATION_ Fuel loads, Vegetation type

SOCIAL INFORMATION_collaboration with the owners

STRATEGY

TYPOLOGY_ Reduce fire hazards on private property through mandatory vegetation management
_Free chipping program

ACTION LINES_ Buffer (30m) around the structures free of prohibited vegetation and material considered high fire hazards.
_ Mandating the removal of dead or flammable vegetation around structures to create defense space.
_Maintenance vegetation regulations to minimize fire risk.

IMPLEMENTATION MEASURES

PHASES_ Maintenance and Inspection

RESOURCES_ Funding from state programs
_ Technical expertise from fire professionals and planners

COMUNICATION_ Educational design regulation
_Collaboration with community for information awareness
_Online platforms

REFERENCES

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities" 2022
_https://www.countyofnapa.org/3097/Fire-Marshals-Office
_ https://library.municode.com/ca/napa_county/codes/code_of_ordinances?nodeId=TIT8HESA_CH8.36FIPRIRHAAB
_ https://napafirewise.org/wp-content/uploads/2020/02/NC-Defensible-Space-Guidelines.pdf

05A_Best practices

SC10_WILDLAND FIRE SUPPRESSION ASSESSMENT DISTRICT

2007 (update20--). City of Santa Barbara, California

The study case showcases a unique funding mechanism for local wildfire risk reduction activities by creating a designated assessment district within city boundaries. This well-established approach, which receives annual support from elected officials, has helped fund a staff position to engage residents in fuel mitigation and educational activities. Finally, this case study illustrates how a voter-supported voluntary initiative can complement other planning and fire-related activities, such as city regulations for the wildland-urban interface.

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities". 2022

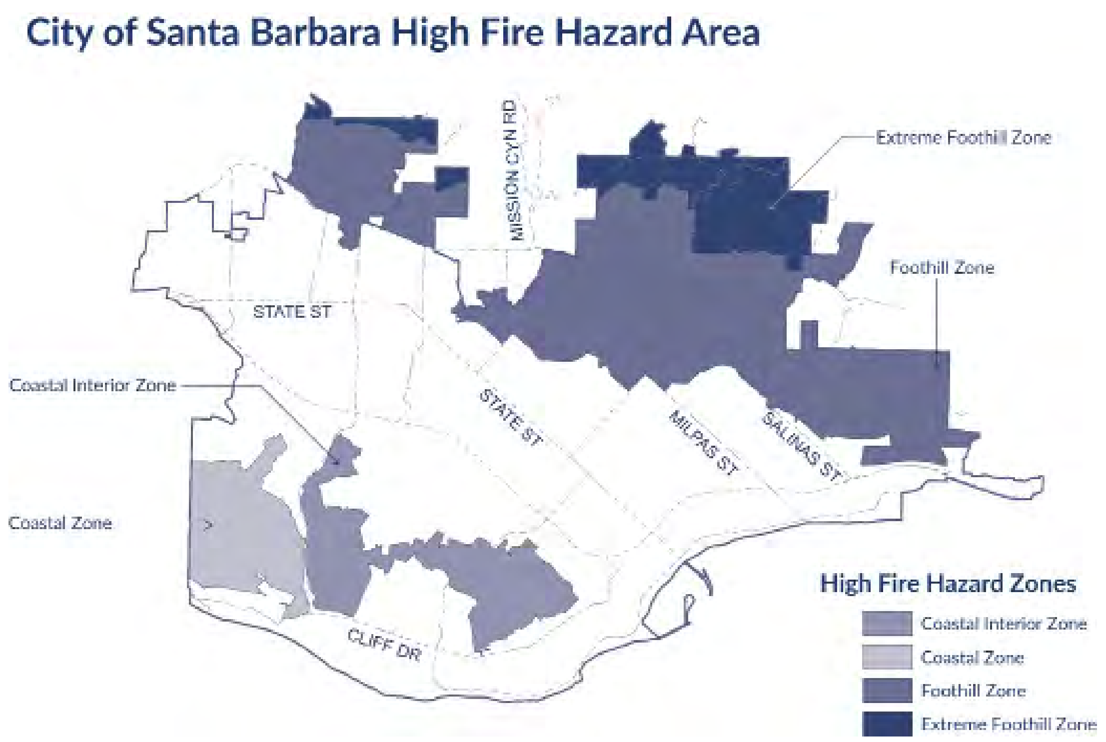
//Better risk assessment

// Landscape planning and regulations

//Green&protective infrastructure design

//Fuel management

E.7//Cross-governmental processes



PLANNING TOOLS

TYPOLOGY_ Special Assessment Districts/ Wildland Fire Plan (PLANNING)

DEVELOPER_ Planning, Building, and Environmental Services Department, Fire Department and Community organizations,

REGULATION_ Mandatory

WILDFIRE

TYPOLOGY_ Wildland-urban interface fires

TEMPORARY PHASE_ Prevention, Mitigation

SCALE

Territorial/ Local_ 10'880 ha

GOVERNANCE

TYPOLOGY_ Collaborative & Networks and participatory governance

AGENTS/NETWORKS_ Local and state government representatives, firefighters, and owners

ASSESSMENT

LANDSCAPE INFORMATION_ Land uses, Vegetation type

FIRE HAZARD INFORMATION_ Fuel loads, Vegetation type

SOCIAL INFORMATION_collaboration with the owners

STRATEGY

TYPOLOGY_ Reduce fire hazards on private property through mandatory vegetation management
_Free chipping program

ACTION LINES_ Buffer (30m) around the structures free of prohibited vegetation and material considered high fire hazards.
_ Mandating the removal of dead or flammable vegetation around structures to create defense space.
_Maintenance vegetation regulations to minimize fire risk.

IMPLEMENTATION MEASURES

PHASES_ Maintenance and Inspection

RESOURCES_ Funding from state programs
_ Technical expertise from fire professionals and planners

COMUNICATION_ Educational design regulation
_Collaboration with community for information awareness
_Online platforms

REFERENCES

"Wildland-Urban Interfece Planning Guide .Examples and Best Practices for California Communities" 2022
_https://www.countyofnapa.org/3097/Fire-Marshals-Office

SC11_USING PARTICIPATORY MAPPING TO FOSTER COMMUNITY-BASED DISASTER RISK REDUCTION IN FOREST FIRE-PRONE AREAS: THE CASE OF MONCHIQUE IN PORTUGAL

2022. Monchique. Portugal

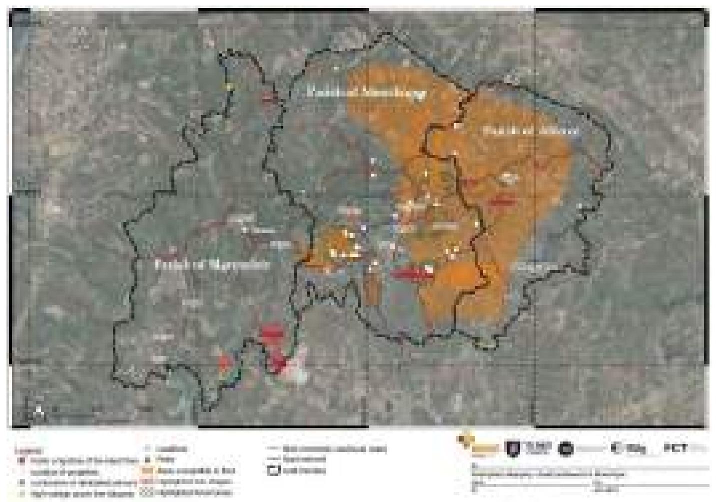
By M.Partidário, G.Saad, M.B.Monteiro, J.Dias, R.Martins, I.Loupa Ramos, H.Ribeiro, M.Teixeira, M.de Belém Costa Freitas, C. Antunes

//Better risk assessment

The project highlights the benefits of a community-based approach to fire risk reduction. It demonstrates how incorporating local knowledge aligns with existing research and empowers communities to play an active role in building resilience against wildfires.

Communities and their knowledge are crucial for understanding and reducing disaster risks, according to existing research. This project in Monchique, Portugal, a fire-prone region, exemplifies this concept. Researchers used the "participatory mapping" within a larger project (BRIDGE) to integrate various knowledge sources.
An "Innovation Laboratory" facilitated dialogue and knowledge sharing among stakeholders managing forests. Here, landowners participated in mapping workshops, identifying local vulnerabilities and risk factors. This active engagement fostered a shared understanding of vulnerable areas and led to the development of strategies to reduce fire risk.

//Green&protective infrastructure design



E.7//Cross-governmental processes

PLANNING TOOLS

TYPOLOGY_ Participatory mapping for community based disaster risk reduction -CBDRR- (DIAGNOSIS)

DEVELOPER_ Research team collaborating with local stakeholders

REGULATION_ Not mandatory

WILDFIRE

TYPOLOGY_ Wildfire

TEMPORARY PHASE_ Preventions, Mitigation

SCALE

Local_39`530 ha

GOVERNANCE

TYPOLOGY_ Collaborative & Networks and participatory governance

AGENTS/NETWORKS_ Researchers, local communities, landowners and environmental NGOs

ASSESSMENT

LANDSCAPE INFORMATION_ Land uses, Vegetation type

FIRE HAZARD INFORMATION_ Historical fires, Forest fire-prone areas map, local knowledge to identify fire risk areas

SOCIAL INFORMATION_local comunity paretcipation

STRATEGY

TYPOLOGY_ Apply "BRIDGE" project's methodology in Monchique community (participatory process)
_ Participatory mapping workshops to identify fire risks and socio-ecological vulnerabilities
_Promote social learning on key aspects of local fire risks
_Strengthen collaborative networks and dialogue

ACTION LINES_ Organizing participatory mapping workshops
_Mapping fire risk factors identified by local participants
_ Developing strategies based on the identified risks and local knowledge

IMPLEMENTATION MEASURES

PHASES_ 1. Data Collection for Participatory Mapping (Research team)
2. Participatory mapping of values and risks (Meetings with local actors and citizens)
3. Strategies (Meetings with local actors and citizens)
4. Result database

RESOURCES_

COMUNICATION_ Establish a database for communication and collaboration among stakeholders, local and regional actors
_Adopt a collaborative approach.

REFERENCES

Article_
https://www.researchgate.net/publication/363792619_Using_Participatory_Mapping_to_Foster_Community-Based_Disaster_Risk_Reduction_in_Forest_Fire-Prone_Areas_The_Case_of_Monchique_in_Portugal

05A_Best practices

SC12_REINFORCING CIVIL PROTECTION CAPABILITIES INTO MULTI HAZARD RISK ASSESSMENT UNDER CLIMATE CHANGE (RECIPE)

2021. Catalunya

By CTFC: E. PLANA, M. SERRA + Pau Costa Foundation, PCF, DGPC CAT, FVA, CIMA, BFW and ICGC

//Better risk assessment

This article explores managing wildfires in the Mediterranean, a region with a history of fire but facing increased intensity due to climate change. The RECIPE project tackles this challenge with an integrated approach, focusing on both preventing fires and building community resilience.

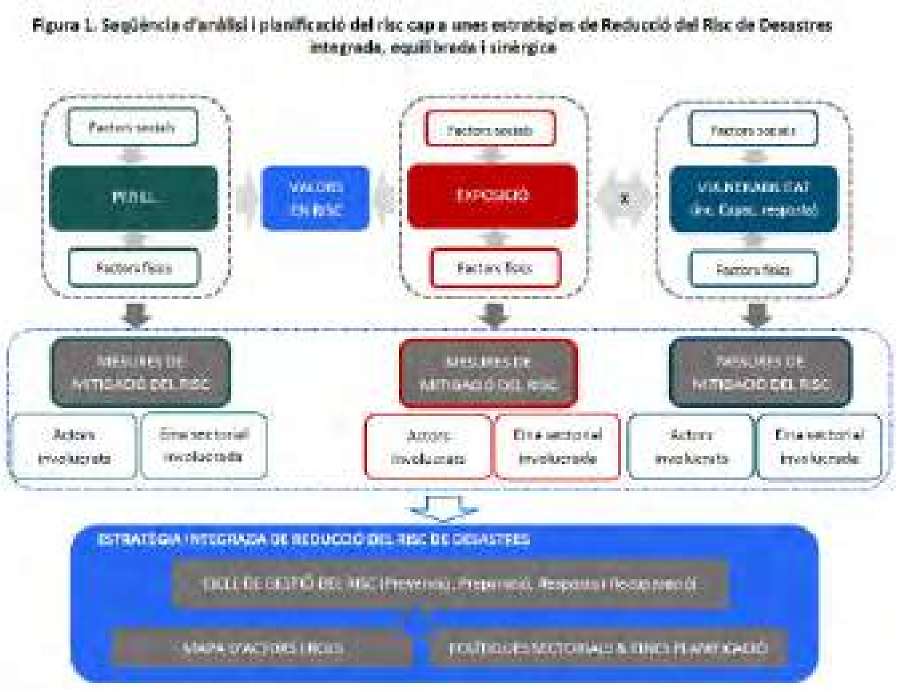
This project, funded by the European Commission, develops tools and recommendations for civil protection. It considers not only physical dangers but also social vulnerabilities during emergencies.

RECIPE, a two-year project involving eight European institutions, aims to create a cost-effective and sustainable framework for managing wildfire risk under a changing climate.

//Fuel management

//Adaptative management

E.7//Cross-governmental processes



PLANNING TOOLS

TYPOLOGY_ Risk analysis cartography and planning map (DIAGNOSIS)

DEVELOPER_ Regional and local entities, Research team collaborating with local stakeholders and community

REGULATION_ Not mandatory

WILDFIRE

TYPOLOGY_ Wildfire / WUI

TEMPORARY PHASE_ Preventions, Mitigation

SCALE

Local/ Neighborhood_ 47'200 ha

GOVERNANCE

TYPOLOGY_ Collaborative & Networks and participatory governance

AGENTS/NETWORKS_ Public entity, Researchers, local communities, landowners and environmental NGOs

ASSESSMENT

LANDSCAPE INFORMATION_ Time evolution of Land uses and WUI, Vegetation type, Climate information

FIRE HAZARD INFORMATION_ Historical fires, Fuel loads, Study of fire types, Fire ignitions

SOCIAL INFORMATION_local comunity workshop

STRATEGY

TYPOLOGY_ Identify and map risk increase and mitigation factors
_ Establish the relationship between territorial actors related to risk increase and reduction dynamics.
_Propose an integrated planning framework in the areas of prevention, response and recovery, optimizing synergies between measures, actors, instruments and planning action.

ACTION LINES_ Set of recommendations for improving wildfire risk management
_Toolkit for civil protection agencies
_Training modules for the community
_Scientific report

IMPLEMENTATION MEASURES

PHASES_ Evaluation of values and risk to define a vulnerability map
_ Establish cycle management process to reduce the risk
_ Educational workshop to increase community awareness

RESOURCES_ European fonds

COMUNICATION_ Establish a database for communication and collaboration among stakeholders, local and regional actors
_Online platform

REFERENCES

Article_
http://recipe.ctfc.cat/

SC13_UN NUEVO PLAN DE MANEJO DEL FUEGO EN LA VAL D'ARAN (PIRINEOS) BASADO EN LA COEXISTENCIA CON EL FUEGO: DETALLES DE LA MODELIZACIÓN CIENTÍFICA PARA LA TOMA DE DECISIONES

2022. Catalunya

By J.OLIVERES + A.Duane, X.Castellarnau, J.Pagés, M.Bosch, G.Arjó, L.Rodriguez, M.Castellnou, L.Brotons

//Better risk assessment

// Landscape planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes

The article details a groundbreaking fire management plan for the Val d'Aran, a 620 km² region in the Pyrenees. This first-of-its-kind European plan integrates fire as a natural process and focuses on pre-emptive measures.

A core concept is "ecological fire flow," the yearly amount of fire beneficial to the ecosystem. Scientists adapted the MEDFIRE model to calculate this flow for the Val d'Aran, simulating fire behavior and climate change impacts.

The plan outlines strategies to reduce wildfire risk (fuel management, education, preparedness) while promoting fire's benefits (ecosystem regeneration, reducing large wildfires).

This innovative plan, developed with stakeholders, paves the way for managing fire as a natural element and building ecosystem resilience.

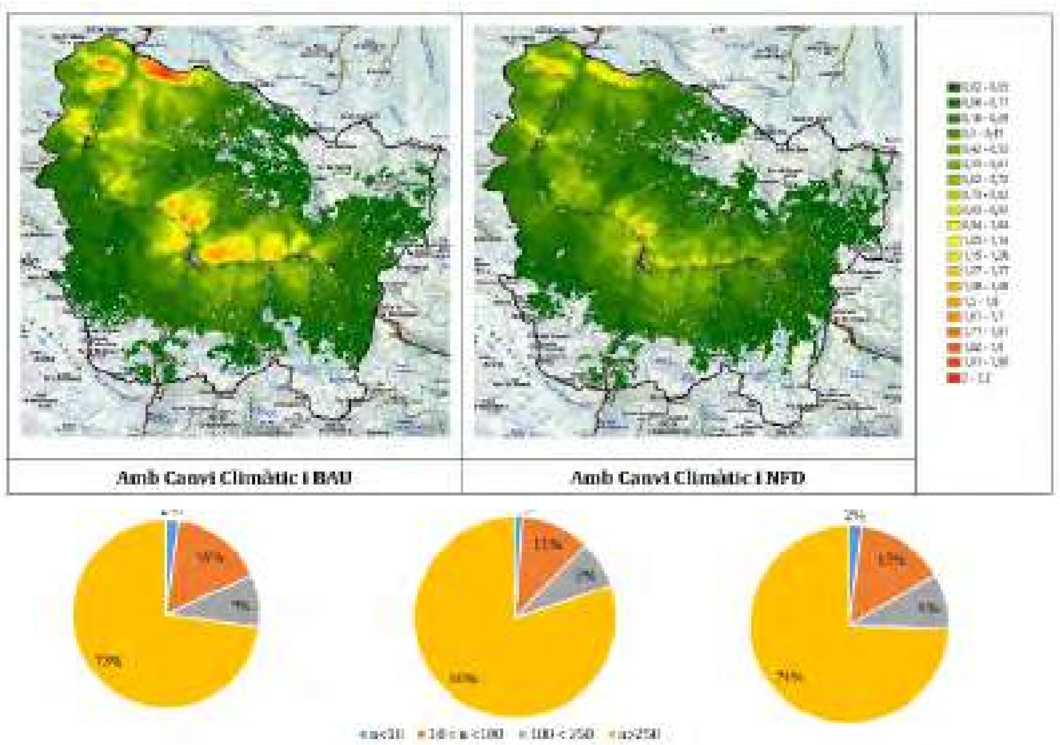


Figura 5. Proporción del área quemada según los diferentes tamaños de incendio según el escenario climático y de gestión.

PLANNING TOOLS

TYPOLOGY_ Fire Regime Sustainable Management Strategic Plan (DIAGNOSIS)

DEVELOPER_ Research team collaborating with local autorities

REGULATION_ Mandatory

WILDFIRE

TYPOLOGY_ Extreme Wildfire

TEMPORARY PHASE_ Preventions, Integration, Mitigation

SCALE

Territorial_ 62'000 ha

GOVERNANCE

TYPOLOGY_ Networks and participatory governance

AGENTS/NETWORKS_ Researchers,Public entity,

ASSESSMENT

LANDSCAPE INFORMATION_ Type of forest cover, Forest age, Altitude, Orientation, Slope, Climate information, Vegetation dynamics

FIRE HAZARD INFORMATION_ Historical fires, Fuel loads, Study of fire types, Potentially fire ignitions, Potentially burned areas, Fire spreading, Burning intensity, Drought index

SOCIAL INFORMATION_ Social awareness, Prioritization of common values

STRATEGY

TYPOLOGY_ Transversal and democratic paradigm shift:
_Pre-emergency planning and landscape management
_ Integrate fire into the landscape (fire ecology)
_ Encourage the use of fire as a landscape management tool
_ Education among public and private entities

ACTION LINES_ Simulations
_Prescribed burns program
_Fire managment
_Training plan for expertise and local actors

IMPLEMENTATION MEASURES

PHASES_ Evaluation and simulation of extreme wildfire
_Desicion-making about menagment measure

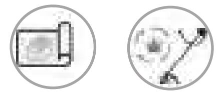
RESOURCES_ European fonds
_ Regional/ National fonds

COMUNICATION_ Establish a database for communication and collaboration among experties, local and regional actors

REFERENCES

Article_
https://8cfe.congresoforestal.es/es/content/un-nuevo-plan-de-manejo-del-fuego-en-la-val-daran-pirineos-basado-en-la-coexistencia-con-el

05A_Best practices



SC14_WUICOM. COMUNITATS D'INTERFÍCIE RESILIENTS AL FOC DE BARCELONA

2021-2023. Barcelona (Spain)

By H. Ballart, (PCF), G. Canaleta (PCF), I. Rodríguez (UOC), M. Arenas (UOC), D. Caballero (UPC), P. Morán (PCF), E. Pastor (UPC), E. Planas (UPC), P. Vacca (UPC)

The research takes a holistic approach, analyzing social, environmental, and infrastructure vulnerabilities within Barcelona's WUI. The goal is to create specific strategies to improve fire resilience in these high-risk areas.
WUICOM-BCN combines landscaper, fire engineering expertise with social science to understand fire risk and behavior. Citizen participation and collaboration with local agents are cornerstones of the project. This allows for the development and application of technologies to analyze fire risk and craft effective prevention plans.
The project incorporates methodologies to consider ecosistem and social inequalities and vulnerabilities when designing solutions. This ensures proposed prevention and self-protection strategies are inclusive and address the diverse needs of the community.

Two case studies serve as testing grounds: Can Rectoret, vulnerable due to its mixed urban-forest development, and Sant Genís dels Agudells, at risk of fire spreading from its dense urban areas towards the park.
The project's ultimate goal is a sustainable action plan for fire resilience in Barcelona's most vulnerable areas. This plan, transferable to other cities, will inform fire policies and promote public participation in wildfire awareness and risk reduction efforts.

//Better risk assessment

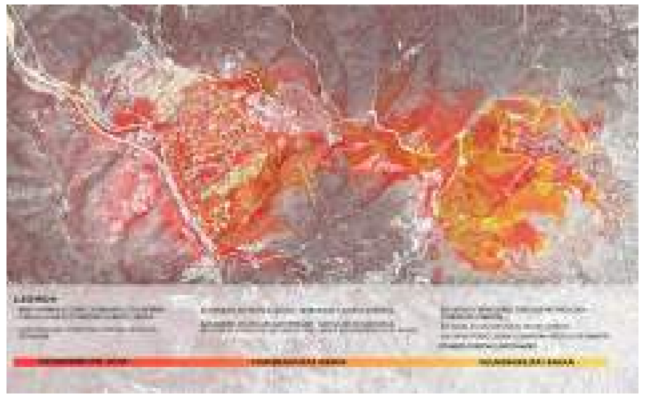
// Landscape planning and regulations

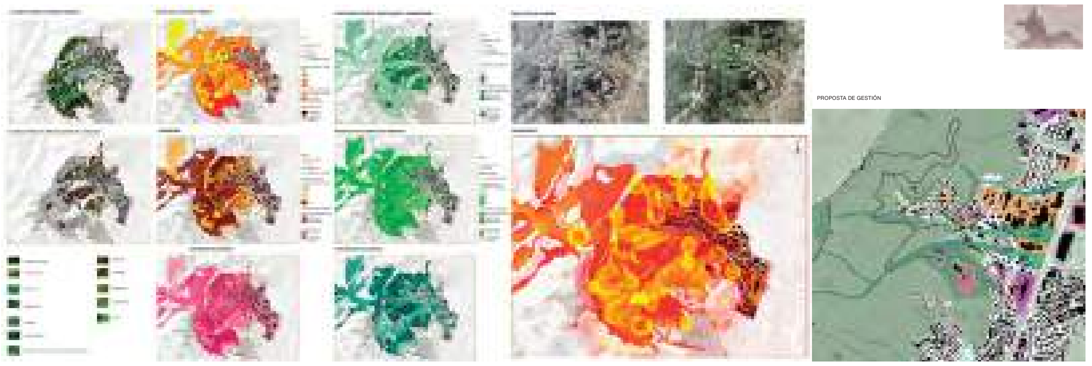
//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes





Ecosistem vulnerability and strategy
By Pepa Morán Núñez's Team:
G. Canaleta, G. Verduci, C. Vera, P. Suescun, R. Quilla, T. Snihur.

PLANNING TOOLS

TYPOLOGY_ Holistic assessment and strategic planning for future WUI management (DIAGNOSIS)

DEVELOPER_ Research team UPC, UOC, PAU COSTA Fondation

REGULATION_ Not Mandatory

WILDFIRE

TYPOLOGY_ WUI Wildfire

TEMPORARY PHASE_ Preventions, Integration, Mitigation

SCALE

Local/ Neighborhood

GOVERNANCE

TYPOLOGY_ Collaborative governance

AGENTS/NETWORKS_ Researchers,fire expert, sociology and local community

ASSESSMENT

LANDSCAPE INFORMATION_ Topography, Type of forest cover, Forest age, Slope, land use, Vegetation structure, Altitude, Orientation

FIRE HAZARD INFORMATION_ ECOSISTEM VULNERABILITY: Historical fires, Surface fuel models, fire ignitions, Fire spreading, Burning intensity, Simulation of wildfire, Fire recurrence, Vegetation resilience and behavior to fire, Flame length, Speed of spread

SOCIAL INFORMATION_ SOCIAL AND INFRASTRUCTURAL VULNERABILITY
Public perception of wildfire risk.

STRATEGY

TYPOLOGY_ Develop and apply technologies to analyze the risk and behavior of WUI fires focusing on detecting social, ecosystemic and infrastructural vulnerabilities
_ Develop strategies specific for the city to increase resilience to fire in those most vulnerable spaces

ACTION LINES_ Develop fire risk maps and vulnerability maps and simulations
_Propose fuel management plans and strategies for creating firebreaks.
_Develop public awareness campaigns and educational programs on wildfire prevention and preparedness.

IMPLEMENTATION MEASURES

PHASES_ Evaluation and simulation of extreme wildfire
_Desicion-making about menagment measure

RESOURCES_ City and private fonds

COMUNICATION_ Establish a database for communication and collaboration among experties, local and regional actors
_Workshop with the community

REFERENCES

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https://www.barcelona.cat/barcelonaciencia/ca/recerca/wuicom-bcn
https://www.paucostafoundation.org/presentacion-de-los-resultados-de-wuicom-bcn/
https://www.sciencedirect.com/science/article/pii/S0379711223001212#gs1

https://civil-protection-humanitarian-aid.ec.europa.eu/system/files/2023-06/Wildfire_PRAF_V2.pdf

05A_Best practices

SC15_LIFE TAIGA.
FIRE BRINGS NEW LIFE TO WOODS

2015 -2020. Sweden

By J. Wretenberg, N. Bergius, J. Carlsson

The project tackling wildfires in Sweden's taiga forests. While wildfires can be devastating, the project explores using controlled burns as a landscape management tool.
This approach focuses on a mitigation strategy. By strategically introducing controlled burns, the project aims to reduce fuel loads (dead wood and vegetation) on the forest floor. This creates a more fire-resilient landscape, lessening the risk of large, uncontrolled wildfires. Additionally, controlled burns can promote the growth of fire-resistant plant species, further strengthening the ecosystem..

LIFE TAIGA doesn't establish a new planning tool, but likely leverages existing national or regional wildfire management plans.
Through careful planning, controlled burn execution, and post-burn monitoring, the project aims to demonstrate the effectiveness of using fire as a tool to revitalize forests and promote fire resilience in the taiga ecosystem.

//Better risk assessment

// Landscape planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes

PLANNING TOOLS

TYPOLOGY_Protection program (MANAGEMENT)

DEVELOPER_County Administrative Boards, Environmental Protection Agency, Fire Department and Community organizations

REGULATION_ Not Mandatory

WILDFIRE

TYPOLOGY_ Wildfire

TEMPORARY PHASE_Preventions, Integration, Mitigation

SCALE

Territorial/ Local

GOVERNANCE

TYPOLOGY_ Networks and participatory governance

AGENTS/NETWORKS_ Local entity, firefighters, planners, biologist and community

ASSESSMENT

LANDSCAPE INFORMATION_ Type of forest cover, Climate information, Flora and Fauna dynamics

FIRE HAZARD INFORMATION_ Historical fires, Fuel loads, Existing dead woods

SOCIAL INFORMATION_Social awareness

STRATEGY

TYPOLOGY_ Prescribed burning to create a more fire-resilient landscape by:
1.Reducing fuel loads
2.Promoting the growth of fire-resistant species
_ Open-air museum, site visit and workshop to increes people on fire education

ACTION LINES_Identifying suitable areas for controlled burns based on assessments.
_Planning and executing controlled burns under controlled conditions.
_Monitoring the effects of controlled burns on fire risk and ecosystem health.

IMPLEMENTATION MEASURES

PHASES_ Planning and assessment
_Executing controlled burns
_Monitoring and evaluation

RESOURCES_ European fonds
_ Regional/ National fonds

COMUNICATION_Establish a database to share the results among experties, local and regional actors
_Online platform
_Public meetings, workshops, and outreach materials.
_Collaboration with local media for information dissemination.

REFERENCES

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https://lifetaiga.se/controlled-burning-in-woodlands/#:~:text=In%20the%20period%202015%2D2020,new%20life%20to%20the%20woodlands.

05A_Best practices

SC16_EASTERN MOURNES WILDFIRE PROJECT

2012. Northern Ireland
By Mourne Wildfire Group

The project is a pilot acting as a blueprint for future wildfire management strategies. It takes a multi-phased approach, addressing wildfire risk throughout its lifecycle. Prevention and mitigation strategies iare a key focus, achieved through measures like fuel management. This involve controlled burns or clearing vegetation to reduce potential fuel sources for wildfires.

Operating at a local scale within the Eastern Mournes mountain range, the project emphasizes collaboration. Government agencies pool resources and expertise with a non-profit organization to effectively manage wildfire risk.

Through this project, Northern Ireland is taking proactive steps towards a more fire-resilient future for the Eastern Mournes. The project's findings can serve as a valuable model for other regions facing wildfire threats.

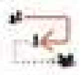
//Better risk assessment

//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes



PLANNING TOOLS

TYPOLOGY_Protection program (MANAGEMENT)

DEVELOPER_County Administrative Boards, Environmental Agency, Water Agency,Fire and Rescue Department

REGULATION_ Not Mandatory

WILDFIRE

TYPOLOGY_ Wildfire

TEMPORARY PHASE_Preventions, Integration, Mitigation

SCALE

Territorial/ Local_ 15'000 ha

GOVERNANCE

TYPOLOGY_ Networks and participatory governance

AGENTS/NETWORKS_ Government agencies, Firefighters, Non-profit organization

ASSESSMENT

LANDSCAPE INFORMATION_ Forest cover, Climate information, Topography

FIRE HAZARD INFORMATION_ Historical fires, Fuel loads, Data collection and computer modelling to identify high-risk areas

SOCIAL INFORMATION_Social awareness

STRATEGY

TYPOLOGY_ Regime of prescribed burning and controlled grazing to limit the probability and impacts of wildfires on wildlife, ecosystems and water quality.

ACTION LINES_Fuel management (prescribed burns, vegetation clearing)
_Improved fire response capabilities
_Development of post-fire recovery plans
_Public education and awareness campaigns

IMPLEMENTATION MEASURES

PHASES_ Planning and assessment
_Executing controlled burns
_Monitoring and evaluation

RESOURCES_ Regional/ National fonds

COMUNICATION_Collaboration among project partners and communication with stakeholders, including the public
_Online platform

REFERENCES

https://jncc.gov.uk/our-work/eastern-mournes-wildfire-project/

05A_Best practices

SC17_ALDEAS MODELO
2021-2022. Galicia (Spain)

Facing high wildfire risk, Galicia, Spain, launched the Model Villages Programme. This program tackles the problem at its root by preventing fires through land management. A Land Bank consolidates fragmented landholdings, enabling larger-scale investments. Farmers then cultivate these areas, creating firebreaks around villages. For instance, Parada dos Montes uses cattle grazing to establish a low-biomass buffer zone.

This approach proved successful during a 2022 wildfire, protecting the village while surrounding forests burned. However, the program requires significant initial investment per hectare. Additionally, attracting younger residents to maintain the bioeconomy model in villages like Parada dos Montes with aging populations remains a challenge. Currently, 21 villages are participating, managing 575 hectares across 2,360 landowners. The program demonstrates promise for mitigating wildfire risk while promoting rural revitalization.

//Better risk assessment

// Landscape planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

//Bioeconomy

E.7//Cross-governmental processes

Figure 1. Map of Parada dos Montes

Figure 3. Forest burnt seen from Parada dos Montes in 2022. Photo by Cecilia Fraccaroli.

PLANNING TOOLS

TYPOLOGY_Protection program (MANAGEMENT)

DEVELOPER_Regional and Local Government

REGULATION_ Not Mandatory

WILDFIRE

TYPOLOGY_ Wildfire

TEMPORARY PHASE_Preventions, Mitigation

SCALE

Local_575 ha

GOVERNANCE

TYPOLOGY_ Participatory governance

AGENTS/NETWORKS_ Government agencies, Landowners

ASSESSMENT

LANDSCAPE INFORMATION_ Topography, Land use, Abandoned fields

FIRE HAZARD INFORMATION_ Fuel loads,

SOCIAL INFORMATION_volunteers

STRATEGY

TYPOLOGY_ Landscape management: By bringing abandoned land back into production, that reduce fuel loads and create firebreaks around villages.
_Sustainable practices: Encouraging sustainable agricultural practices to promote healthier vegetation and improving fire resilience.
_Community engagement: Increased activity in rural areas to improve awareness of wildfire risks and a more proactive approach to prevention.

ACTION LINES_Promoting specific crops or land management techniques, such as grazing, that reduce fire risk.
_Integrating firebreaks and fuel management strategies into land-use planning.
_Encouraging collaboration between landowners and local authorities on wildfire preparedness.

IMPLEMENTATION MEASURES

PHASES_ Program development, outreach to landowners, land assessment, development of management plans and monitoring.

RESOURCES_ Regional and European fonds

COMUNICATION_Outreach campaigns to promote program
_Online platform

REFERENCES

https://agader.xunta.gal/es/recuperacion-de-tierras/aldeas-modelo
https://www.ctfc.cat/docs/FIRE-RES_eng.pdf

05A_Best practices

SC18_ALDEIA SEGURA PESSOAS SEGURAS
2012. Portugal
By Mourne Wildfire Group

Portugal's "Safe Village Safe People" program tackles wildfire risks in rural areas. It combines two initiatives: "Safe Village" focuses on structural improvements like firebreaks and fire-resistant building materials to shield villages. "Safe People" prioritizes public awareness through education campaigns and training residents on fire prevention, preparedness, and potentially even basic firefighting skills. This collaborative effort between the national government and local municipalities aims to strengthen fire resilience in villages nestled within the wildland-urban interface. By integrating preventative measures with public preparedness, the program strives to safeguard lives and communities facing wildfire threats.

//Better risk assessment

// Landscape planning and regulations

//Green&protective infrastructure design

//Fuel management

//Adaptative management

E.7//Cross-governmental processes

PLANNING TOOLS

TYPOLOGY_Protection program (MANAGEMENT)

DEVELOPER_Ministry of Internal Administration

REGULATION_ Not Mandatory

WILDFIRE

TYPOLOGY_ Wildfire

TEMPORARY PHASE_Preventions, Integration, Mitigation

SCALE

Local

GOVERNANCE

TYPOLOGY_ Collaborative governance

AGENTS/NETWORKS_ Government agencies, Local entities, Firefighters and Comminity

ASSESSMENT

LANDSCAPE INFORMATION_ Topography, Vegetation

FIRE HAZARD INFORMATION_ Historical fires, Fuel loads, Identify vulnerable villages

SOCIAL INFORMATION_Social awareness

STRATEGY

TYPOLOGY_ Implementation and management of protection zones and refuge areas
_ Raising awareness among populations about preventing risky behavior
_ Adopting self-protection and preparedness measures against rural fires

ACTION LINES_ Creating firebreaks and managing vegetation around villages.
_Improving access for emergency vehicles.
_Upgrading building materials to be more fire-resistant
_ Fire drills and evacuation planning for communities
_Public education campaigns on wildfire risk and prevention.

IMPLEMENTATION MEASURES

PHASES_ Planning
_Implementing structural works
_Conducting awareness campaigns and training

RESOURCES_ Government and European fonds

COMUNICATION_Collaboration among project partners and communication with stakeholders, including the public
_Online platform

REFERENCES

https://aldeiasseguras.pt/
https://aldeiasseguras.pt/wp-content/uploads/2020/08/Guia-Apoio-Implementacao-EN-Web_2.pdf

05A_Best practices

SC19_THE WORLD'S BEST FIRE MANAGE-MENT SYSTEM IS IN NORTHERN AUS-TRALIA, AND IT'S LED BY INDIGE-NOUS LAND MANAGERS

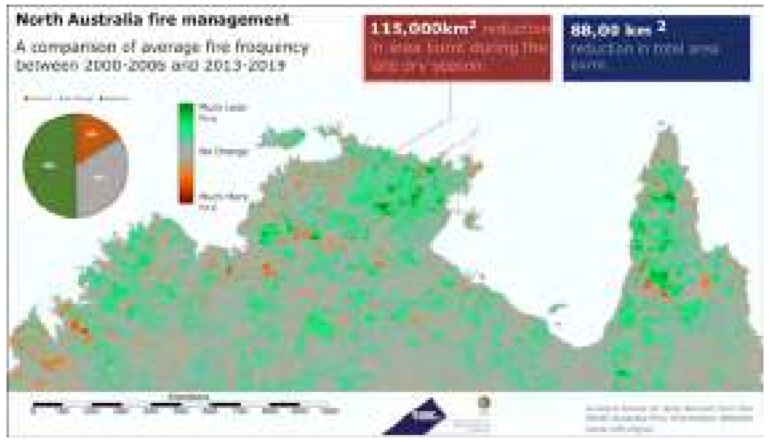
2020. Australia

Indigenous land management practices in northern Australia represent the world's most effective fire management system. It likely highlights how traditional Aboriginal burning techniques differ from conventional methods and contribute to a more sustainable approach.
For millennia, Indigenous Australians have used controlled burns to manage vegetation. These strategic fires clear flammable undergrowth, reducing the fuel load that could feed larger, destructive wildfires. This proactive approach helps prevent uncontrollable blazes and promotes a healthier ecosystem.

//Better risk assessment

Furthermore, it emphasizes the deep ecological knowledge possessed by Indigenous land managers. Their understanding of the local environment and fire behavior allows them to conduct controlled burns strategically. The success of this system suggests the importance of collaborating Indigenous fire management practices with conventional techniques for a more holistic approach to wildfire mitigation.

//Fuel management



//Adaptative management

E.7//Cross-governmental processes

PLANNING TOOLS

TYPOLOGY_Protection program (MANAGEMENT)

DEVELOPER_ Government agencies, Fire Department, Scientists and Indigenous

REGULATION_Not mandatory. (Cultural tradition)

WILDFIRE

TYPOLOGY_ Wildfire

TEMPORARY PHASE_Preventions, Integration, Mitigation

SCALE

Territorial /Local

GOVERNANCE

TYPOLOGY_ Collaborative and Adaptive governance

AGENTS/NETWORKS_ Government/Local entities, Firefighters, Rangers, Fire expert researchers and Comminity: Indigenous land managers, pastoralists.

ASSESSMENT

LANDSCAPE INFORMATION_ Topography, Vegetation types, Vulnerable ecosystems

FIRE HAZARD INFORMATION_ Historical fires, Fuel loads, Weather patterns, Identify vulnerable areas

SOCIAL INFORMATION_Cultural values and traditional ecological knowledge

STRATEGY

TYPOLOGY_ Prescribed burning: Regularly conducting controlled burns to reduce fuel loads and manage vegetation.
_Landscape mosaic burning: Creating a patchwork of burned and unburned areas to disrupt fire spread.
_Adaptive management: Adjusting burning practices based on changing environmental conditions.

ACTION LINES_ Planning and coordinating controlled burns based on traditional knowledge and seasonal conditions.
_Creating firebreaks and managing vegetation around villages.

IMPLEMENTATION MEASURES

PHASES_ Knowledge transmission, planning, burning, and monitoring

RESOURCES_ Government and private fonds

COMUNICATION_Online platform

REFERENCES

https://theconversation.com/the-worlds-best-fire-management-system-is-in-northern-australia-and-its-led-by-indigenous-land-managers-133071
https://firenorth.org.au/nafi3/

05A_Best practices

SC20_RAMATS DE FOC
2016. SPAIN, CATALONIA
By Pau Costa Foundation

A project founded in 2016 that combines silvopastoralism and fire prevention through grazing in forest areas. It is currently made up of a total of 18 shepherds who participate in the management of some 500 hectares in the province of Girona. The Pau Costa Foundation intends to expand the project to other communities and territories in the future. Ramats de Foc seal promotes the continuity of livestock activity in the territory, creating and maintaining landscapes adapted to fire that prevent large wildfires.

Ramats de Foc received an EMAS Award in 2018 for the best Tandem project, an award given jointly to all the creators of this plan that combines circular economy and sustainability; artisan butchers and charcuterie makers from the Girona region, the Pau Costa Foundation, GRAF fire management bodies, shepherd farms and the Mas Pi de Verges Restaurant. All of them together are part of this cooperation project for fire prevention by guaranteeing grazing in the forest and the marketing of meat and dairy products.

//Green&protective infrastructure design

//Fuel management

//Adaptative management

//Bioeconomy

E.7//Cross-governmental processes

PLANNING TOOLS

TYPOLOGY_Protection program (MANAGEMENT)

DEVELOPER_ Government agencies, Fire Department, Scientists and Indigenous

REGULATION_Not mandatory. (Cultural tradition)

WILDFIRE

TYPOLOGY_ Wildfire

TEMPORARY PHASE_Preventions, Integration, Mitigation

SCALE

Territorial /Local

GOVERNANCE

TYPOLOGY_ Collaborative and Adaptive governance

AGENTS/NETWORKS_ Government/Local entities, Firefighters, Rangers, Fire expert researchers and Comminity: Indigenous land managers, pastoralists.

ASSESSMENT

LANDSCAPE INFORMATION_ Topography, Vegetation types, Vulnerable ecosystems

FIRE HAZARD INFORMATION_ Historical fires, Fuel loads, Weather patterns, Identify vulnerable areas

SOCIAL INFORMATION_Cultural values and traditional ecological knowledge

STRATEGY

TYPOLOGY
_Landscape mosaic grazing: Creating a patchwork of grazing to disrupt fire spread.

_Adaptive management: Adjusting burning practices based on changing environmental conditions.

ACTION LINES_ Planning and coordinating grazing based on traditional knowledge and seasonal conditions.
_Creating firebreaks and managing vegetation around villages.

IMPLEMENTATION MEASURES

PHASES_ Knowledge transmission, planning, grazing, and monitoring

RESOURCES_ Government and private fonds

COMUNICATION_Online platform

REFERENCES

https://www.ramatsdefoc.org/

05B_Summary

_TERRITORIAL SCALE

PLANNING TOOL			STRATEGY	ACTION LINES
Masterplan / fire management plan (PLANNING)		SC13_UN NUEVO PLAN DE MANEJO DEL FUEGO EN LA VAL D'ARAN (PIRINEOS) BASADO EN LA COEXISTENCIA CON EL FUEGO 2022. Catalunya By CTFC, GRAF, UPC, CREAF, CSIC, Pompièrs Emergéncies Conselh Generau d'Aran	-The plan outlines strategies to reduce wildfire risk (fuel management, education, preparedness) while promoting fire's benefits (ecosystem regeneration, reducing large wildfires).	-This innovative plan, developed with stakeholders, paves the way for managing fire as a natural element and building ecosystem resilience.
	10'880 ha	SC10_WILDLAND FIRE SUPPRESSION ASSESSMENT DISTRICT 2007 (update20--). City of Santa Barbara, California	_ Reduce fire hazards on private property through mandatory vegetation management _Free chipping program	_ Buffer (30m) around the structures free of prohibited vegetation and material considered high fire hazards. _ Mandating the removal of dead or flammable vegetation around structures to create defense space.
Participatory mapping for community based disaster risk reduction (DIAGNOSIS)	680 ha	SC1_THE CROSBY ARBORETUM 1998. Picayune, Mississippi By Andropogon Associates, W. Platt and Ed Blake	-Integrating prescribed burning as a design tool to restore and maintain the native vegetation ecosystem -Reduce the risk of wildfires by managing fuel loads. -Habitat management techniques to promote biodiversity within the savanna by encouraging the native plants and animals that thrive with fire	-Develop a prescribed burn plan -Conduct controlled burns under appropriate weather conditions with trained personnel. -Monitor the post-burn effects on vegetation composition, wildlife populations, and soil health.
	39`530 ha	SC11_PARTICIPATORY MAPPING TO FOSTER COMMUNITY-BASED DISASTER RISK REDUCTION: THE CASE OF MONCHIQUE IN PORTUGAL 2022. Monchique. Portugal By M.Partidário, G.Saad, M.B.Monteiro, J.Dias, R.Martins, I.Loupa Ramos, H.Ribeiro, M.Teixeira, M.de Belém Costa Freitas, C. Antunes	_Apply "BRIDGE" project's methodology in Monchique community _ Participatory mapping workshops to identify fire risks and socio-ecological vulnerabilities _Promote social learning on key aspects of local fire risks _Strengthen collaborative networks and dialogue	_Organizing participatory mapping workshops _Mapping fire risk factors identified by local participants _ Developing strategies based on the identified risks and local knowledge
		SC12_REINFORCING CIVIL PROTECTION CAPABILITIES INTO MULTI HAZARD RISK ASSESSMENT UNDER CLIMATE CHANGE (RECIPE) 2021. Catalunya By CTFC, Pau Costa Foundation, PCF, DGPC CAT, FVA, CIMA,	_Identify and map risk increase and mitigation factors _ Establish the relationship between territorial actors related to risk increase and reduction dynamics. _Propose an integrated planning framework in the areas of prevention, response and recovery, optimizing synergies between measures, actors, instruments and planning action.	-Organizing participatory mapping workshops _Mapping fire risk factors identified by local participants _ Developing strategies based on the identified risks and local knowledge
Participatory mapping of values (DIAGNOSIS)	50.167 ha	SC2_DEMOCRATIZING DECISION-MAKING ON WILDFIRES AND ADAPTING TO CLIMATE CHANGE IN THE MONTSENY BIOSPHERE RESERVE 2019. Montseny, Catalunya By I.Otero,G.Gamboa, C.Bueno, G.Canaleta, G.Tolosa, H.Ballart, L.Camprubí, O.Vilalta, E.Arilla, M.Castellnou	_Communize fire management decisions by involving various stakeholders. _Adapt fire management strategies to climate change by considering its impact on fire risk and to minimize the loss of values. _Promote a collaborative approach that integrates local knowledge and scientific expertise.	_Develop a participatory process for decision-making on fire prevention actions. _Multicriteria method to prioritize management actions.
Protection program (MANAGEMENT)		SC15_LIFE TAIGA.FIRE BRINGS NEW LIFE TO WOODS 2015 -2020. Sweden By J. Wretenberg, N. Bergius, J. Carlsson	_ Prescribed burning to create a more fire-resilient landscape by: 1.Reducing fuel loads 2.Promoting the growth of fire-resistant species _ Open-air museum, site visit and workshop to increes people on fire education	_Identifying suitable areas for controlled burns based on assessments. _Planning and executing controlled burns under controlled conditions. _Monitoring the effects of controlled burns on fire risk and ecosystem health.
		SC16_EASTERN MOURNES WILDFIRE PROJECT 2012. Northern Ireland By Mourne Wildfire Group	_ Regime of prescribed burning and controlled grazing to limit the probability and impacts of wildfires on wildlife, ecosystems and water quality.	_Fuel management (prescribed burns, vegetation clearing) _Improved fire response capabilities _Development of post-fire recovery plans _Public education and awareness campaigns

05B_Summary

_LOCAL SCALE

PLANNING TOOL			STRATEGY	ACTION LINES
Community Plan (PLANNING)	10'100 ha	SC4_CITY LANDSCAPE MANUAL 2016. Carlsbad, Northern California	_Integrate fire management principles into landscape design _ Standards based on site-specific conditions. _ Implementing the project with fire-resistant plants _Establishing defence buffers space around structures. _Integrating firebreaks using appropriate vegetation and maintenance practices.	_ Plant selection criteria based on fire resistance and water needs. _Guidelines for plants distribution from structures and using fire resistant mulch. _Design recommendations for fuel modification zones, firebreaks, including width, vegetation composition, and maintenance.
	47'400ha	SC3_UPPER RIDGE COMMUNITY PLAN 2021. Butte County, Northern California	Develop a wildfire risk reduction program: - Land Use planning policy direction - Building codes and standards - Vegetation management	_ Fire-safe practices for future development _ Enforces fire-resistant building materials and design principles _ Fuel reduction, defensible space creation, and prescribed burn _ Upgrades water supply systems and emergency access routes
	575 ha	SC17_ALDEAS MODELO 2021-2022. Galicia (Spain)	_ Landscape management: By bringing abandoned land back into production, to reduce fuel loads and create firebreaks around villages. _Sustainable practices: Encouraging sustainable agricultural practices to promote healthier vegetation and improving fire resilience. _Community engagement: Increased activities in rural areas to improve awareness of wildfire risks and a more proactive prevention approach	_Promoting specific crops or land management techniques, such as grazing, that reduce fire risk. _Integrating firebreaks and fuel management strategies into land-use planning. _Encouraging collaboration between landowners and local authorities on wildfire preparedness.
		SC18_ALDEIA SEGURA PESSOAS SEGURAS 2012. Portugal By Mourne Wildfire Group	_ Implementation and management of protection zones and refuge areas _ Raising awareness among populations about preventing risky behavior _ Adopting self-protection and preparedness measures against rural fires	_ Creating firebreaks and managing vegetation around villages. _Improving access for emergency vehicles. _Upgrading building materials to be more fire-resistant _ Fire drills and evacuation planning for communities _Public education campaigns on wildfire risk and prevention.
		SC19_THE WORLD'S BEST FIRE MAN-AGEMENT SYSTEM IS IN NORTH-ERN AUSTRALIA, AND IT'S LED BY INDIGENOUS LAND MANAG ERS 2020. Austalia	_ Prescribed burning: Regularly conducting controlled burns to reduce fuel loads and manage vegetation. _Landscape mosaic burning: Creating a patchwork of burned and unburned areas to disrupt fire spread. _Adaptive management: Adjusting burning practices based on changing environmental conditions.	_Planning and coordinating controlled burns based on traditional knowledge and seasonal conditions. _Creating firebreaks and managing vegetation around villages.
City Landscape Manual (GUIDELINE FOR PLANNING)	5'154 ha	SC5_LANDSCAPE WATER CONSERVA-TION AND FIRE PROTECTION ORDINANCE 2020. City of Malibu, Northern California	_ Promote fire-resistant landscapes through regulations_Introducing new fire protection standards to reduce fire hazard and spread _ Community resilience	-Plant selection criteria based on fire resistance and water needs. _Regulation for plants distribution from structures and using fire resistant mulch. _ Minimizing the fuels available to wildfires, such as restricting or prohibiting trees, shrubs, and ground cover.

05B_Summary

_WUI SCALE

PLANNING TOOL			STRATEGY	ACTION LINES
Post Disaster Recovery Ordinance (PLANNING)	378'900 ha	SC6_WILDFIRE PLAN ALIGNMENT 2021(update2024). Mariposa County, California	_ Identify and prioritize areas for hazardous fuel treatments _Recommending measures for reducing structural ignitability _ prescribed burn program	_ Plant selection criteria based on fire resistance and water needs. _Regulation for plants distribution from structures and using fire resistant mulch. _ Minimizing the fuels available to wildfires, such as restricting or
		SC8_RANCH PLAN FIRE PROTECTION PROGRAM 2007 (update2013).Orange County, California	_ Encouraging fire-resistant landscaping with plant selection and maintenance guidelines _Recommending measures for reducing structural ignitability _ Guidlines for fuel modification zones _ Alternative development standards exist for road and street layoutsand	_ Plant selection criteria based local climate and fire risk _Regulation for plants distribution from structures and maintenance practices _Design recommendations for fuel modification zones, type of materials and siting for fences and walls _ Educational resources on fire safety practices for residents
Community Wildfire Protection Plan, Masterplan	204'400 ha	SC9_FIRE HAZARD ABATEMENT ORDINANCE 2019. Napa County, California	_ Reduce fire hazards on private property through mandatory vegetation management _Free chipping program	_ Buffer (30m) around the structures free of prohibited vegetation and material considered high fire hazards. _ Mandating the removal of dead or flammable vegetation around structures to create defense space. _Maintenance vegetation regulations to minimize fire risk.
		SC14_WUICOM. COMUNITATS D'INTERFÍCIE RESILIENTS AL FOC DE BARCELONA 2021-2023. Barcelona (Spain) By H. Ballart, (PCF), G. Canaleta (PCF), I. Rodríguez (UOC), M. Arenas (UOC), D. Caballero (UPC), P. Morán (PCF), E. Pastor (UPC), E. Planas (UPC), P. Vacca (UPC)	_ Develop and apply technologies to analyze the risk and behavior of WUI fires focusing on detecting social, ecosystemic and infrastructural vulnerabilities _ Develop strategies specific for the city to increase resilience to fire in those most vulnerable spaces	_Develop fire risk maps and vulnerability maps and simulations _Propose fuel management plans and strategies for creating firebreaks. _Develop public awareness campaigns and educational programs on wildfire prevention and preparedness.

_URBAN AND PUBLIC SPACE SCALE

Park Masterplan (PLANNING)	3'000 ha	SC7_GENERAL MILLS SCULPTURE GARDEN 1991. Minneapolis, Minnesota. By Michael Van Valkenburgh Associates Inc	_ Introducing fire as a management tool for ecological benefit _ Prescribed burn meadow program to encourage vegetation cycle _ Introducing new cultural aesthetics values _ Integrate the concept of change over time	_ Planning the controlled burns considering fire safety and the desired aesthetic outcome. _Documenting the burning process through photographs. _Maintaining the burned meadow to achieve the design intent.

FIRE-RES