European Meeting on Cartography for Risks and Forest Fire Prevention

Open Forum "Towards an European Forest Fire Prevention Network"

MEETING PROCEEDINGS

Workshop "Cartography of Risks"

Open Forum "Towards an European Forest Fire Prevention Network"

León, Spain

21st-23rd February 2012

Location of the event:

Centro para la Defensa contra el Fuego / "Centre for Defense against Forest Fire " (CDF)

Junta de Castilla y León

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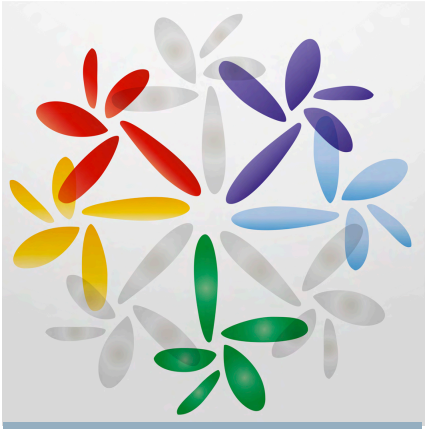
Content:

ANNEXES:



Executive Summary

The Interreg IVC EUFOFINET project organised a technical workshop and its Steering Committee meeting in the Centre for Defense against Fire (CDF) in León (Spain) on 21-24 February 2012. The main objective of the Eufofinet project is the transfer of already-identified good practices to improve national or regional policies on forest fire prevention and management into the Operational Programmes of the PP's M.A. The project has duration of 2 years (Oct 2010 – Oct 2012), a total budget of little more than two million Euros and participating partners from Greece (coordinator), Italy, France, Slovakia, Spain, Denmark, Poland and United Kingdom.

One of the objectives of the workshop was to advance prevention by Cartography of Risks and its exploitation through GIS technologies. EUFOFINET partners presented their experience in this field, strengthening participant partners´ knowledge. To complete the technical activities, a field trip and two technical rooms took place as side events for external organisations and companies to present their experience in the project's topics. Side events of the EFFMIS project also took place: bilateral meetings and staff-training exchanges.

Part of this programme but distinct from the rest of it, an Open Forum was called to advance on the subject of a European forest fire prevention network. Representatives of FAO, the Joint Research Centre and other relevant European institutions and projects (USSE, NAT Commission of the Committee of the Regions, SUDOE project "PYROSUDOE", 7FP FIRESMART and "MOVE" projects, "Fire Paradox" Project, Interreg IVC "PROMPT") participated in the meeting. The Open Forum hosted seminal presentations and a lively debate around the perceived needs and framework for such a network to be developed, and there was general consensus in that the meeting's hosts (the CDF on behalf of the Junta or regional government of Castilla y León and Cesefor Foundation) were able and fit to further develop a complete proposal (concept paper, terms of reference and a short- to medium-term agenda) and present it to participants in the Open Forum and other relevant agents.

1. Background

EUROPEAN MEETING ON CARTOGRAPHY FOR RISKS AND PREVENTION

The Interreg IVC EUFOFINET project celebrated a technical workshop and its Steering Group comittee in León (Spain).

The main objective of the Interreg IVC EUFOFINET project is the transfer of already identified good practices to improve national or regional policies on forest fire prevention and management into the Operational Programmes of the PP's M.A.

One of the objectives of the workshop was to work around prevention and Cartography of Risks, around GIS technologies. Interreg IVC EUFOFINET partners presented their experience in this field. Other European project's partners participated in the meeting: Interreg IVC "EFFMIS" and SUDOE project "PYROSUDOE" initiatives.

Another aim was to advance on a European forest fires prevention network. In this sense, this meeting hosted a debate around its needs and framework as an additional activity of a meeting of the European project Interreg IVC EUFOFINET. During the last day of that meeting, this Open Forum was the dialogue space where a proposal of the creation of a European Forest Fire Prevention Network was presented. This action, one of the planned activities of the Interreg IVC EUFOFINET project, is identified as a need from different fields of forest fire fighting.

The Open Forum was divided into two parts. During the first part representatives of FAO, the Joint Research Centre, lead partners of six related European projects and the Junta de Castilla y León presented their perspectives. This was followed by an open debate. The findings of this debate are presented below.

During the discussion there was broad agreement on the need for greater collaboration in prevention at European level, being an area where significant challenges lay ahead.

To complete these activities, some side events of Interreg IVC "EFFMIS" projects took place: bilateral meetings and training staff exchanges.

As a side event, 2 technical rooms took place for external organizations and companies to present their experience in these project's topics.

2. Workshop proceedings

Session I: Technical Workshop "Cartography for Risks" (León, Spain) (1)

Vicente Rodríguez

Junta de Castilla y León, (Spain)

The regional GIS for forest fire prevention and fight.

Castilla y León Region: 9.422.543 ha Total Surface - 4.807.731 ha Forest Surface - 2.982.317 ha Tree Covered Surface

Evolution of the forest: Crop Abandonment (400.000 ha in 40 years) and intense repopulation and natural regeneration

Statistics: Most fires are found in mountainous areas in the west part of the Region and 50% of attempts thanks to the smooth running of the operation unfolded, adjusted weekly according to risk.

Check Times: 73% of fires are controlled in less than 3 hours, 82% are extinguished in less than 6 hours and fires over 500 ha account for 0.32% of the total and affect 46% of the forested areas and 34% of forest areas.

Investigation of causes: Over 90% of fires caused by humans, either intentionally or negligence or accidents, of fires caused by man over 70% have their origin in agricultural and livestock causes

Cartography of Risk:

- *Structural risk* -measures -location and deployment of resources and infrastructure, guards' calendar. Variables considered: type of the masses, protected areas, and proximity of vegetation to urban risk). The local risk index is calculated by multiplying the frequency index, the causality and hazard fuel derived from forestry. The combination of local risk index and the vulnerability of values to be protected provide the potential risk

- *Weather Risk* -measures -protocols -temporary deployment of media alerts, change of guards, media movement. The weather risk mapping is queried from different sources: prediction and observation. Combination of meteorological variables, statistics, information on fuels and other factors to improve risk indices. Canadian index calibration. Both absolute and relative indices.Generate an index of large fires. GIF PREVENTION.

- *Risk of daily risk* (structural -weather) -measures -application module stop. 4 DEGREES SET: NORMAL, WARNING, ALARM and EXTREME WARNING.

- *Anthropic risk* -action -communication to the agencies (responsible for prevention). Steps in the analysis for each hazard: Locate it, Collect status information, Define overall corrective measure and / or unique to each location, Establish a level of assessment for this risk, Create a map of risk and Inform responsible.

GIS Applications: SIPRO Fire Simulator, the Emercarto, and the NOMO.

Conclusions: Risk mapping is an essential tool in making:

- Search the anticipation
- Make the deployment of risk-based media (floppy, convoys, media scaling, ...)
- Risk analysis need to know if workers must work on prevention or fight (stop modules)
- It is based on protocols according to risk (fires, artillery ...)
- Preventive measures adapted to the risk (Spot: warning statement and permanent risk periods)

GIS applications are an essential tool in decision-making: For prevention and decision making (simulation, localisation, perimeter calculation)

Session I: Technical Workshop "Cartography for Risks" (León, Spain) (2)

Pavlos Konstantinidis & Georgios Tsiourlis

(National Agricultural Research Foundation – NAGREF for the North Aegean region)

GIS in North Aegean

Prevention, fighting and management of forest fires are, perhaps, the most important issue, in contemporary forestry. The problem of forest fires is, of particular importance for Greece, due primarily, to a significant shift, in the socio-economic conditions over the last decades. Increased fuel loads, as a result of urbanisation and forest abandonment, and increased number of forest visitors result, in both, an increased number of forest incidents, as well as in-creased fire intensity and burned area.

The first reaction time in a wildfire is directly related to the difficulty of intervention and the intensity of forest fire, and depends of the time detection (by permanent or mobile observers). The performance of observers depend of the available number, their level of knowledge of the terrain, their resistance, the location of the observatory etc. Last years the problem of the early detection of fire events is solved by using modern methods for example by use wireless camera detection networks to get early detection - notification – monitoring of forest fires.The coordination problem is more complex because the forest fire prevention and fighting is under the responsibility of a numerous services and organisations: Fire Brigade, Forest Services, Municipalities, Army and Volunteers.

Providing a common platform of an integrated data base of geographical information system (G.I.S.) could be a solution to the above problems. The cartographical material produced using in the GIS environment allows the Fire Brigade to control more effectively the area where the fire incident is located, to improve the time of first intervention and the coordination of ground and aerial interventions forces, so well as all the services involved.

An adapted special software (as "Behave" or "farsite") allowing the prediction of the front of forest fires according the climatic parameters and the fuel type and amount of the vegetal formations in the fire event has been adapted and integrated. This is a very strong, and useful decisions tool, in the hand of the coordinator, in order to carry out, forecasting and scenario planning interventions.

All maps are on the project website INCENDI and are available for all the services involved (Fire Brigade, Forestry Services, Municipalities, Educational and Research Organisations, volunteers, etc.). http://incendi.geo.aegean.gr/

Conclusions:

1. The time of awareness and preparation of fighting forces is drastically reduced.
2. It improves the overall efficiency of the intervention and fighting forces since the process of the related information is faster and more reliable.
3. The improving of an effective intervention at the stage of fighting creates, as it is expected, the conditions for the reduction of expected damage and losses. This resulted from the capacity for the coordinator to have reliable and updated information at real time helping him to take the more efficient decisions.

Marian Lopúch

(Fire brigade's member – NFC)

Using GIS information by Slovak fire brigade.

Slovak republic: 68,2 % forest, 9 national parks, 1082 small protected areas and 382 sites of European importance.

Input data: relief of the simulation area, climatic characteristics and fuel model.

Output data: digital model of forest fire, depending on climatic conditions in time steps.

This GIS data information is in the format *.ASC, and it's provided by: National Forest Centre, State Forests TANAP and the Ministry of Interior, Department GIS Information.

On line: Biometeorological monitoring http://www.emsbrno.cz

FUEL model includes: initial fuel humidity and for 1,10,100 hours, Min. and max. fuel humidity, fire calorific value, volume the living or dead particles, depth of soil cover and the adjustment model.

Yvon Duché

ONF (France)

The GIS system in the south of France

In France, the cartography of risk and hazard is used in many contexts and with many goals. In the frame of this workshop, we chose to focus on two recent and innovative practices that come out a few of our habits and potentially interest other partners : cartography of risk in the interfaces and evolutive cartography of vegetation sensitivity.

General facts on french cartography of risk: Static risk and Daily risk.

- *Static risk, or intrinsic risk*: This risk relates to the physical characteristics of where it is described. It is dependent on many characteristics which the main are vegetation and topography.
- *Daily risk or evolving risk*. Also often called "weather risk" or "weather danger" because it takes into account mainly the meteorological component which unlike other factors is changing quite rapidly.

Cartography of risk in the interfaces: In the static cartography of risk at the scale of a municipality, of a massif or of a department, the most important areas to consider are the wildland-urban interfaces, because that's where are concentrated the highest issues (natural issues passing always in the background behind the protection of persons and goods).

To better define the risk levels and to adapt the measures, it appeared necessary to characterise these interfaces. A first work was done in 2006-2010 in the European research project FIREPARADOX by French research institute CEMAGREF (now IRSTEA) crossing habitat grouping types with aggregation of vegetation types.

A second study was conducted in 2010-2011 within the framework of European cooperation project PYROSUDOE in which ONF participated. This project has made progress in defining habitat grouping types and in defining areas of influence of these types, which seemed perfectible points in the previous work. The first results and their uses are the subject of this form of good practice.

Evolutive cartography of vegetation sensibility: To respond to a need of the Inter ministerial General Staff of Defence Zone South (Mediterranean region), which coordinates the activities of all extra-departmental resources (national resources and reinforcements from other departments or other zones), ONF in 2009 produced a map of sensibility of the vegetation. This map is based on maps of stands made by the National Forest Inventory grouped into 31 types.

During the seasons 2010 and 2011, ONF has developed a methodology which allows to modulate the sensitivity of vegetation according to the drought calculated by Météo-France. Drought is an index into 5 levels calculated from the indices IH (humus index) and IS (soil index) of the Canadian method, themselves evaluated from the cumulative rainfall and evapotranspiration. This index is calculated daily and spatialised (1km pixels), but changes very little rapidly in the absence of rainfall. The modulated sensitivity map is generated 2 times a week plus intermediate production in case of heavy rainfall.

Rather than a systematic offset of index, modulation is done by cross tables, which can take into account different behaviours, depending on stand type, biogeographic zones, slopes and sunshine. A different modulation was also introduced for the start of the season (called "spring modulation ", versus "summer modulation ").

Józef Piwnicki - Ryszard Szczygieł - Bartłomiej Kołakowski

FRI (Poland)

The Cartography of risk in Poland

Classification of forest area in Poland: Forest fire risk category is calculated for each Forest District, every 10 years.

Forest fire risk category is based on: Number of forest fire during last 10 years for 1000 ha, Type of forest stand (rich sites, poor sites, coniferous or broadleaves), Climatic factors: air humidity, share of days with litter humidity less than 15%, Human factor (population density). Can be calculated for RD, province, subregions, districts.

Forest fire forecasting system. Forest fire risk degree. The purpose of forest fire risk forecasting is determination of fire occurrence possibility on a given day depending on dynamic weather changes. Forest fire risk degree determines the type of organisational actions for which forest services (forest divisions or national parks) and rescue services are obliged on a given day.

National Forest Fire Information System. Main purpose of the NFFIS:

- Creating the nationwide base about forest, agriculture land and wasteland fires.
- The NFFIS is a reliable data source about all forest fire sand cultivated lands in Poland.
- The NFFIS enables the data management about forest fires and agriculture lands coming from three different sources as well as makes reports and balance sheets formally of European Union.

Detailed data are made available in the different range, depending on authorisations of logged in user. Accordingly seven user groups were formed, i.e.: I -Administrators; II -National parks -the level of the country; III -National parks -the level of the park; IV -The General Directorate of the State Forests; V -The Regional Directorate of the State Forests; VI -The Central Statistical Office -the level of the country; VII -The Central Statistical Office -the level of the province.

José Antonio Grandas Arias

Xunta de Galicia (Spain)

GIS Applications in the fight against forest fires in Galicia

Galicia and the forest fires: High forest fires incidence. Period 1969-2008:

46% of fires of Spain – 225,100 fires (minimum of 17% and maximum of 64%)

25% of the burnt area of Spain – 1,728,000 has (minimum of 3% and maximum of 65%).

Law 3/2007 of 9 April, prevention and defence against forest fires in Galicia: shall maintain a system of forest fires and keep records cartographic and computer of burnt areas and the networks of defence against wildfires of districts and to integrate all the necessary information in this system, will be regulated and standardised the data capture procedure.

Priorities identified: the need for a simple visual environment that shows a global information in real time the status of the fires in Galicia and need for a GIS to collect all information related to the prevention offorest fires.

XeoCode: XeoCode is a geographic information system that can integrate, store, edit, analyse, share and display geographically referenced all the information necessary for the prevention and suppression of forest fires in Galicia. There are different applications, planning instruments and information sources that provide to XeoCode the data that user wants to use.

Problems / solutions incurred:

Implantation of GIS across the device: the number of persons responsible for entering information and using it is very high and many workers were not accustomed to managing computer systems.

Solutions: Specific training for each professional category, Development of protocols to unify and standardise the information, Development of guidelines for managing the GIS and Support and monitor the data input from the central coordination centre.

Transferability of the specific good practice: Success Factors, thanks largely to:

- Political will to improve the coordination, management and availability of information on preventing and extinguishing forest fires.
- Normative support through the law of forest fires in Galicia.
- Availability of funding.
- Demand by professionals of tools to facilitate decision making and allow for prioritising actions.

Risk factors: It is necessary to sustain the effort in updating information and standardising the data so that XeoCode continue to provide its full potential.

Julia McMorrow

University of Manchester for the partner Northumberland (United Kingdom)

GIS experiences in the Peak District

National and regional context: PDNP 1438 km2, first National Park established 1951. It's a flat plateau (not peaks!), open moorland and wooded valleys. Blanket peat important carbon store, badly degraded by fire, pollution, etc : costly restoration

90% in private ownership. Home to 39,000 people. Semi-natural, working upland landscape, 69% of land under agricultural subsidy. Public access contributes to fire risk; 16M visitors pa. 36% is Access Land – closed at times of high fire risk, MOFSI (Met Office Fire Severity Index), Dense network of statutory rights of way remains open. Multiple ecosystem services: Biodiversity, carbon regulation, water supply, forestry, grazing, grouse shooting, outdoor recreation, 13% is heather moor, mostly managed for grouse by burning -- controversial for biodiversity & wildfire.

Wildfire management superimposed upon complex land use, land ownership and regulatory framework : restrictions on use of fire. Fire Operations Group; highly successful partnership approach.

Multi-criteria evaluation (MCE) static risk map:

How the map is used: fire ponds, fire watches, fire breaks

Impact: "Wildfire risk mapping has directly informed the design of our ranger early 'wildfire warning system'; a system that we estimate has prevented at least five potentially large incidents [since 2007]" [PDNPA Head of Field Services, 2011]. And, in spring 2011, 12 fires, largest 1 mile2 (2.6 km2)

Recommendations:

- Differing interpretations of 'risk': workshop better than online survey
- Flexibility in map output; provide digital data
- Fire ground location needed, not call-out or rendezvous point.
- Burned area needed; GPS fire scar perimeter since 2003
- Cross-referencing with Fire Service incident number

G. Pacini (Tuscany Region) - **E. Marchi** (University of Florence)

Tuscany Region (Italy)

Cartography of risk: experiences in Tuscany

In Tuscany the cartography of risk is developed at different levels, and namely: Static risk map, Dynamic risk map, ODIF Map and IRM Map.

1. STATIC RISK MAP: The model takes into account the most important parameters that characterise the Mediterranean ecosystem and affect the wildfire events. The input parameters for the model are: FOREST FIRE DATABASE (AIB), ROAD NETWORK AND URBAN AREAS, REGIONAL FOREST INVENTORY (forest regional inventory at 400 m), DTM (elaborated at 90 m to make the layer easier to use), and METEO DATA (meteorological station network).

2. DINAMYC RISK MAP: This index is calculated applying the Fire Weather Index (FWI) (Canadian index). In order to calculate and map the index the following steps are followed: meteorological data collection from the regional station network, Daily spazialisation of the meteorological variables by means of algorithm daymet (www.daymet.org) implemented by LaMMa (pixel= 1km), and the Calculation of the following indices included in the Canadian method: FFC (Fuel moisture - indicator of the relative ease of ignition and the flammability of fine fuel). FWI (is a numeric rating of fire intensity).

Use of the maps: On the basis of the daily bulletin of the dynamic risk level each Province has to provide at: The assessment of the risk level in each operational area, i.e. the area in charge at each fire boss; and, if the FWI for the day and the next two days is high, sharing the high alert level among the firefighter agencies and organisations in the area.

3.ODIF MAP: Assessment of the efficiency and effectiveness of firefighting; ODIF analyses several factors affecting the suppression activities carried out by aerial and ground resources; ODIF model was applied to 70,000 hectares and is still in experimental phase.

ODIF is the combination of two main indices: GROUND OPERATIONAL DIFFICULTY INDEX (GODI) and HELICOPTERS OPERATIONAL DIFFICULTY INDEX (HODI).

4. IRM MAP: Map of infrastructure risk in Wild-Urban Interface areas . Based on the operational guidelines of the National Department of Civil Protection. A wildland-urban interface (WUI) refers to the zone of transition between unoccupied land and human development; These lands and communities adjacent to and surrounded by wild lands are at risk of wildfires. The map was built for the province of Florence and is still in experimental phase. Touristic infrastructure" (such as hotel, camping, residence, ect.) ware taken into consideration (many people may be threatened by forest fire during the fire season).

The study of WUI involves multiple disciplines and consequently requires the cooperation of various actors (forest fires specialists, fire brigade specialists, researchers);

The study only evaluates variables connected to the forest sector, but the model could easily be adjusted to accept data from different fields (i.e. the evaluation of building characteristics and materials).

Viviane Ascenso

Municipality of Batalha, Portugal, Interreg IVC "EFFMIS" project (Portugal)

Forest Fire Risk Cartography: Methodology and Appliances.

The methodology to create the FOREST FIRE HAZARD MAP and the FOREST FIRE RISK MAP was defined by the National Forest Authority and all the municipalities in Portugal had adopted this methodology, using the tools of the Geographic Information Systems (GIS).

The Forest Fire Hazard is the most important map to plan and execute the policies of forest fire prevention in Portugal.

By the Decree-Law n.º 17/2009, 14th January, on the classes HIGH and VERY HIGH, of the FOREST FIRE HAZARD MAP, it is forbidden to construct any kind of buildings, like houses, industries, commerce or service buildings. All the interventions and investments to improve and build new forest roads, water tanks, lookout towers, forest fuel management and other infra-structures need to ensure the information of the FOREST FIRE HAZARD MAP.

By the Decree-Law n. 17/2009, 14th January, municipalities have obligations in the forest fire defence and needs to invest in prevention. The investment needs to carefully focus on the most dangerous areas, using the tools of GIS software and using the FOREST FIRE HAZARD MAP.

Forest fire hazard: Appliances : water tanks investments, forest roads investments, fuel Management investments, fuel management in Urban Areas, industrial Parks Investments, fuel management in Forest Roads, PRODER (funded project) investments… The importance of prevention.

Session II: Technical room (León, Spain) with Dimap, University of Valladolid, Balmart and Agresta Soc.coop.

DIMAP. SISVIA.

Environmental monitoring system for early fire detection.

The main objective is the design and development of an environmental monitoring system for early fire detection based on the installation of wireless sensor networks, scattered in forest areas, capable of acquiring in real time and continuous data of environmental variables (concentration of gases in the air, temperature, humidity, etc.).. This system can be also supported by relevant information (land use, mapping of biomass, flammability, moisture content in living matter, etc.), obtained through remote sensing.

Finally, the system will implement all the data collected and / or generated in a common database that can be incorporated into a GIS tool to carry out the functions of query, analysis, diagnosis and decision making in fire.

SISVIA is designed in a modular way in different systems, which allow better sizing and greater flexibility in its development:

1. Sensorisation and Communication System: Installation of a sensor network in forest areas based on ZigBee technology for monitoring environmental variables defined and Creating data management capabilities to filter and ensure the quality of their own data.
2. System Earth Observation (Geospatial): Getting variables obtained from satellite images of Earth observation, List of variables obtained by remote sensing sensors and environmental indicators and Creating a database of common environmental information
3. Systems analysis and simulation: Hazards models, Propagation models and Integration into a GIS
4. Accessibility of information: Webmap Publishing (including the possibility of publication under OGC standards) and Posted in 3D environments.

University of Valladolid / Junta de Castilla y León (Spain)

Advanced mathematical techniques potential to map burned areas and severity levels from satellite images

Carmen Quintano, Alfonso Fernández-Manso, Oscar Fernández-Manso, Eduardo Cuesta, Alfred Stein, Dar Roberts and Yosio Shimabukuro

Forest fires throughout the world result in tree mortality that can cause substantial timber and carbon losses. There is a critical need to map the areas burned by such fires and the fire severity level to guide forest management decisions. This work shows how conventional methods for satellite image based in spectral indices specifically designed for burned and severity quantification like the Burned Area Index (BAI) and the Normalised Burn Ratio (NBR – dNBR) can be improved by applying advanced mathematical techniques. The main aim of the study is to evaluate the usefulness of Spectral Mixture Analysis (SMA), Multiple Endmember Spectral Mixture Analysis (MESMA), Data Mining (DM) and Fractional type Convolution Filter (FCF) for mapping forested areas burned by fires (and their severity level) in the Mediterranean area using both MODerate-resolution Imaging Spectroradiometer (MODIS) data and Landsat TM/ETM+ images. The methodologies that we propose improved the burned area / severity level estimates obtained with standard methods. This work displays the result of the scientific collaboration among major research centres in the world and the Valladolid and Leon Universities.

BALMART: *Sistema de Monitorización Medioambiental mediante una Red de Sensores Inalámbricos para prevención y extinción de incendios forestales*

BALMART electronic and communication systems make wireless sensor networks that send data via radio frequency, to obtain real-time agroclimatic parameters (temperature and buried Humidity, Temperature and Humidity, Wind Speed, Rainfall, Humidity fuel, etc.), parameters that are necessary for technicians who are responsible for preventing and extinguishing forest fires.

AGRESTA/CESEFOR:

The role of the LiDAR technology on the decision making on forest fire prevention and extinction.

Authors: Francisco Rodríguez (Fundación Cesefor), Alfredo Fernández (AGRESTA S. COOP.), Jose Ramón González-Olabarria (Centre Tecnològic Forestal de Catalunya), Blas Mola-Yudego (University of Eastern Finland).

The LiDAR (Light Detection And Ranging) is a technology that allows a three dimensional point cloud and georeferenced terrain and vegetation using airborne laser scanner (ALS). This technology allows us to obtain a larger number of measurements of the surface (soil, vegetation, buildings ...) than any other known system. All measurements are actual measurements taken, uniform and continuous in space throughout the area covered by the LIDAR flight. This technology is radically changing the way of generating useful information for decision making in planning forest fire prevention and extinguishing them.

The analysis of the arrangement and density of the laser returns for vegetation allows us to estimate and model variables that influence fire behaviour, the canopy cover of bushes, the crown insertion height, the height of bushes, biomass density in glasses are one of them. Generated mapping to identify areas of high fire risk (susceptibility + impact), which allows easily define actions designed to eliminate the presence of highly flammable fuels near sources of ignition, such as opening and / or maintenance of areas and fire lanes in the vicinity of tracks, roads, and other sources, among others.

In their presentation they shared the information about processing methodologies LiDAR to generate high-resolution mapping fuel models.

Session V: Technical room (León, Spain) with Vstep/Bull, Tecnosylva, Luceit, GMV and Tragsa.

BULL/VSTEP (Holland)

Bull is a European company, manufacturer and systems integrator for "Homeland Security" in Spain since the 60's. They offer solutions as RescueSim, a new tactical simulation system that allows virtually perform training or drills, to prepare agencies (fire, police, emergency medical services) in the troubleshooting, checking and monitoring protocols emergency plans. It is also used to study, design, development and verification of protocols and plans, for example to synchronise the multi-sectoral action.

One role of Civil Protection is the theoretical and practical training in risk and emergency management, including training of managers and staff from different services and organisations involved in emergency actions, including fire services and rescue, medical services and the Security Forces. The theoretical and practical training is vital to maintain the operational effectiveness and efficiency of members of agencies and resources available.

However, practical training, especially drills are often compromised by the high cost of implementation. Furthermore, these simulations have many shortcomings, because it is impossible to stop the activity, eg an airport, for implementation in a real scenario. And the infrequency with which they are made more difficult goal. It should therefore be necessary to seek a means to perform simulations at low cost so that the formation of controls, and coordination of the agencies is in the extreme.

Desktop simulations, employing scale physical representations of scenarios and resources, is one of the tools traditionally used to control tactical training and preparing for drills. In the military field have been implemented in computer systems and their effectiveness in training for decision-making aimed at staff, or even smaller units, has been demonstrated in practice and in studies for verification.

Therefore, the presentation attempts to analyse the feasibility of a desktop virtual simulator for Emergencies, in addition to the actual simulation as a tool in the training of commanders, and to support the development and testing of protocols and plans.

GMV AEROSPACE AND DEFENSE S.A.U.

GMV

(**http://www.gmv.com/**)

GMV AD has accumulated experience in projects related to forest fire prevention such as FUELMAP (JRC), PYROS (ESA), ARCFUEL (LIFE +), FireSmart (FP7), DRUID (ESA), EOFOREST (Junta de Andalucia) or RECOVER (FP7-REDD). This technical conference is to make known two of them, ARCFUEL And EOFOREST.

ArcFUEL, aims to develop a complete and current methodology for mapping fuel maps on a Web database geo-referenced in the Mediterranean area and based on available data, harmonised, accessible and interoperable in accordance with the principles of INSPIRE. The methodology currently under development will be validated in pilot areas in Greece, Portugal, Italy and Spain. ARCFUEL LANDSAT images is based on the definition of a methodology of "self-process" (automation) to create maps of vegetation, makes a methodological standardisation of data and develops a methodology for creating fuel maps. These developments are incorporated into a SW tool.

EOFOREST, is a catalog of geo-information products derived using RADAR image processing to serve the forest industry and in particular biomass sector. The use of forest biomass is a key element of fire prevention, but the industry sector needs security of supply. EOForest identify accurately the forest area and biomass estimates at the stand level. It also allows you to track precise spatiotemporal surfaces cleared.

EOForest used optical imaging, eg. SPOT-5 (10 m) or RapidEye (5 m) - to generate successive clear cuts maps, and images-ALOS-PALSAR RADAR (15 m), ENVISAT-ASAR (20 m). The estimates of biomass by RADAR can be supplemented with LiDAR data (subject to availability of a flight). The accuracies achieved very satisfactory products usually exceed 85% (biomass) and 90% (mapping of logging).

TECNOSYLVA

Over the past 20 years there have been several efforts to utilise GIS analysis to derive wildfire behaviour and simulate fire growth. Despite initial achievements with research software, there has not been much success in applying these tools operationally. Researchers and practitioners alike have been challenged with utilising GIS tools to provide real time results that support operational decision making by incident commanders. Technical issues with GIS data integration, model performance and processing times, and the inability to present outputs in a usable form, have limited the utility of these software to date.

However it is now possible to derive reliable, robust wildfire simulations that closely mimic actual on-the-ground events. Behaviour analysis and simulations can now be modelled in minutes providing accurate and timely results. Previously these simulations would take hours and this inherently limited the usability of outputs for response and suppression decision making.

Working with leading scientists, Tecnosylva has developed the Wildfire Analyst® (WFA) software. WFA is able to model sophisticated wildfire simulations in less than 2 minutes providing stakeholders with accurate and timely information necessary for operational decision making. WFA has been developed over the past several years using a combination of Esri SDKs and advanced computing toolkits.

In particular, WFA has been specifically designed to address operational requirements for initial attack, response and suppression. This includes consideration of the following factors – fast performance with simulations typically taking less than 2 minutes; seamless integration of GIS data including real time acquisition of active and predicted weather data; availability of different simulation modes that address specific information requirements including fire propagation, and evacuation times for assets.

A key enhancement is the ability to integrate real time field observations to adjust Rate of Spread algorithms to reflect what is actually occurring on the ground. In this regard WFA can utilise observed ROS into new simulations resulting in more accurate outputs. WFA can build a database of knowledge that calibrates the spread equations to the local landscape.

Wildfire Analyst® is one key component of a software suite designed to directly support enterprise wide wildfire incident management. The software suite provides seamless integration of data – mobile, desktop, enterprise and web - to provide comprehensive situational awareness to the fire chief, incident command team, emergency operation centre, local stakeholders and the public

Originally developed under a R+D European project www.preview-risk.com, WFA has been used in several agencies in Europe and US, including the Spanish Military Emergency Unit, Junta de Andalusia & Extremadura, Bomberos de Madrid & Catalonia and recently with the Alabama Forest Commission, and the North Carolina Forest Service. Tecnosylva used WFA with the Alabama Forestry Commission to analyse the impacts of proposed budget cuts on response and suppression capabilities. Similarly, WFA was used with the North Carolina Forest Service to support development of a FEMA Fire Management Assistance Grant documenting the impacts to threatened homes and people.

For more information visit http://wildfireanalyst.com/ and for the Alabama budget analysis project results: http://www.youtube.com/user/ALForestryCommission?feature=watch#p/u/15/hrRoJ282wAM

Session VII: Interreg IVC EUFOFINET and Interreg IVC "EFFMIS" bilateral meetings (Valladolid, Spain)

Interreg IVC "EFFMIS" Training session on GR2GP2 from Greek partners to Junta de Castilla y León (Spain).	The partner of the Region of Castilla y León in the project (Cesefor) requested bilateral training with one of the Greek partners (University of Patras) about a managing forest fires software, Mesinnia, implemented in Greece. The interest of Castilla y León is that the technicians of the Junta de Castilla y León manage similar applications but disintegrated: Emercarto, Meteológica and SINFO. But there is an internal project in the Junta de Castilla y León to integrate them with their own staff. They wanted to know the functionalities of the software, called SAFER. A technician of the company SATWAYS came to explain the functionality of the application and the computer architecture, as well as advising on questions of local technicians on how to approach an integration of the tools. The participants were: Diego Vazquez de Prada and Anna Brieva (Junta de Castilla y León, service of the Defense), Manuel Garcia Vacas (head of Environment Computing department), other technicians from the department and Miguel Angel Losa (Sigmena).
E-Mercarto tool explanation (localisation system by GPS) for the partner ONF (France)	This bilateral training was requested by the ONF (France). They wanted to understand how the terrestrial resources GPS positioning system (E-Mercarto) on fire and other utilities, for example, the tool to calculate the perimeter of a fire in "Real Time" (NOMO). The meeting included explanations from the representatives of the Junta de Castilla y León (Spain) to explain the use of the tools (Teresa Mompin and others), and especially what has been the process to get to work with TRAGSA by the development of these tools. He also explained the satisfaction level of the technicians of the board, the problematic and prices: the tools, the maintenance and updating. They also evaluated the technical interest in working with external experts for the management of these tools or internal trained technical staff. They were also two TRAGSA representatives and presented the E-Mercarto under a technical point of view: technological development, how it works, advantages and management. The ONF (France) were very satisfied of the meeting, and they emphasised that the two tools are very interesting and they intend to evaluate the opportunity to buy and test them in the south of France, with a call published in 2013.
The shared land forest management with the Military Army (Field) for the partner Frederikssund (Denmark).	A shooting range was visited to see how the coordinate the fire fighting system with the military. This responded to a bilateral request from Frederikssund, who have this case and wanted to compare coordination arrangements and working methods. Besides the military and the Junta de Castilla y León,, Tragsa participated bringing the prevention crews operating there.

Other activities: CDF tour and local activities explanation.

The fight against wildfires is an essential activity for the rich natural heritage of “Castilla y León”. Because of this, the Regional Department of Environment created in 2003 the “Centro para la Defensa contra el Fuego” (CDF), Defense against the Fire Centre, and entrusted in training, environmental education and research functions having to do with fires.

Since the CDF Centre was established in October 20067, it has increased and developed its activity. It has a themed exhibit on wildfire named “Aula del Fuego”, Fire Classroom, that supports the environment education activities.

The technical team of the Centre develops several research branches. The largest concentration is related to: fire behaviour analysis, analysis of the emergency fire response planning and evaluation of its efficiency and effectiveness.

The permanent exhibition is spread on 660 m2. It has been created for use by different organised groups (education, professionals, associations…) and the general public.

The exhibition path is set up in to three different spaces:

- “Nuestros bosques”, our forests: this exhibit invite us to learn about our forests and the value of its resources, to simulate the experience of being in a wildfire, and to know the direct outcomes of wildfire on the landscape.
- “Defensa contra el fuego”, defence against fire: this second part offers a current view of the wildfire problem. It shows techniques and resources for prevention and suppression.
- “Historias del fuego”, fire histories: this room makes a trip thought our history, showing curious details about wildfire fighting.

An audiovisual explains the coordination of the fire response and the integration of suppression resources. There is also a place for temporal exhibitions.

3. Open Forum proceedings

Session IV: Open forum on a European Forest Fires prevention Network. European Comission, FAO, JRC and Projects partners participation (León, Spain)

During the last day of that meeting, this Open Forum was the dialogue space where a proposal of the creation of a European Forest Fire Prevention Network was presented. This action, one of the planned activities of the Interreg IVC EUFOFINET project, is identified as a need from different fields of forest fire fighting. The moderator of this session was Alvaro Picardo (Junta de Castilla y León, Spain).

The Open Forum was divided into two parts. During the first part representatives of FAO, the Joint Research Centre, lead partners of six related European projects and the Junta de Castilla y León presented their perspectives. The participants were:

- Inazio Martínez (USSE, Spain) Position about the creation of a European Network.
- Pieter Van Lierop, (FAO) The Forest Fire worldwide reality: urgent needs.
- Dimitrios Kalogeropoulos , (NAT Commission of the Committee of the Regions) The creation of a Network of experts: recommendations.
- Jesús San Miguel (Joint Research Centre, European Commission) The existent EU Forest Fire Expert Network.
- Nikos Kroustalias (Regional Union of Municipalities of Attica, Greece, Interreg IVC EUFOFINET Lead Partner): The creation of a European Forest Fire Network as a main result of the project.
- Yiannis Bakouros (University of Western Macedonia, Greece Interreg IVC "EFFMIS" Lead Partner) Objectives and results of the project.
- Yvon Duché (ONF, France, SUDOE project "PYROSUDOE" Partner) Results of the project in the SUDOE cooperation space.
- Ana Sebastián (GMV, Spain, 7FP FIRESMART Project). Objectives and results of the project.
- Domingo Molina (University of Lleida, Spain. “Fire Paradox” Project Lead Partner) Objectives and results of Fire Paradox.
- Fantina Maria Santos Tedim, (University of Porto, Portugal, Interreg IVC "PROMPT" and FP7 "MOVE" projects) Objectives and results.
- Mariano Torre & Enrique Rey (Junta de Castilla y León, Spain) Proposal for a structured European regional Expert’s network.

This was followed by an open debate. The findings of this debate are presented below.

During the discussion there was broad agreement on the need for greater collaboration in prevention at European level, being an area where significant challenges lay ahead.

Scope of the Network

1. There are several institutional European networks related to forest fires, mainly intergovernmental, with specific duties in the policy arena.

2. Similarly, collaborative work related to forest fires has been carried out within the framework of separate and often unrelated European projects. But there is no stable network focused on landscape-level management and local consensus-building, with specific scope on preventing forest fires. A new network should not interfere with or pretend to assume the role of institutional networks of higher rank, but work as a link with and amongst them.

3. It is therefore important to begin from local perspectives in order to build regional consensus in Europe+. In so doing, the Network could also be relevant in order to deliver policy proposals and to demand preventive policies and Europe-wide support.

4. An alternative of facilitating networks of local actors that would be subsequently integrated into a European (Europe+) regional network was discussed and appreciated.

Relevance of bottom-up approach based on good local practices

5. The network would be based on the contribution of experience and local expertise in order to build from the bottom (local) to the top (continental) level. Emphasis should be put on experience exchange, results evaluating and sharing, learning together from mistakes and in general, increase the value of good practices. This will help all members to advance in the right direction.

6. On the other hand, a wide dissemination of good practices that have proved their effectiveness has real use for those who carry out concrete actions in the territories. Extending the application of these experiences should be done through an adaptation to local conditions, which can better be done collaboratively.

7. On the soundness and credibility that the previous steps would confer the Network, it would also develop means for having an impact on the public policy process and in society

Range of actors

8. A network of only fire-fighting experts would be very limited. It is important to involve socio-economic experts, the entire forest sector, and actors in the territory that are opinion makers and those who carry out local-level actions. The exchange of experiences should happen between different types of actors.

Common concept of prevention (reference document)

9. A common, broader and comprehensive understanding of prevention is needed, which should be translated into a document. It should be specific about types of effective actions able to reduce fire impacts, and at the same time go beyond surveillance, fire-fighting operatives and awareness campaigns.

10. Important ideas to be considered are the needs of territory management for a comprehensive prevention strategy. This concept includes socio-economic actions focused on enhancing the value of forests, silvicultural actions on the territories and fire-management related actions.

Educate the society

11. During the Forum there was general agreement in that the Network should make a serious effort on the educational work oriented to the general society. The starting point is to spread what prevention is and what results it can achieve, based on the reference document mentioned above.

12. The goal is to involve society in the application of preventive policies and actions, as well as to raise its awareness of the need of comprehensive approaches, with prevention not as part of fire-fighting, but instead with preventive and supressive operations as an integrated component of land management.

Implementation

13. Once the network is accepted as a process not a project, needed is to start working and gradually move towards achievable targets. The implementation approach should be very practical, looking for joining efforts. In the short term, the possibility exists to take advantage of the resources of the ongoing European projects that will be in execution this year.

14. The Forum expressed a consensus in that the Government of Castilla y León (through its Centre for Defence against Fires, CDF with support from Cesefor Foundation) and the Interreg IVC EUFOFINET project partnership to propose a more specific idea of the Network to participants. Later, as the network is being developed, all stakeholders will take on specific tasks. It is essential for the progress of the Network to have a stable secretariat that will assume dynamisation functions and concrete tasks in the short term.

15. Specific actions for the initial development of the initiative are the search of an appealing name for the Network, designing a website and work with social media as a forum for exchange, as well as the coordination of a coherent calendar of activities in the short and medium term.

16. At the local level, the capacity to collect all information and results of all projects implemented is very limited. An initial task of the network would consolidate and disseminate what is already underway. A review of all European projects dealing with prevention is assumed as task by the joint CDF-Cesefor secretariat.

4. Joint field trip: Forest fires prevention practices presentations (León, Spain)

Objectives and presentation of the field trip.

General situation of forest fires. Presentation of prescribed burns.

In the region of Castilla y León (Spain), some circumstances occurring together accumulate forestry fires:

- Weather conditions.
- Abandonment of traditional uses. Fuel
- Lack of economical interest of the forest. Wood value above all.
- Traditional use of fire. As farming tool to use the vegetation, most bush.

The region has around 2000 fires every year and most of fires are located in the west-north areas of the region. More than 90% of fires are causes by people (deliberate or accidents negligence) within them, 70% of the deliberated fires come from farming uses.

The Junta de Castilla y Leon, the regional government, proposes two essential principles as the basis for its policy for the prevention of forest fires:

- Make good use of forest resources, by seeking development of the forestry industry and economic participation of local populations in such use.
- Integrate both the prevention and the extinguishing of fires in such a way that the agents in charge of and involved in both tasks are one and the same and not only have a global awareness of the phenomenon, but also avoid an imbalance in investment towards the means of extinguishing.

Starting from these two principles, the prevention strategy for forest fires in the Comunidad will be undertaken along the following lines of action:

- Active prevention (avoid fires being produced)
  - Research into the causes of all forest fires and determination of the motivation for the intentional ones, in order to achieve a greater degree of understanding of the problem and guide activities appropriately. This will also increase the number of legal actions taken out against those to blame, and so bring the impunity of such fire-starters to an end.
  - Environmental education and measures for social intervention specifically aimed at the most affected areas, and the groups linked to the causes of fires in each area.
  - Fostering of pasture planning by means of aid for mechanical scrub clearing and other activities on pasture land to avoid indiscriminate burning to increase such land.
  - Increase in controlled burning that is either authorised or carried out by the Administration for regeneration of pasture land or the reduction of fire hazards in such a way that the need to provoke fires is reduced and vegetation structures are created that are more fire resistant.
- Indirect prevention (make it difficult for fires to start or to spread when they do)
  - Carry out preventive woodland treatments on a large part of the woodland area. The option here is for the personnel hired to put out the fires to carry out this work. Shrub clearance, clearing and pruning will be undertaken in strategic areas.
  - Maintenance and increase of support infrastructures for extinguishing (fire breaks and tracks, water points, bases for air response). These tasks will be carried out by the same personnel who make up the most specialised fire fighting teams during the High Risk Season (bulldozer reserves and heli-transport teams).
- Direct prevention (improve alert systems and reduce response time to give a faster and more suitable fire fighting response)
  - Characterisation and updating of the structural risks for forest fires in order to size and deploy fire fighting resources in the most appropriate way.
  - System for Geographic and Meteorological Data to carry out permanent tracking of the situation of both the atmosphere and vegetation with regards to fire hazards.
  - Meteorological alert system with various degrees of adaptation for resources and for preventative and dissuasive measures according to the meteorological risk existing at any one time.
  - Fleet management systems using GPS and GSM technologies to allow the location of equipment to be known at all times so that it can managed in a significantly better way.

Within the strategy of prevention, both direct or indirect, is commonly used the cartography of risks cartography and meteorological variables analysis for choosing locations of action.

1st demo, focused on burns.

Weather conditions permitting, there will be a demonstration of a planned burning. The burning has been programmed for a plot of briar in order to protect the woodland masses, in this case a mature replanted pine wood. From the roadside the briar spreads upwards over a hillside towards the edge of the pine wood. The briar land covers some 20 ha and has become noticeably thicker in recent years. Its location makes it a threat to the pine wood in the event of fire, even more so if the relative frequency of fires in the area is considered. The fire-break strip that borders the lower part of the pine wood would not be very effective in the face of a fire going up the hillside over the scrub, and so the protection area is to be increased. By using a fire technique the aim is to eliminate the scrubland with established conditions for the burning in order to comply with the aim and minimise the impact on the soil.

2nd demo, focused on thinning, pruning and brush-out works.

Several forestry interventions on woodland masses will be explained. The area to be visited is a wood in which there is a mix of *Quercus pyrenaica* and different species of pine. The main element of the ground cover and the areas of scrub in this setting is briar. The examples correspond to recent ground clearing, clearing cutting and pruning activities aimed at breaking up the continuity of the potentially combustible material. This will be contrasted with similar areas where intervention has not yet taken place. Analysis will be made of the planning and criteria for prioritising such work, and its efficiency in the face of fire.

3rd demo, focused on firebreaks.

A demonstration was given of bulldozer work for maintenance of fire-break strips. The increase in fuel load in country areas makes it necessary to compartmentalise the territory so that the chance of success is greater when putting out fires. Bulldozers are a means that can be characterised by their versatility when fighting forest fires. Their extensive use in forestry work and in infrastructures for supporting fire extinguishing has lead to great skill being acquired in the use of these machines. This skill can be seen in the efficient use of bulldozers to put out fires by direct attack. They are also notable for their effectiveness in large scale fires when used for indirect attack together with the use of fire-breaks.

The demonstration machine is active in the reserve state when the fire hazard requires this, at a point that is easily accessible for fast deployment when mobilisation calls for it. When not in reserve, it is used for preventative works in the maintenance of tracks and fire-breaks, and can be mobilised from where it is working if necessary.

Annexes

Annex I: Meeting Agenda

http://www.pfcyl.es/meetingeufofinet

EUROPEAN MEETING ON FOREST FIRES PREVENTION

Workshop "Cartography of Risks"
Open Forum "A new European Regional Forest Fires Prevention Network"
León, Spain
21st-22nd-23rd February 2012

AGENDA

Monday 20th:

Arrival of participants. Official shuttle from Barajas Airport, Terminal 4, 18h00. Riccardo Castellini, +34 666918723).

Tuesday 21st Technical Workshop "Cartography of Risks" - Donor partners presentations

08h30 - 09h00	Participant's welcome and registration at Defense against Fire Center.
09h00 - 09h30	Objectives and scope of the meeting.
09h30 - 10h30	Vicente Rodríguez (Junta de Castilla y León) *The regional GIS for forest fire prevention and fight.* Notes:
10h30 – 11h00	Pavlos Konstantinidis & Georgios Tsiourlis (National Agricultural Research Foundation – NAGREF for the North Aegean region) *GIS in North Aegean* Notes:
11h00 - 11h30	Marian Lopúch (Fire brigade's member – NFC) *Using GIS information by Slovak fire brigade.* Notes:
11h30 - 12h00	Coffee break

12h00 - 12h30	Yvon Duché (ONF) *The GIS system in the south of France* Notes:
12h30 - 13h00	Józef Piwnicki - Ryszard Szczygieł - Bartłomiej Kołakowski (FRI) *The Cartography of risk in Poland* Notes:
13h00 - 14h00	Technical room with Dimap, University of Valladolid, Balmart and Agresta Soc.coop. Notes:
14h00 – 15h00	Lunch break (Defense against Fire Center)
15h00 - 15h30	José Antonio Grandas Arias (Xunta de Galicia) *GIS Applications in the fight against forest fires in Galicia* Notes:
15h30 - 16h00	Julia McMorrow (University of Manchester for the partner Northumberland) *GIS experiences in the Peak District* Notes:
16h00 - 16h30	G. Pacini (Tuscany Region) - E. Marchi (University of Florence) *Cartography of risk: experiences in Tuscany* Notes:

16h30 – 17h00	Viviane Ascenso: (Municipality of Batalha, Portugal, Effmis project) *Forest Fire Risk Cartography: Methodology and Appliances* Notes:
17:00 – 17:30	CDF tour and local activities explanation. End of workshop. Notes:
20:00	Free dinner

Wednesday 22nd. Field trip

Please bring warm clothes and shoes. Meeting point: Defense against Fire Center.

	Teresa Mompín & José Carlos García (Junta de Castilla y León)
09h00 – 10h00	Objectives and presentation of the fieldtrip Presentation of prescribed burns.
10h00 – 13h00	Transfer to 1st demo, focused on burns.
13h00 – 14h00	Presentation of preventive works (thinning, pruning and clear-cuts operations; firebreaks).
14h00 – 15h00	Lunch break
15h00 – 16h15	Transfer to 2nd demo, focused on firebreaks.
16h15 - 17h30	Transfer to 3rd demo, focused on thinning, pruning and clear-cuts operations.
17h30 – 18h00	Transfer back to the Defense against Fire Center.
21h00	Official dinner. Meeting point: Hotel Tryp hall

Thursday 23rd. Morning Session: Open Forum

09h00 - 11h15	Open Forum about the creation of a European Regional Network of Fire Experts. Presentations. Moderator: Alvaro Picardo, Junta de Castilla y León - Pieter Van Lierop, (FAO) *The Forest Fire worldwide reality: urgent needs.* - Dimitrios Kalogeropoulos , (NAT Commission of the Committee of the Regions) *The creation of a Network of experts: recommendations.* - Jesús San Miguel (Joint Research Center, European Commission) *The existent EU Forest Fire Expert Network.* - Inazio Martínez (USSE, Spain) *Position about the creation of a European Network.* - Nikos Kroustalias (Regional Union of Municipalities of Attica, Greece, EUFOFINET Lead Partner): *The creation of a European Forest Fire Network as a main result of the project.* - Yiannis Bakouros (University of Western Macedonia, Greece EFFMIS Lead Partner) *Objectives and results of the project.* - Yvon Duché (ONF, France, PYROSUDOE Partner) *Results of the project in the SUDOE cooperation space.* - Ana Sebastián (GMV, Spain, 7FP FIRESMART Project). *Objectives and results of the project.* - Domingo Molina (University of Lleida, Spain. "Fire Paradox" Project Lead Partner) *Objectives and results of Fire Paradox.* - Fantina Maria Santos Tedim, (University of Porto, Portugal, Interreg IVC "PROMPT" and FP7 "MOVE" projects) *Objectives and results.* - Mariano Torre & Enrique Rey (Junta de Castilla y León, Spain) *Proposal for a structured European regional Expert's network.* Notes:

11h15 –11h30	Coffee Break
11h30 - 13h00	Open Forum about the creation of a European Regional Network of Fire Experts. Round Table and structured debate. Notes:
13h00 - 14h00	Technical room, with Vstep/Bull, Tecnosylva, Luceit, GMV and Tragsa. Notes:
14h00 – 15h00	Lunch break (Defense against Fire Center)

Tuesday 23rd: Afternoon Session: EUFOFINET Group: Steering Committee Meeting (for members only)

15h30 - 16h00	Debriefing of the field visits / synthesis and analysis of the good practices to be transferred.
16h00 - 16h30:	Tuscany Region: project of organization of the Final Conference
16h30 – 17h00	Action Plans: state of the art
17h00 - 18h30	Eufofinet Steering Committee.
18h30	End of session.
20:00	León touristic guided tour and Tapas dinner (organized and offered by the Organizers). Meeting point: Hotel Tryp hall.

Friday 24th : Project members bilateral meetings. Valladolid

08:00	Departure to Valladolid (Junta de Castilla y León. Consejería de Fomento y Medio Ambiente. Rigoberto Cortejoso, 14). Meeting point: Hotel Tryp hall.
10:00: 13:30	Effmis Training session on GR2GP2 from Greek partners to Junta

	de Castilla y León.
10:00: 13:30	E-Mercarto tool explanation (localization system by GPS) for the partner ONF (France)
10:00: 13:30	The shared land forest management with the Military Army (Field) for the partner Frederikssund (Denmark).

- Contact with:
  - Rodrigo Gómez rodrigo.gomez@cesefor.com (+34) 606443693.
  - Riccardo Castellini riccardo.castellini@cesefor.com (+34) 666918723.
  - Ana Mayor ana.mayor@cesefor.com (+34) 975212453. Press and logistic office.
  - Enrique Rey. Centro Del Fuego Director, Meeting location, Junta de Castilla y León. reyberen@jcyl.es +34 987220946.
- Leon has a cold climate in February. In a 10 days-forecast we area expecting no rain but cold (-2ºC/12ºC for Tuesday).

  Please bring warm clothes with you and check this forecast before coming: http://www.aemet.es/en/eltiempo/prediccion/municipios/leon-id24089
- All the communications files will be upload to www.pfcyl.es/meetingeufofinet
- Some information of the event will be published live on Twitter. Please follow @FCesefor.

PRACTICAL INFORMATION

OFICIAL SHUTTLE

The organization will offer a bus from the Madrid-Barajas Airport to León and return (4:00h trip).

20/02/2012 Departure Madrid-Barajas Airport TERMINAL 4 to León, 18:00H.

24/02/2012 Departure León to Madrid-Barajas Airport (TERMINAL 4) 8:00H

ALTERNATIVE TRANSPORT (NOT SUPPORTED BY ORGANIZERS)

TRAIN. Renfe website http://www.renfe.com/viajeros/index.html
[Proposed schedule]

MADRID-LEÓN 20/02/2012

Renfe (internet fare)

Train	Departure	Arrival	Duration	Cost
04141 ALVIA	14.40 h.	17.34 h.	2h 54min	44,40€
04181 ALVIA	18.30 h.	21.14 h.	2h 44min	44,40 €

LEÓN- MADRID 24/02/2012

Renfe (internet fare)

Train	Departure	Arrival	Duration	Cost
04141 ALVIA	09.35 h.	12.28 h.	2h 53min	44,40€
04181 ALVIA	12.45 h.	15.39 h.	2h 54min	44,40 €

PUBLIC BUS. ALSA (click to link)
[Proposed schedule]

MADRID - Barajas T4 - LEÓN 20/02/2012

Bus	Departure	Arrival	Duration	Cost
1	16.45 h.	21.15 h.	4h 30min	42,94€
2	21.45 h.	02.45 h.	5h 00min	42,94 €

LEÓN - MADRID- Barajas T4 24/02/2012

Bus	Departure	Arrival	Duration	Cost
1	02.30 h.	07.15 h.	4h 45min	42,94€
2	08.00 h.	12.00 h.	4h 00min	42,94 €

ACCOMODATION

Suggested hotel: Reservation at TRYP León Hotel ****

http://www.tryphotels.com/es/hotel-tryp-leon-espana.html

(The hotel is 50m far from the meeting place: Defense Against Fire Center)

C/Obispo Vilaplana, 3 y 5
24008 LEÓN

Tel. 987 87 71 00

Location: map. Lat/Lon Coordinates: 42.609675, -5.581205

(please refer “EUFOFINET” when booking)

Type	Fare accommodation & breakfast
Double room	74,90€
Single room	58,85€

Includes Buffet Breakfast
8% VAT included

Dinner: 11,00 € (VAT included)

How to reach the hotel from the León train station: see the route
How to reach the hotel from the León bus station: see the route
How to reach the hotel from the Defense against the Fire center (meeting location): see the route

Annex II: Participant List

http://www.pfcyl.es/meetingeufofinet

Surname	Name	Name2	Organization	Position	Country
Miguel Angel	Alcalde	Cazorla	Bull	Gerente Emergencias y PIC	Spain
Mª Cristina	Alférez	Alférez	TRAGSA	Técnico, Dir. Adj de Emergencias	Spain
Silia	Angelopoulou		North Aeg. Region	Assistant project manager	Greece
Yiannis	Bakouros		University of Western Macedonia	Associate Professor	Greece
Panagiotis	Balatsos		PEDA	Forest Ingeneer	Greece
Hugo	Barredo		Xunta de Galicia		Spain
KOLAKOWSKI	BARTLOMIEJ		FOREST RESEARCH INSTITUTE	TECHNOLOGIST	Poland
Hector	Brotons	Briva	Balmart Sistemas Electrónicos y de Comunicaciones SL	RandD Manager	Spain
VICTOR FRANCISCO	CABRERIZO	SORIA	JUNTA DE CASTILLA Y LEÓN	TÉCNICO DE INVESTIGACIÓN DE CAUSAS	Spain
JUAN MANUEL	CALVO	LÁZARO	JUNTA DE CASTILLA Y LEÓN	JEFE SECCIÓN REPOBLACION FORESTAL	Spain
Rita	Carmona		Batalha Municipality		Spain
FEDERICO	CASAS	CARPIO	MADRID	Director de Desarrollo de Negocio	Spain
Riccardo	Castellini		CESEFOR	Euroepan Project Manager	Spain
Efthymios	Chousos		University of Patras	Professor	Greece
Samantha	Clarke		SGI, Coventry	Games Designer	UnitedKingdom
PABLO	CRISTOBAL	MAYORAL	COMUNIDAD DE MADRID. D.G. PROTECCION CIUDADANA	JEFE SUBSECCION INCENDIOS FORESTALES	Spain
Laura	del Moral	Vargas	Ministerio de Agricultura, Alimentación y Medioambiente	Jefe de Sección	Spain
Francisco José	Domínguez	Ordóñez	COR Plan INFOEX.	Geógrafo	Spain
YVON	DUCHE		ONF	forest fires national responsible	France
OSCAR	FERNANDEZ	MANSO	AGENCIA DE PROTECCION CIVIL-JCyL	RESPONSABLE DE RIESGOS NATURALES	Spain
Alfonso	Fernandez	Manso	Universidad de León	Catedrático EU	Spain
VÍCTOR	FERNÁNDEZ	HUERTAS	CDF JUNTA DE CASTILLA Y LEÓN	INGENIERO DE MONTES	Spain
David	Francés	Peñuelas	Cesefor	Técnico	Spain
Mariano	García	Alonso	Dpto. Geografía Universidad Alcalá.	Investigador	Spain
José Carlos	García		Junta de Castilla y León	Incendios León	Spain
Tsiourlis	Georgios		Forest Research Institute Thessaloniki	Senior Research Scientist	Greece
Rodrigo	Gómez	Conejo	Cesefor	Jefe Área TDI	Spain
Bruce	Hardy		Northumberland Fire and Rescue Service	Fire Fighter, Learning and Development	UnitedKingdom
CARMEN	HERNANDO	LARA	INIA-CIFOR	CIENTIFICO TITULAR	Spain

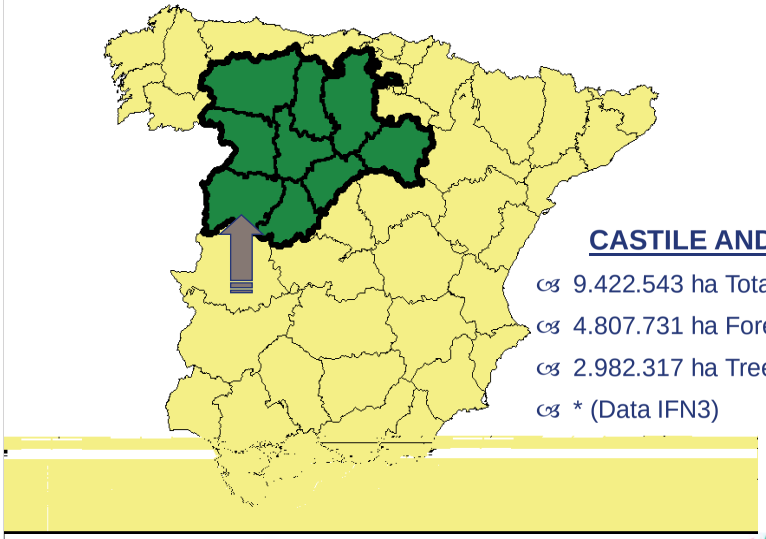
Surname	Name	Name2	Organization	Position	Country
ANGEL	IGLESIAS	RANZ	S.T.MEDIO AMBIENTE AVILA JCYL	JEFE SECCION RESTAURACION	Spain
Pajtíková	Jana		National forest centre	researcher	Slovakia
geoffroy	jeanne		Parcourir l'Europe	consultante junior projets européens	France
BLANC	Jean-Pierre		ENTENTE pour la forêt méditerranéenne	Parters	France
Capuliak	Jozef		National Forest centre	researcher	Slovakia
Anastasios	Kanavos		University of Patras	Researcer	Greece
Pavlos	Konstantinidis		Forest Research Institute Thessaloniki	Senior Research Scientist	Greece
Nikos	Kroustalias		PEDA	Civil Protection Expert	Greece
Milan	Lalkovic		National Forest Centre	Project manager	Slovakia
Giovanni	Laneve		Centro di Ricerca Progetto San Marco - Università di Roma "La Sapienza"	reseracher	Italy
Kim	Lintrup		Frederikssund-Halsnæs Fire and Rescue Service	Chief Fire Officer	Denmark
Ian	Long		Northumberland Fire and Rescue Service	Station Manager - Learning and Development	UnitedKingdom
JOSÉ ANTONIO	LUCAS	SANTOLAYA	JUNTA CASTILLA Y LEÓN-CONSEJERÍA FOMENTO Y MEDIO AMBIENTE		Spain
Enrico	Marchi		DEISTAF - University of Florence	Associate Professor	Italy
Lopuch	Marián		Slovak fire brigade.	firefighter	Slovakia
Tyers	Mark	John	SGI, Coventry	Lead Analyst Programmer	UnitedKingdom
Inazio	Martinez de Arano	San Sebastian	Unión de Selvicultores del Sur de Europa (USSE)	Presidente Ejecutivo	Spain
Nanett	Mathiesen		Frederikssund-Halsnæs Fire- and Rescue Service	Head of administration/Finance	Denmark
Julia	McMorrow		University of Manchester	Senior Lecturer in Remote Sensing	UnitedKingdom
Andrea	Mecci				Italy
Teresa	Mompín		Junta de Castilla y León		Spain
ángel	natal	tello	dimap	director	Spain
Jose Antonio	Navalon	Jimenez	Gobierno de Extremadura	Coordinador Regional Plan INFOEX	Spain
Igor	Olajec		Ministry of Agriculture and Rural Development	General Director of Forestry section	Slovakia
Patricia	Oliva	Pavon	Universidad de Alcala	Investigador	Spain
Giacomo	Pacini				Italy
ALVARO	PICARDO	NIETO	Consejería de Fomento y Medio Ambiente	Asesor de la Dirección General del Medio Natural	Spain
Józef	Piwnicki		Forest Research Institute	forestry researcher	Poland

Surname	Name	Name2	Organization	Position	Country
Rosa Maria	Planelles	González	EIMFOR S.L.	Directora	Spain
Carmen	Quintano	Pastor	Universidad de Valladolid	Profesor Titular de Universidad	Spain
JOAQUIN	RAMIREZ	CISNEROS	TECNOSYLVA	OWNER	Spain
Enrique	Rey	van den Bercken	Centro para la Defensa contra el Fuego - Junta de CyL	Ingeniero de Montes	Spain
JUAN ANTONIO	RIESCO	GARCÍA	PROSECAR SL.	DIRECTOR-GERENTE	Spain
Vicente	Rodríguez		Junta de Castilla y León		Spain
JULIO	RUIZ	ORTIZ	COP CORDOBA. JUNTA DE ANDALUCIA	DIRECTOR DEL COP	Spain
SZCZYGIEL	RYSZARD		FOREST RESERACH INSTITUTE	DEPUTY DIRECTOR	Poland
Anestis	Sampanidis		PEDA		Greece
Jesús	San Miguel	Ayanz	European Commission Joint Research Centre	Scientific Officer	Italy
REMI	SAVAZZI		ONF	forest fire engineer	France
Ana	Sebastián	López	GMV AD	Project Manager	Spain
Miguel	Segur		Cesefor	Jefe Área Coop. Int.	Spain
Mairi	Stergiou				Greece
Fantina	Tedim		University of Porto, Faculty of Arts	Assistant Professor	Portugal
Kalliopi	Tesia		Region of Epirus		Greece
Konstantinos	Theocraris		PEDA		Greece
Luca	Tonarelli		Centro di Formazione AIB Regione Toscana		Italy
Mariano	Torre	Antón	Servicio Territorial Medio Ambiente León	Jefe de Servicio	Spain
Pilar	Valbuena	Perez	CESEFOR	Knowledge Management Officer - International Cooperation Department	Spain
Jean-Louis	VALLS		Parcourir l´Europe	Consultant	Spain
Pietr	Van Lierop		FAO	Forestry Officer	Italy
Diego	Vázquez de Prada		Junta de Castilla y León		Spain
Ascenso	Viviane	Pereira	Batalha Municipality	Technician	Portugal

Annex III: Presentations

http://www.pfcyl.es/meetingeufofinet

Background



CASTILE AND LEÓN

- 9.422.543 ha Total Surface
- 4.807.731 ha Forest Surface
- 2.982.317 ha Tree Cover Surface
- * (Data IFN3)

Carthography of risk and GIS for the Forest Fire prevention and fight in the Region Castile and León

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

EUROPEAN REGIONAL DEVELOPMENT FUND

Operational

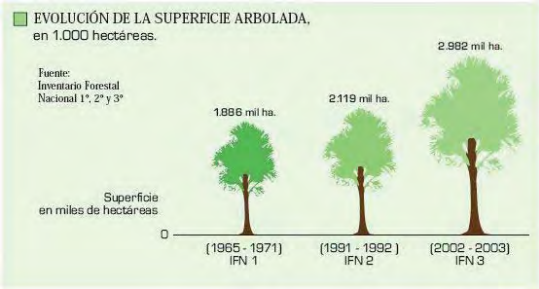
In 2011: Material Resources

POSTS AND SURVEILLANCE CAMERAS		**182**
PUMPER	OUR OWN	92
	FROM OUTSIDE	112
TOTAL PUMPER		**204**
CREWS	ON LAND	126
	ON HELICOPTER	60
TOTAL CREWS		**186**
AERIAL MEANS	PLANES	4
	HELICÓPTERS	25
TOTAL AERIAL MEANS		**29**
EQUIPMENTS SEALS		**23**

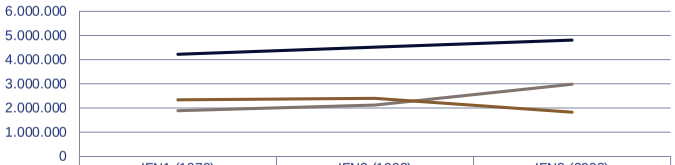
*** From the Ministry: 4 planes, 5 HT and 15 helicopter transport crews.**

Evolution of the wooded

- Crop Abandonment (400.000 ha in 40 years).
- Intense repopulation and natural regeneration

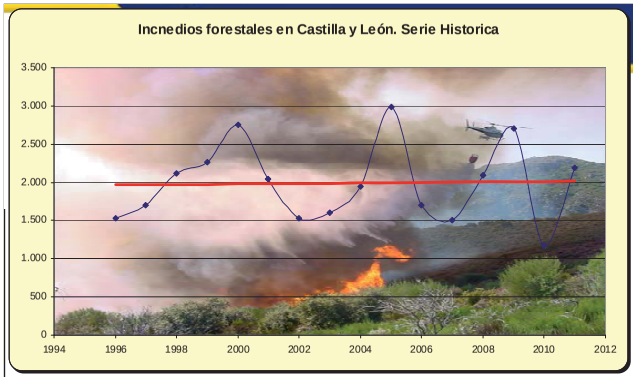


Evolution of the wooded



	IFN1 (1970)	IFN2 (1992)	IFN3 (2002)
Monte Arbolado	1.885.700	2.119.139	2.982.318
Monte Desarbolado	2.336.100	2.397.247	1.825.414
Superficie Forestal	4.221.800	4.516.386	4.807.732

Statistics



Most fires are found in mountainous areas in the west part of the Region

CASTILLA Y LEÓN	2001-2010	2011
Total Fires	1.928	2.185
Attempts	942	1.254
% attempts	49%	57%
- Fires >1 ha	986	931
% Fires >1 ha	51%	43%
Wooded Surface	4.357,22	2.046,15
Forest Surface	21.846,68	16.775,68

50% of attempts thanks to the smooth running of the operation unfolded, adjusted weekly according to risk.

Datos 1ene-31dic

Operational

EUFOFINET

In 2011: Human resources

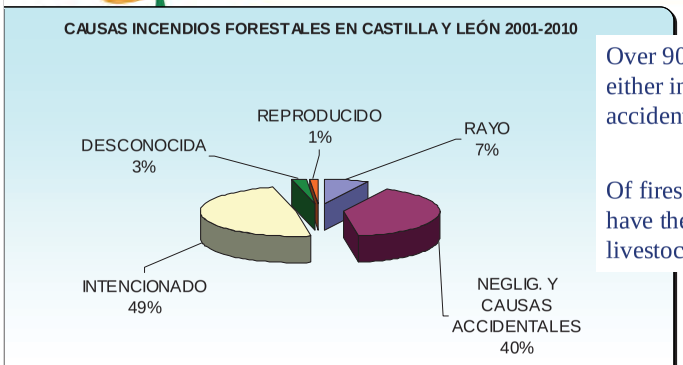
HUMAN RESOURCES 2011	
INGENEERS	217
FOREST GARDS	953
WORKERS	1.341
WORKERS CREWS ON HELICOPTER	444
WORKERS CREWS ON LAND	1.286
AIR RESOURCES CREW AND EQUIPMENT SEALS	149
TOTAL	4.390

4.390 professionals

* 176 workers with aerial resources from the Minister.

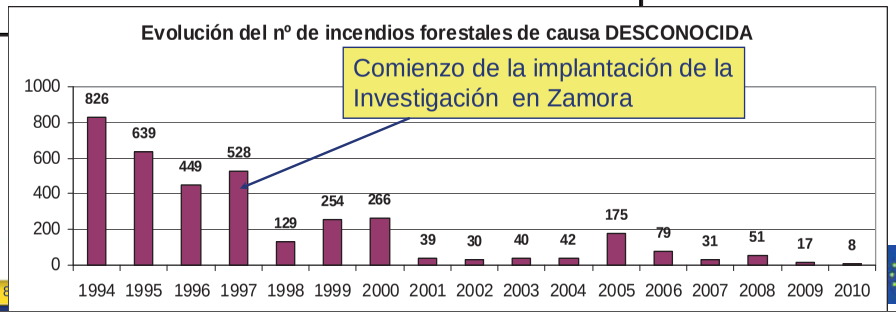
INTERREG IVC

Investigation of causes



Over 90% of fires caused by humans, either intentionally or negligence or accidents.

Of fires caused by man over 70% have their origin in agricultural and livestock causes



Check Times

EUFOFINET

Accident Duration (hours)	% till control	% till extintion
<1	35	16
>=1 - < 3	38	45
>= 3 - <6	10	21
>=6	7	18
No data	10	1
TOTAL	100	100

Data 2001-2010

73% of fires are controlled in less than 3 hours.

82% are extinguished in less than 6 hours.

Fires over 500 ha account for 0.32% of the total and affect 46% of the forested areas and 34% of forest areas.

INTERREG IVC

Outline

- Carthography of Risk
- GIS Applications

Carthography of risk

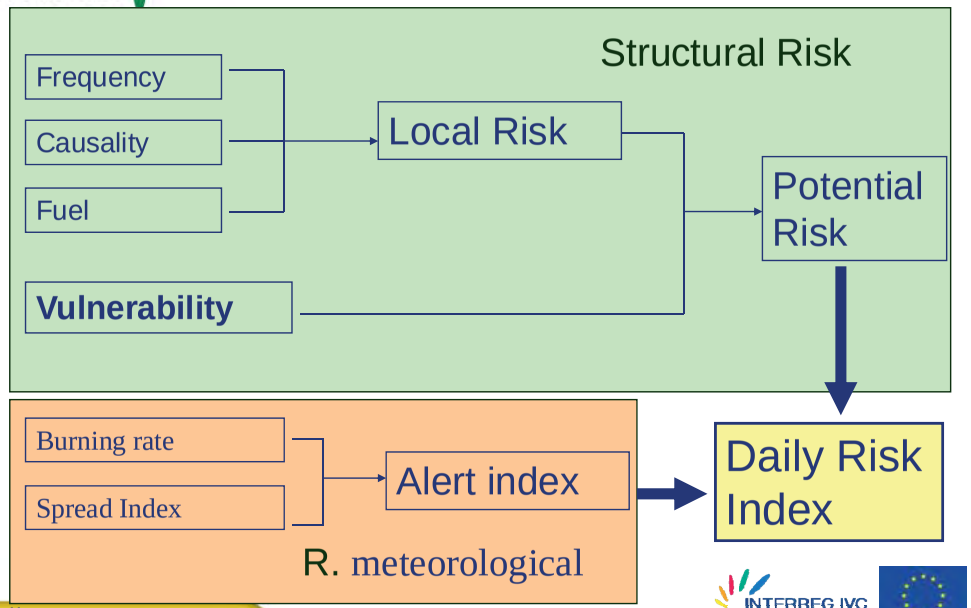
- **Structural risk - measures - location and deployment of resources and infrastructure, guards calendar.**

  Weather Risk - measures - protocols - temporary deployment of media alerts, change of guards, media movement

  Risk of daily risk (structural - weather) - measures - application module stop

  Anthropic risk - action - communication to the agencies (responsible for prevention)

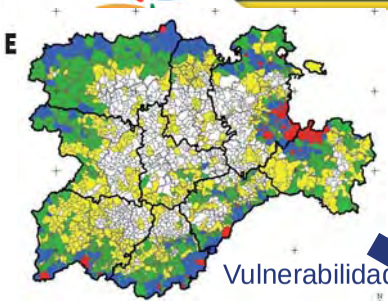
Risk



Structural Risk

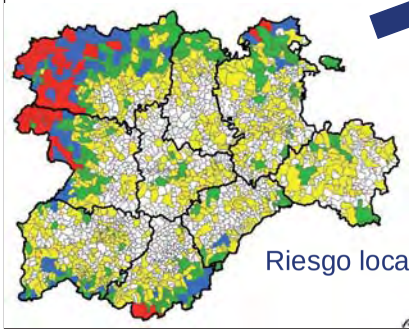
- **The collected structural risk factors:**
  Risk fire occurs in an area
  Statistical data (frequency and number of forest fires)
  Human activity (causality and motivation of the fire)
  Threat of fuel (vegetation map, fuel load, continuity and flammability)
  Vulnerability (Level of damage or loss in case of forest fire can affect people, property and environment. Variables considered: type of the masses, protected areas, proximity of vegetation to urban risk)

Structural Risk

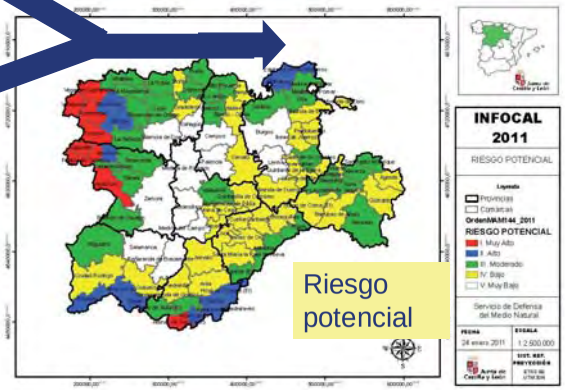


Vulnerabilidad

- The combination of local risk index and the vulnerability of values to be protected provides the potential risk

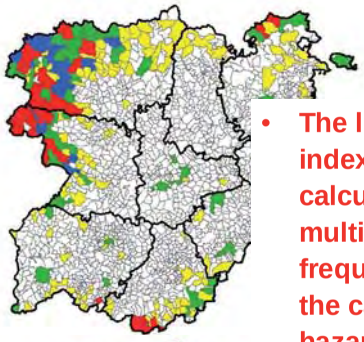


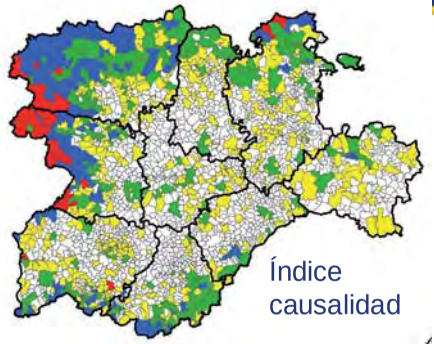
Riesgo local



Riesgo potencial

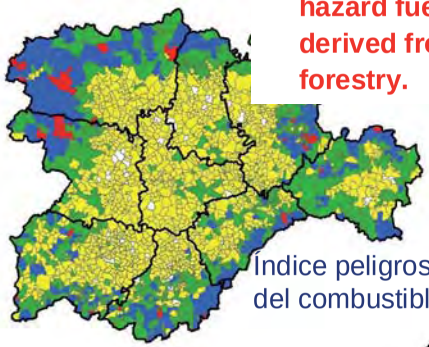
Structural Risk



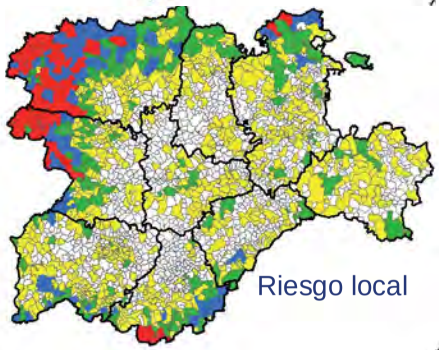


- The local risk index is calculated by multiplying the frequency index, the causality and hazard fuel derived from forestry.

Índice causalidad



Índice peligrosidad del combustible



Riesgo local

Meteorological Risk

EUFOFINET

Meteorological Variables

The weather risk mapping is queried from different sources.

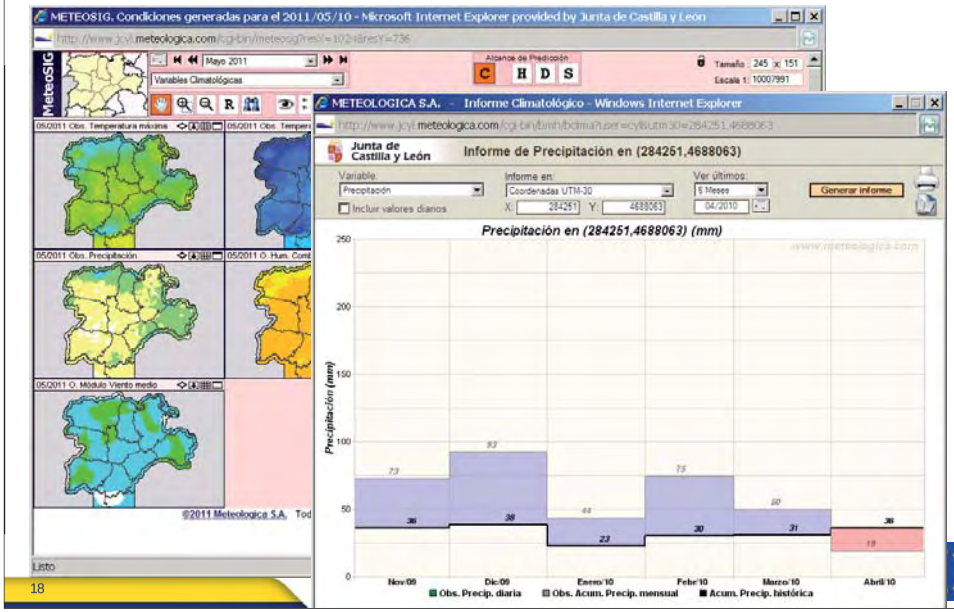
- **prediction**
  - AEMET - Wetterzentrale (temperature, precipitation, continental Saharan Africa, ...)
  - Meteológica (temperature, precipitation, wind, relative humidity, ignition probability, probability of storm ...)
- **observation**
  - AEMET (lightning, precipitation, water balance, satellite)
  - Meteológica (lightning, precipitation, temperature, other variables)

Structural Risk Measures

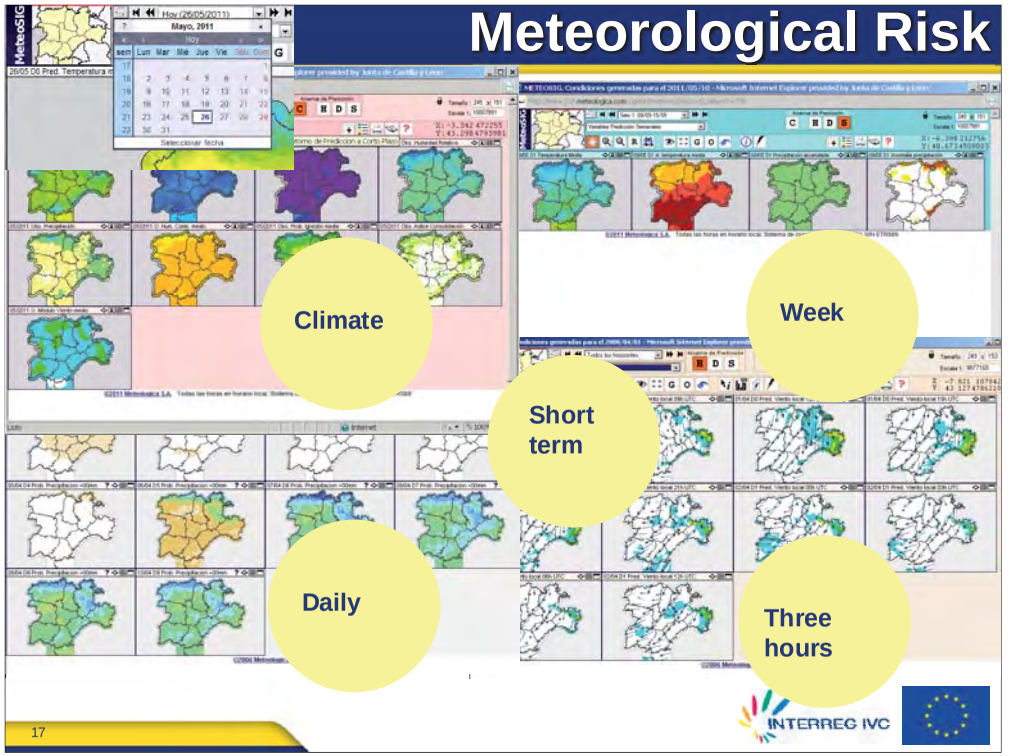
EUFOFINET

- **The structural risk (potential) determines to take action on:**
  - The location of facilities and resources of extinction.
  - The location of checkpoints infrastructure, network firewalls, water points, ...
  - The annual distribution of guards by counties and provinces in Castile and Leon.
  - The distribution of guards is approved by the time schedule for high risk (summer).
  - The distribution of guards fit over the rest of the year according to weather risk.

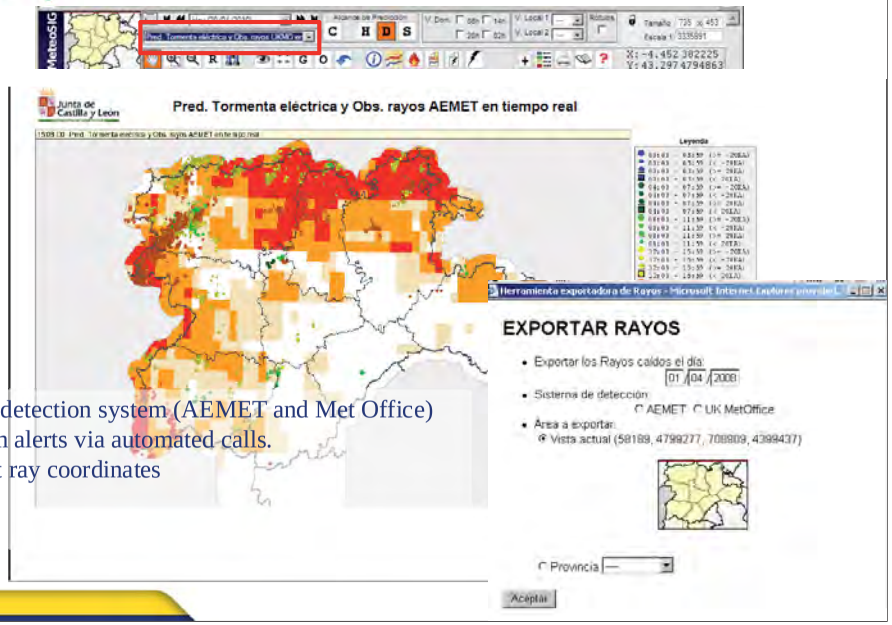
Meteorological Risk



Meteorological Risk



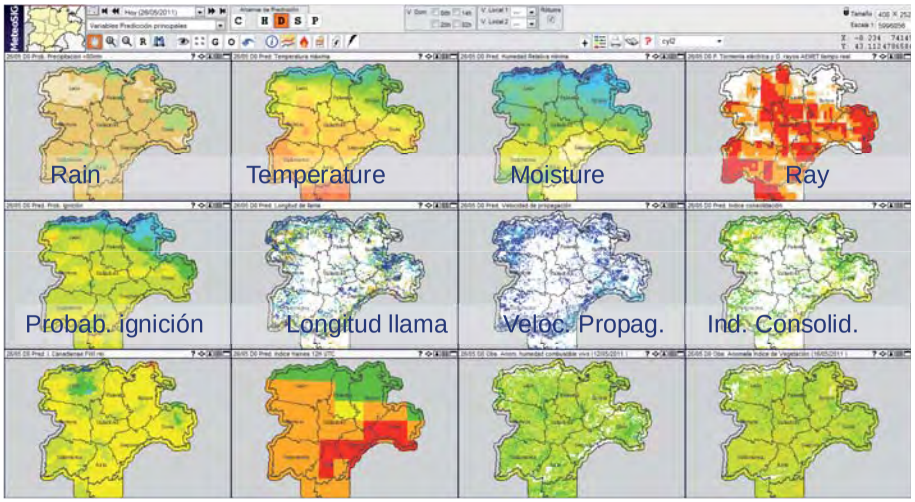
Meteorological Risk



Radar detection system (AEMET and Met Office)
System alerts via automated calls.
Export ray coordinates

Meteorological Risk

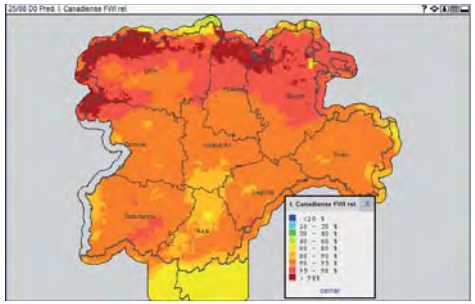
MeteoGIS variables



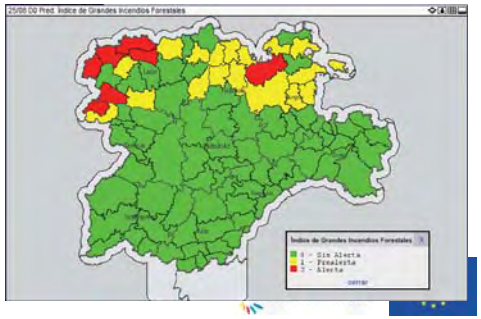
Meteorological Risk

Combination of meteorological variables, statistics, information on fuels and other factors to improve risk indices.

Canadian index calibration. Both absolute and relative indices.

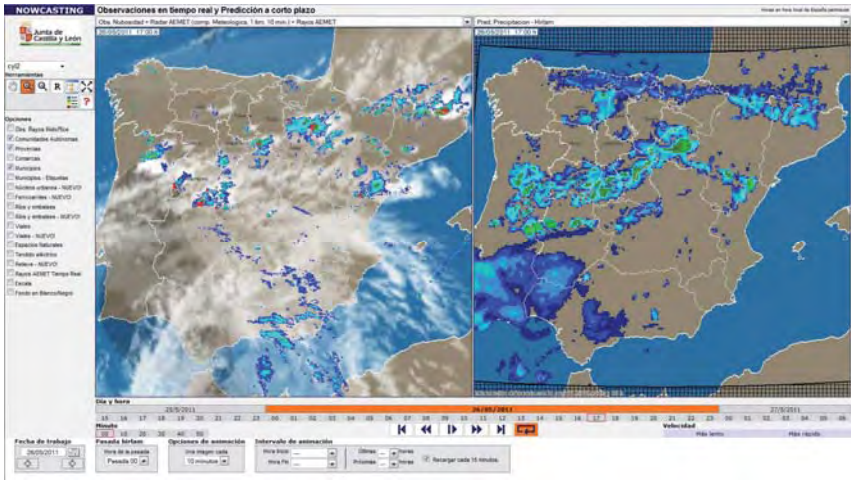


Generate an index of large fires.
GIF PREVENTION



Meteorological Risk

Setting short-term prediction



Comparison between prediction and observation

Meteorological Risk

Weather Typing G.I.

- **Fire linear wind. Independent variables such as temperature and relative humidity. The temperatures are high in the case of Medinaceli but not for Castrocontrigo**

Tª min	20,2 ºC
Tª max	32,3 ºC
HR	16%
Tª 850hPa	22ºC
Vel. viento	35-40 km/h

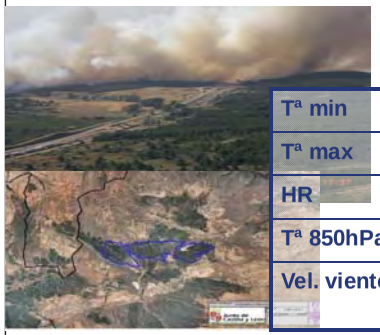
Tª min	8,4º C
Tª max	20,3ºC
HR	32%
Tª 850hPa	10ºC
Vel. viento	18-22 km/h

- **Medinaceli and Castrocontrigo (2009)**

Meteorological Risk

Weather Typing G.I.

- **Fire duration with great development and great convective column. Days with high temperatures and atmospheric instability. Saharan continental input and high Haines index.**



Tª min	14ºC
Tª max	33ºC
HR	21%
Tª 850hPa	24ºC
Vel. viento	16-19 km/h

Tª min	16,9ºC
Tª max	34,8ºC
HR	14%
Tª 850hPa	21ºC
Vel. viento	9-13 km/h

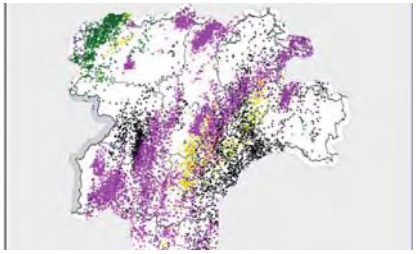
- **Honrubia (6/08/2008)**
- **Arenas de San Pedro (28/07/2009)**

Meteorological Risk

Weather Typing G.I.

- **Storm dry with plenty of electrical device (at the beginning of summer, June-July). Wind gusts and lightning and high speed without precipitation.**
  On specific days 13,415 rays are recorded in 12 hours which gives an idea of the electrical current. Additional problems: difficulty of intervening air assets.

-18/06/04 Portillo (Va) **709,9 ha**
-18/06/05 San Miguel de Robledo (Sa) Quilamas **1.287,80 ha**

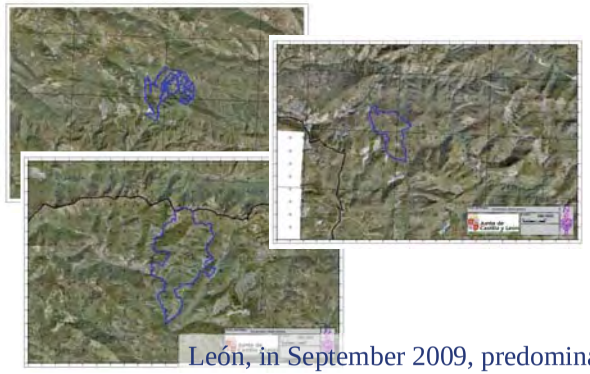


Very useful the automatic detection system SIGYM although these sometimes overflows.

Meteorological Risk

Weather Typing G.I.

- **Fire under drought at the end of summer.**



León, in September 2009, predominantly scrub
Benuza (11/09) Murias (10/09) and Peranzanes (10/09)
In these days in León: a total of 15 starting fires.
This situation also occurred in 2000 and 2011.

Meteorological Risk measures

Weather data can find the window to run the protocol as prescribed burning.

Meteorological data indicate when to perform under artillery practice protocol.

VARIABLE	RANGE
Temperature	0 - 15 °C
Relative	30 - 60 %
Wind	2 - 15 Km/h
Soil Moisture	50 - 100 %
Fine Dead Fuel Moisture	Between 5 and 15 %
Days without rain	4-8 days
ATMOSPHERIC STABILITY	

VARIABLE	VALORES PARAMETROS RELACIONADOS						SE SUGIERE
H.B.C.F.M. (HUMEDAD BÁSICA DEL COMBUSTIBLE FINO MUERTO)	<15 %						NO REALIZAR PRÁCTICAS
	15-20 %	VIENTO	>20 km/h				NO REALIZAR PRÁCTICAS
			15-20 km/h	DIRECCIÓN VIENTO	(135°-180°) SUDESTE-A-SUR		NO REALIZAR PRÁCTICAS
					OTRAS DIRECCIONES	PENDIENTE >25 %	NO REALIZAR PRÁCTICAS
						PENDIENTE <25 %	REALIZACIÓN DE PRÁCTICAS
			<15 km/h	DIRECCIÓN VIENTO	(135°-180°) SUDESTE-A-SUR	PENDIENTE >25 %	NO REALIZAR PRÁCTICAS
						PENDIENTE <25 %	REALIZACIÓN DE PRÁCTICAS
					OTRAS DIRECCIONES		REALIZACIÓN DE PRÁCTICAS
	>20 %						REALIZACIÓN DE PRÁCTICAS

Meteorological Risk measures

- **The weather risk determined to take action on:**

Continued analysis of meteorological parameters and indices.

Display media weekly from October to June.

Maximum deployment in summer (at least July to September) with removal or relocation of facilities.

Statement of time at risk (high, medium, low) or alertness (alert, alarm, alarm extreme) or the risk conditional approval.

Meteorological Risk measures

EUFOFINET

Prohibited activities throughout the year	Prohibited Activities Period of High Risk
Stubble burning Use of fire. exceptions: Outside EPA: control fitosanit., Fuel management - Authorization Burning of agricultural waste -communication Traditional uses - authorization Fire art. Trad Events Exc. - Author. Bonfires pastors Exc .. Rest areas, camping, park vehicles blocking roads, highways or firewall.	Use of machinery or tools that can generate a fire - Authorization Exc infrastructure maintenance, fire Author transport of explosives. Barbecues - Exc Infraestruct. safe, camping - aut. Burning of debris on urban land within 400 m. of Mt. Rallies - Exc authorization

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Meteorological Risk measures

EUFOFINET

Continuous evaluation of weather conditions

⇩

Statement of risk levels (high, medium, low)

⇧

Implementation of preventive measures through legislation.

Activation means

Deployment of material

Reinforcement guards assignment to technical and environmental agents

INTERREG IVC

GRADUATION AT RISK

EUFOFINET

- **4 DEGREES SET:**

  NORMAL: The set of regular days of summer (Time High risk)
  WARNING: Situations point (1 to 4 days) of high risk (greater than usual) part of the Autonomous Community of Saharan landmass, dry storms, strong winds, ...
  ALARM: Situations point (1 to 4 days) of extreme risk in the Autonomous Region of previous circumstances or situations of high risk 5-7 days throughout the region.
  EXTREME WARNING: Situations of more than 5 days of extreme risk in the whole autonomous region or situations of more than 7 days in high-risk part of the region.

INTERREG IVC

Meteorological Risk measures

EUFOFINET

Anticipation: Warning System

Continuous evaluation of weather conditions

⇩

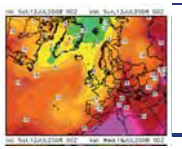
Declarations of alert or alarm

⇧

Posteriori analysis of GIF conditions occurred

CONDITIONS OF THE MOST ALERTS

CONTINENTAL SAHARAN
Strong increase of the maximum
Moderate increase in nighttime minimum
Lack of rainfall except storms
Moderate to weak winds S-SW component



Strong Wind **> 50 km/h**

Or combination of both in some cases

Although there has not been in recent years other causes are: **dry storms**

INTERREG IVC

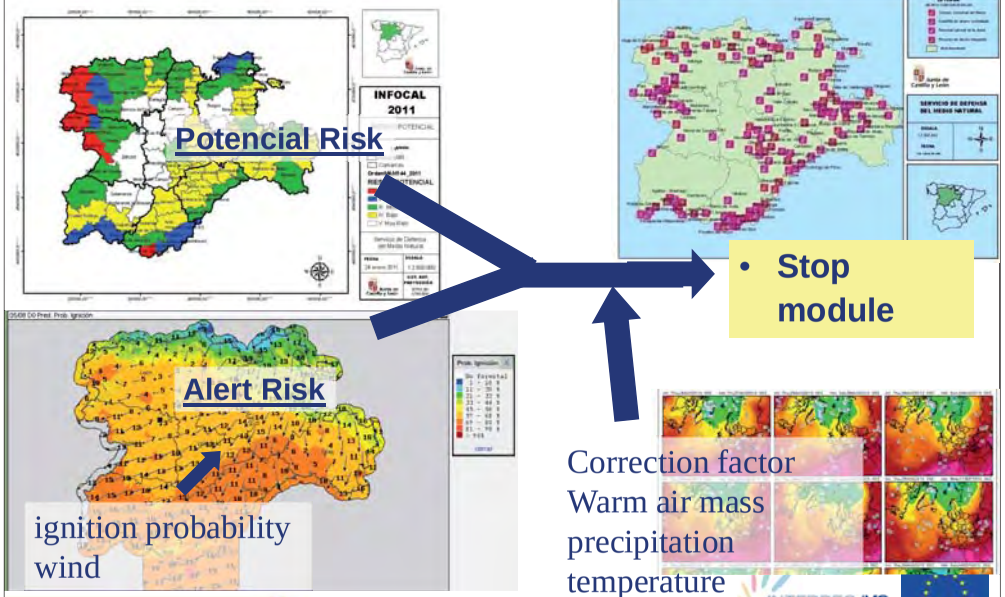
Meteorological Risk measures

SITUACIÓN RIESGO	NORMAL	ALERTA	ALARMA	ALARMA EXTREMA
Puestos vigilancia	Funcionamiento EPA	Alertar	Alerta extrema sin dejar vacías	Alerta extrema sin dejar vacías
AAMM y FF	Guardias Normal	Alertar	Reforzar guardias y limitar tareas	Reforzar guardias y suprimir otras tareas
Módulos Parada	Normal EPA	Adaptar	Adaptar s/ empleo herramientas exp.	Modulo D (parada)
Autobombas	Funcionamiento EPA	Alertar y patrullas	Alertar y patrullas s/ vacantes	Alertar y patrullas s/ vacantes
Maquinaria	Funcionamiento EPA	Alerta	Retén doble	Retén doble
Medios aéreos	Funcionamiento EPA	Suspender reconocimientos	Suspender reconocimientos	Suspender reconocimientos
Ataque inicial	Funcionamiento EPA	Despacho automático contundente	Despacho automático contundente	Despacho automático contundente
Técnicos	Calendario EPA	Alertar	Reforzar guardias	Reforzar guardias

Meteorological Risk measures

RISK SITUATION	NORMAL	ALERT	ALARM	EXTREM ALARM
Barbecue	Normal EPA	Limit	Forbid	Forbid by law
Fire use	Normal EPA	Limit	Forbid	Forbid by law
Forest works	Normal EPA	Limit	Forbid	Forbid by law
Works in wooded areas	Normal EPA	Limit	Forbid	Forbid by law
Forest transit	Normal EPA	Limit	Forbid	Forbid by law
Circulation in forest areas	Normal EPA	Normal EPA	Forbid	Forbid by law
Comunication	NO	YES	YES	YES

Daily risk index



Meteorological Risk measures

Anticipation: Warning System

2008	
Alerta nº	Días en alerta
1	19 y 20 de julio de 2008
2	23 y 24 de julio de 2008
3	3, 4, 5 y 6 de agosto de 2008
4	10 de agosto de 2008
5	25 de septiembre de 2008

2009	
Alerta nº	Días en alerta
1	22 y 23 julio 2009
2	26 julio 2009
3	4 al 6 agosto 2009
4	14 al 17 agosto 2009
4 ampliación	18 al 20 agosto 2009
5	31 agosto y 1 sept.

2010	
Alerta nº	Días en alerta
1	8 julio 2010
2	31 julio y 1 agosto de 2010
3	21 al 23 agosto 2010
4	26 agosto 2010

2011	
Alerta nº	Días en alerta
1	17 y 18 de agosto de 2011

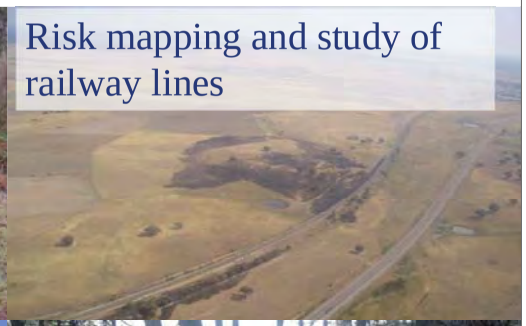
Sólo 23% de los grandes incendios ocurrieron en situación de alerta

anthropic risk

EUFOFINET

- **Risk mapping and study of recreational areas**

Risk mapping and study of railway lines



Risk mapping and study of power lines

Risk mapping interface developments in

Daily risk index

EUFOFINET

Variable Meteorological

MODULES STOP HOURS:

N: no stop
A: 2 hours / day squad
B: 4 hours / day squad
C: 6 hours / day squad
D: 8 hours / day squad

		ALERT INDEX			
		Prealerta	Alerta	Alarma	Alarma Extrema
Potential Risk for provinces	Very low	N	N	N	A
	low	N	N	A	B
	Medium	N	N	A	B
	High	N	N	B	C
	Very High	N	A	B	D

INTERREG IVC

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anthropic risk

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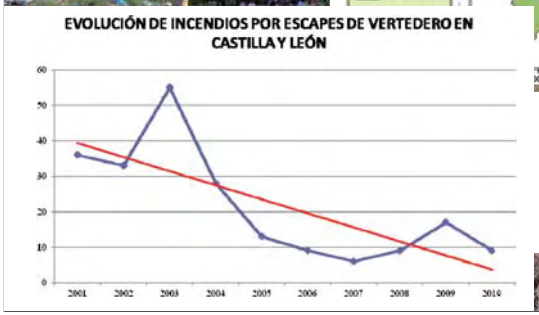
DESARROLLO DEL ESTUDIO DE SITUACIONES DE RIESGO VERTEDEROS

EVOLUCIÓN DE INCENDIOS POR ESCAPES DE VERTEDERO EN CASTILLA Y LEÓN



They are getting lower:

- Continuous annual reviews, responsible communication.
- Coordination with Environmental Quality Department of the Environment.

ERREC IVC

Anthropic risk

DESARROLLO DEL ESTUDIO DE AREAS RECREATIVAS

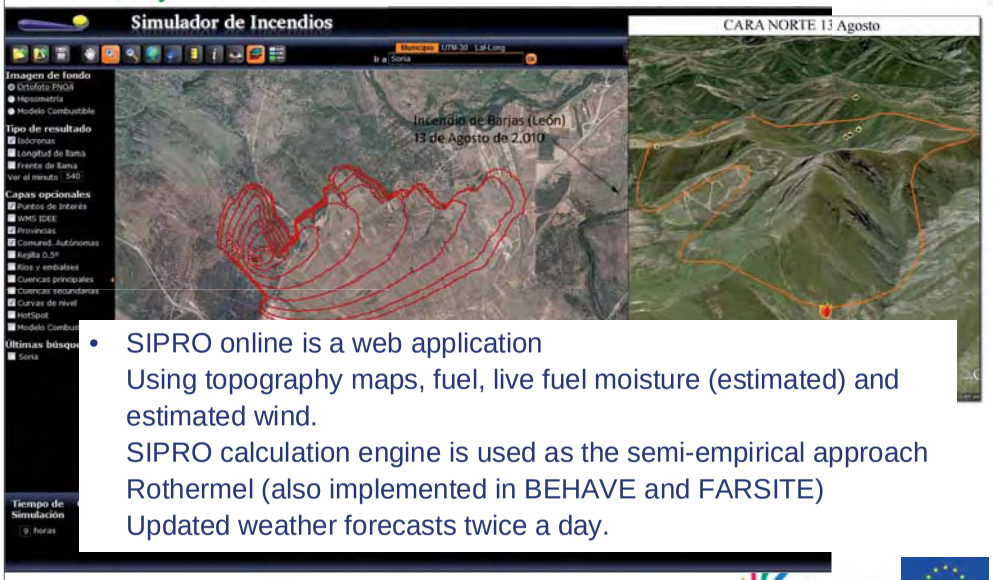
DESARROLLO DEL ESTUDIO DE LINEAS DE FERROCARRIL

DESARROLLO DEL ESTUDIO DE LINEAS ELECTRICAS

DESARROLLO DEL ESTUDIO DE SITUACIONES DE RIESGO URBANIZACIONES EN INTERFASE

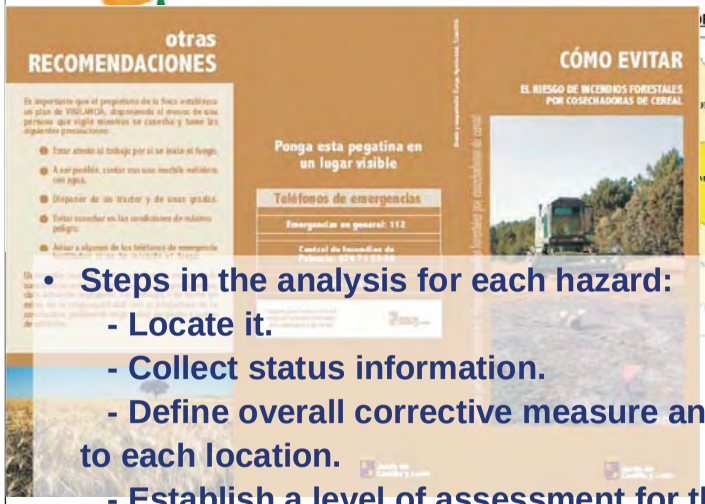
GIS Applications

SIPRO Fire Simulator



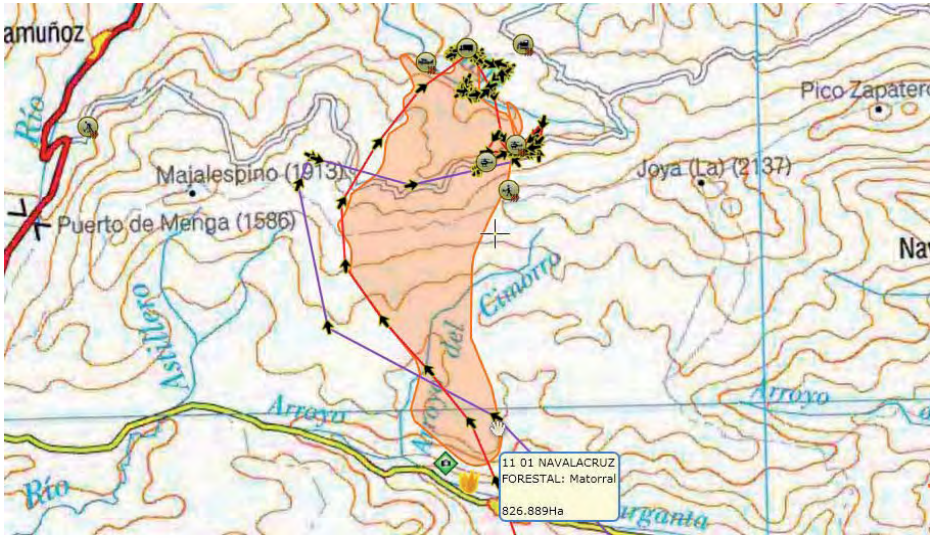
- SIPRO online is a web application
  Using topography maps, fuel, live fuel moisture (estimated) and estimated wind.
  SIPRO calculation engine is used as the semi-empirical approach Rothermel (also implemented in BEHAVE and FARSITE)
  Updated weather forecasts twice a day.

Anthropic risk measures



- **Steps in the analysis for each hazard:**
  - **Locate it.**
  - **Collect status information.**
  - **Define overall corrective measure and / or unique to each location.**
  - **Establish a level of assessment for this risk.**
  - **Create a map of risk.**
  - **Inform responsible.**

GIS Applications

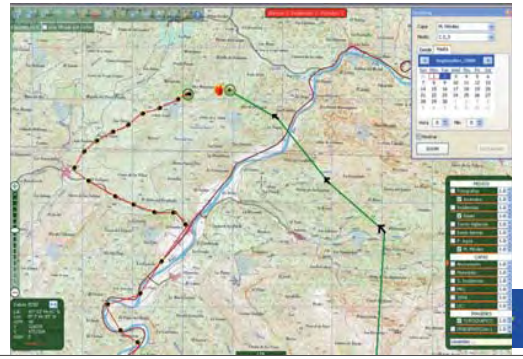


GIS Applications

The Emercarto

- **Location coordinates over 300 means by GPS.**

The media send their position every minute.
Track the trajectories of the media.
Ability to press an alarm button and communicate directly with the Provincial Command Center.



Conclusions

- **Risk mapping is an essential tool in making :**
  - Search the anticipation
  - Make the deployment of risk-based media (floppy, convoys, media scaling, ...)
  - Risk analysis need to know if workers must work on prevention or fight (stop modules)
  - It is based on protocols according to risk (fires, artillery, ...)
  - Preventive measures adapted to the risk (Spot: warning statement and permanent risk periods)

- **GIS applications are an essential tool in decision-making:**
  For prevention and decision making (simulation, localization, perimeter calculation)

GIS Applications

The NOMO

New Project for fire perimeter establishment: sending surface and the route of the fire in REAL TIME to the Command Centers.

Currently available in all the districts.

Surface
38,47 ha

Thank you

Vicente Rodríguez Fernández
Jefe de Servicio de Defensa del Medio Natural
Consejería de Fomento y Medio Ambiente
Junta de Castilla y León.
rodfervi@jcyl.es

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Cartografía de riesgo y SIG en la prevención y lucha contra los incendios forestales en Castilla y León

INTERREG IVC

EUROPEAN REGIONAL DEVELOPMENT FUND

Antecedentes

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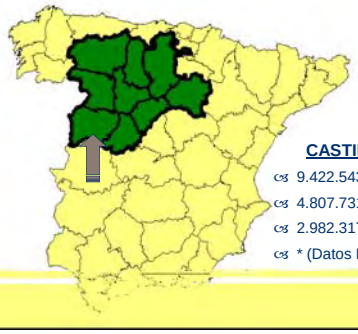

CASTILLA Y LEÓN

- 9.422.543 ha Superficie Total
- 4.807.731 ha Superficie Forestal
- 2.982.317 ha Superficie Arbolada
- * (Datos IFN3)

2

Evolución superficie forestal

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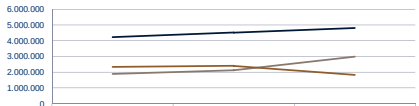
- Abandono de cultivos (400.000 ha en 40 años).
- Intensa actividad repobladora y regeneración natural

Evolución de la superficie forestal



	IFN1 (1970)	IFN2 (1992)	IFN3 (2002)
Monte Arbolado	1.885.700	2.119.139	2.982.318
Monte Desarbolado	2.336.100	2.397.247	1.825.414
Superficie Forestal	4.221.800	4.516.386	4.807.732

3

Operativo

EUFOFINET

Operativo máximo 2011: Medios materiales

PUESTOS Y CÁMARAS DE VIGILANCIA		**182**
AUTOBOMBAS	**PROPIAS**	92
	CONVENIADAS Y OTRAS	112
TOTAL AUTOBOMBAS		**204**
CUADRILLAS	**TERRESTRES**	126
	HELITRANSPORTADAS	60
TOTAL CUADRILLAS		**186**
MEDIOS AEREOS	**AVIONES**	4
	HELICÓPTEROS	25
TOTAL MEDIOS AEREOS		**29**
RETENES DE MAQUINARIA		**23**

*** MMARM aporta 4 aviones, 5 HT y 15 cuadrillas helitransportadas.**

4

Operativo

Operativo máximo 2011: Medios humanos

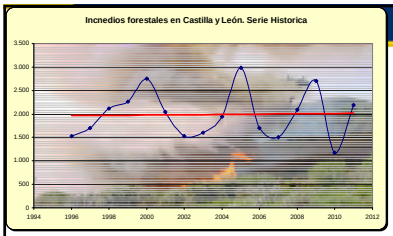
MEDIOS HUMANOS 2011	
INGENIEROS	217
AGENTES FORESTALES, MEDIOAMBIENTALES Y CELADORES	953
TRABAJADORES FIJOS Y FIJOS DISCONTINUOS Y OTROS	1.341
TRABAJADORES CUADRILLAS HELITRASPORTADAS	444
TRABAJADORES CUADRILLAS TRATAMIENTOS SELVICOLAS	1.286
TRIPULACIÓN MEDIOS AEREOS Y RETENES DE MAQUINARIA	149
TOTAL	4.390

4.390 profesionales para defender el bosque

* MMAMR aporta 176 trabajadores asociados a sus medios aéreos.

5

Estadística



- La mayor parte de los incendios se concentran en zonas montañosas del oeste de la Comunidad

CASTILLA Y LEÓN	Promedio 2001-2010	2011
Número de Incendios total	1.928	2.185
-Número de conatos	942	1.254
% conatos	49%	57%
- Número de incendios >1 ha	986	931
% Número de incendios >1 ha	51%	43%
Superficie arbolada	4.357,22	2.046,15
Superficie forestal	21.846,68	16.775,68

- 50% de conatos gracias al buen funcionamiento del operativo desplegado, adaptado semanalmente en función del riesgo.

Datos 1ene-31dic

6

Tiempos de control

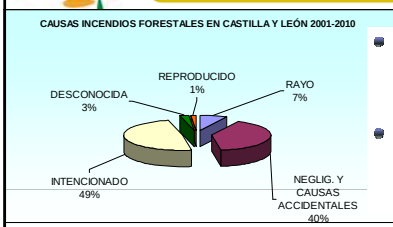
Duración del siniestro (horas)	% Hasta el control	% Hasta extinción
<1	35	16
>=1 - < 3	38	45
>= 3 - <6	10	21
>=6	7	18
Sin datos	10	1
TOTAL	100	100

Datos 2001-2010

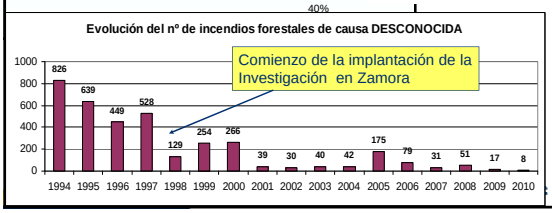
- El 73% de los incendios se controlan en menos de 3 horas.
- El 82 % se extinguen en menos de 6 horas.
- Los incendios de más de 500 ha suponen un 0,32% del total y afectan al 46% de la superficie arbolada y el 34% de la superficie forestal.

7

Investigación de causas



- Más del 90% de los incendios causados por el hombre, bien intencionadamente o negligencias o accidentes.
- De los incendios causados por el hombre más del 70% tienen como origen causas agroganaderas



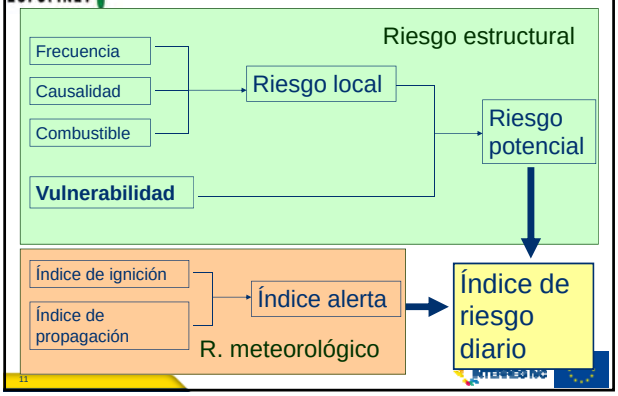
Esquema

- Cartografía de riesgo
- Aplicaciones GIS

Cartografía de riesgo

- Riesgo estructural – medidas – ubicación y despliegue de medios e infraestructuras, guardias calendario.
- Riesgo meteorológico – medidas – protocolos – despliegue temporal de medios, alertas, modificación de las guardias, traslado de medios
- Riesgo de riesgo diario (estructural – meteorológico) – medidas - aplicación modulo de parada
- Riesgo antrópico - medidas – comunicación a las entidades responsables en materia de prevención

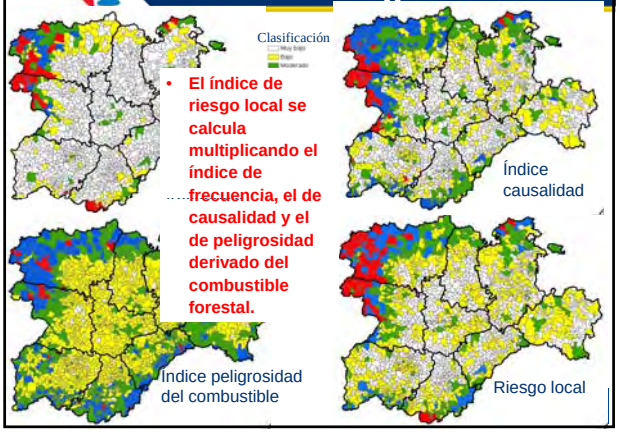
Riesgo



Riesgo estructural

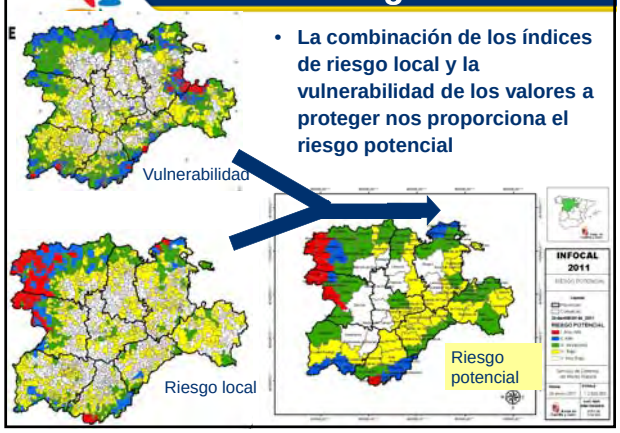
- **El riesgo estructural recoge factores:**
  - Riesgo que se produzca incendio en una zona
    - Datos Estadísticos (frecuencia y número de incendios forestales)
    - Actividad humana(causalidad y motivación de los incendios)
    - Peligrosidad del combustible (mapa de vegetación, carga de combustible, continuidad y combustibilidad)
  - Vulnerabilidad (Grado de daños o pérdidas que, en caso de incendio forestal, pueden afectar a la población, los bienes y el entorno. Variables consideradas: tipología de las masas, espacios protegidos, proximidad de vegetación de riesgo a núcleos urbanos)

Riesgo estructural



- **El índice de riesgo local se calcula multiplicando el índice de frecuencia, el de causalidad y el de peligrosidad derivado del combustible forestal.**

Riesgo estructural



- **La combinación de los índices de riesgo local y la vulnerabilidad de los valores a proteger nos proporciona el riesgo potencial**

Medidas Riesgo estructural

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El riesgo estructural (riesgo potencial) determina tomar medidas sobre:

- **La ubicación de medios y recursos de extinción.**
- **La ubicación de infraestructuras puestos de vigilancia, red cortafuegos, puntos de agua,…**
- **La distribución anual de guardias por comarcas y provincias en Castilla y León.**
  - La distribución de guardias se aprueba mediante calendario para la época de riesgo alto (verano).
  - La distribución de guardias se ajusta a lo largo del resto del año conforme al Riesgo meteorológico.

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Riesgo meteorológico

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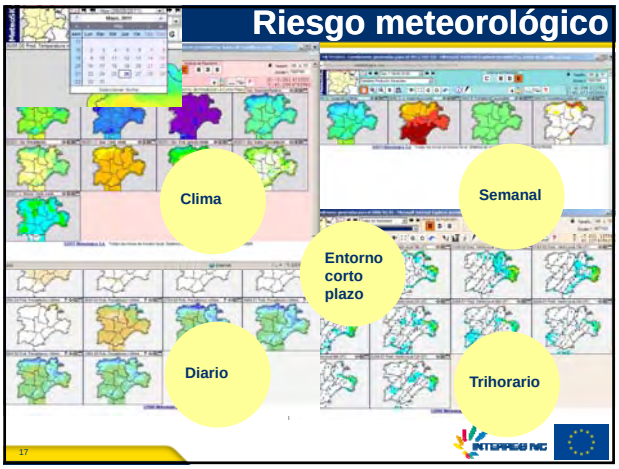
Variable Meteorológicas

- **La cartografía de riesgo meteorológico se consulta en diferentes fuentes.**
- **Predicción**
  - AEMET – Wetterzentrale (temperatura, precipitación, continental Sahariana,…)
  - Meteologica (temperatura, precipitación, viento, humedad relativa; probabilidad de ignición, probabilidad de tormenta …)
- **Observación**
  - AEMET (rayos, precipitación, balance hídrico, satélite)
  - Meteologica (rayos, precipitación, temperaturas, otras variables)

16

Riesgo meteorológico



Riesgo meteorológico

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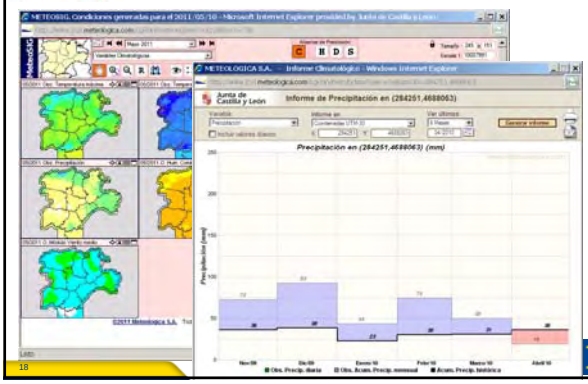

Riesgo meteorológico

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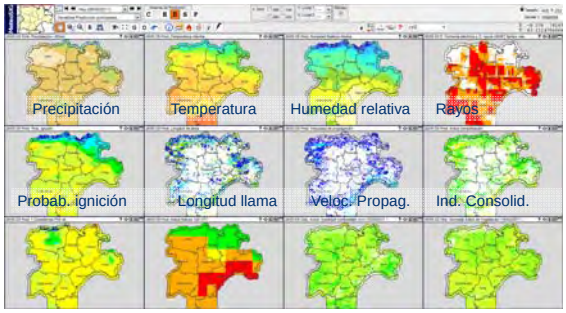
Variables MeteoGIS



Riesgo meteorológico

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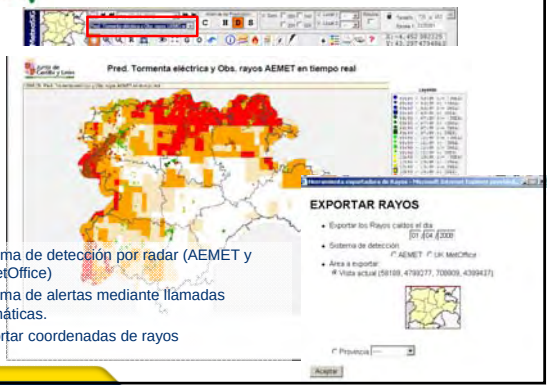
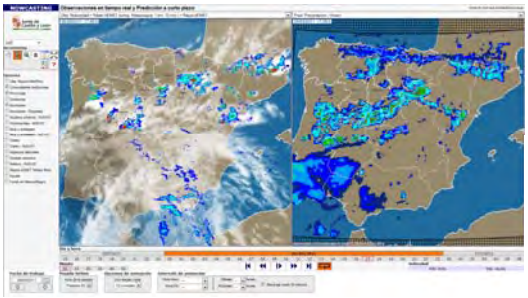


- Sistema de detección por radar (AEMET y UKMetOffice)
- Sistema de alertas mediante llamadas automáticas.
- Exportar coordenadas de rayos

Riesgo meteorológico

Entorno predicción a corto plazo



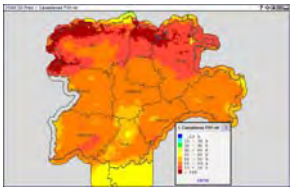
- Comparación entre predicción y observación

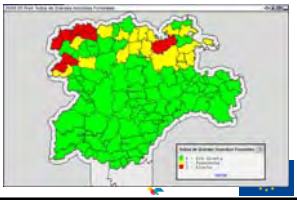
21

Riesgo meteorológico

- **Combinación de variables meteorológicas, estadísticas, información de combustibles y otros factores para mejorar los índices de riesgo.**
- **Calibración índice canadiense. Índices tanto absoluto como relativo.**
- **Generación de un índice de grandes incendios.**

PREVENCIÓN de GIF





22

Riesgo meteorológico

Tipificación meteorología G.I.

- Incendios de gran desarrollo y duración con gran columna convectiva. Días con elevadas temperaturas e inestabilidad atmosférica. Entrada de continental Sahariana y elevado índice de Haines.

Tª min	14ºC
Tª max	33ºC
HR	21%
Tª 850hPa	24ºC
Vel. viento	16-19 km/h

Tª min	16,9ºC
Tª max	34,8ºC
HR	14%
Tª 850hPa	21ºC
Vel. viento	9-13 km/h

- Honrubia (6/08/2008) y
- Arenas de San Pedro (28/07/2009)

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Riesgo meteorológico

Tipificación meteorología G.I.

- Incendios lineales por viento. Independiente de variables como temperatura y humedad relativa. Las temperaturas son elevadas en el caso de Medinaceli pero no Castrocontrigo

Tª min	20,2 ºC
Tª max	32,3 ºC
HR	16%
Tª 850hPa	22ºC
Vel. viento	35-40 km/h

Tª min	8,4º C
Tª max	20,3ºC
HR	32%
Tª 850hPa	10ºC
Vel. viento	18-22 km/h

- Medinaceli y Castrocontrigo (2009)

Riesgo meteorológico

Tipificación meteorología G.I.

- Incendios bajo sequía al final de verano.

- León, Septiembre 2009, predominio matorral
- Benuza (11/09) Murias (10/09) y Peranzanes(10/09)
- En estos días en León se iniciaron un total de 15 incendios.
- Esta situación se dio también en el 2000 y en 2011.

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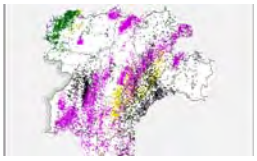
Riesgo meteorológico

Tipificación meteorología G.I.

- Tormenta seca con abundante aparato eléctrico (al principio del verano, junio – julio). Viento racheado y elevada velocidad y rayos sin precipitación .
- En días concretos se registran 13.415 rayos en 12 horas lo que da idea de la intensidad aparato eléctrico. Problemas añadidos: dificultad de intervenir los medios aéreos.

-18/06/04 Portillo (Va) **709,9 ha**
-18/06/05 San Miguel de Robledo (Sa) Quilamas **1.287,80 ha**



Muy útil el sistema de detección automático del SIGYM aunque en estas ocasiones se desborda.

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Medidas r. meteorológico

El riesgo meteorológico determina tomar medidas sobre:

- **Análisis continuo de los parámetros y índices meteorológicos.**
- **Despliegue semanal de medios de Octubre a Junio.**
- **Máximo despliegue en verano (al menos Julio a Septiembre) con traslado o reubicación de medios.**
- **Declaración de época de riesgo (alto, medio, bajo) o estados de alerta (alerta, alarma, alarma extrema) o autorización condicionada al riesgo.**

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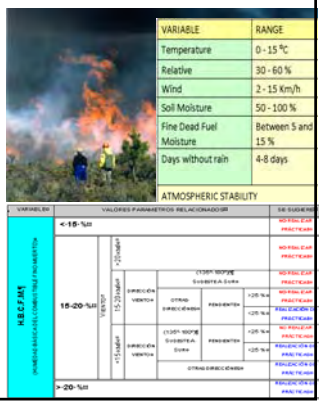
Medidas r. meteorológico

- Datos meteorológico permite encontrar la ventana para ejecutar las quemas prescritas conforme protocolo.



- Datos meteorológicos indican cuando se deben realizar prácticas de artillería conforme protocolo.

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Medidas r. meteorológico

Evaluación continúa de las condiciones meteorológicas

⇩

Declaración de niveles de riesgo (alto, medio, bajo)

⇧

-Aplicación de medidas preventivas mediante normativa.

-Activación de medios

-Despliegue de medios materiales

-Refuerzo de asignación de guardias al personal técnico y Agentes Medioambientales

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Medidas r. meteorológico

Actividades prohibidas todo el año	Actividades prohibidas Época de Peligro Alto
-**Quema de rastrojos** -**Uso del fuego. Excepciones:** -Fuera EPA: control fitosanit., gestión del combustible – autorización -Quema de restos agrícolas – comunicación -Usos tradicionales - autorización -**Fuegos art. Exc. Fiestas Trad. –** autor. -**Hogueras Exc. pastores,.. Áreas de descanso, acampada libre, aparcar vehículos obstaculizando caminos, carreteras o cortafuegos.**	-**Use de maquinaria o herramientas que pueda generar un incendio – Autorización Exc. Mantenimiento infraestructuras, extinción de incendios** -**Transporte de explosivos Autor.** -**Barbacoas – Exc. Infraestruct. seguras, camping – aut.** -**Quema de restos en terrenos urbanos a menos de 400 m. de monte.** -**Rallies – Exc autorización**

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Medidas r. meteorológico

Anticipación: Sistema de Alertas

Evaluación continúa de las condiciones meteorológicas

⇩

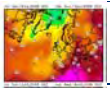
Declaración de estados de Alerta o Alarma

⇧

Análisis a posteriori condiciones de los GIF ocurridos

CONDICIONES DE LA MAYORÍA DE LAS ALERTAS

CONTINENTAL SAHARIANA
Fuerte incremento de las máximas
Moderado incremento de las mínimas nocturnas
Ausencia de precipitaciones salvo tormentas
Viento moderado a flojo de componente S-SW



Vientos fuertes **en rachas de > 50 km/h**

O la combinación de ambas en algún caso

Aunque no ha habido en estos últimos años otra causa son: **Tormentas secas**

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GRADUACIÓN SITUACIONES DE RIESGO

ESTABLECER 4 GRADOS:

- **NORMAL: Es el conjunto de los días normales del verano (Época peligro Alto)**
- ALERTA: **Situaciones puntuales (1 a 4 Días) de riesgo elevado (mayor al habitual) en parte de la Comunidad Autónoma por masa continental sahariana, tormentas secas, vientos fuertes,…**
- ALARMA**: Situaciones puntuales (1 a 4 Días) de riesgo extremo en parte de la Comunidad Autónoma por circunstancias anteriores o situaciones de 5-7 días de riesgo elevado en toda la Comunidad Autónoma.**
- ALARMA EXTREMA: **Situaciones de más de 5 días de riesgo extremo en toda la Comunidad Autónoma o situaciones de más de 7 días de riesgo elevado en parte de la Comunidad Autónoma.**

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Medidas r. meteorológico

SITUACIÓN RIESGO	NORMAL	ALERTA	ALARMA	ALARMA EXTREMA
Uso barbacoas	**Normal EPA**	**Limitar**	**Prohibir**	**Prohibir por Orden o Decreto**
Uso fuego	**Normal EPA**	**Limitar**	**Prohibir**	**Prohibir por Orden o Decreto**
Trabajos forestales	**Normal EPA**	**Limitar**	**Prohibir**	**Prohibir por Orden o Decreto**
Trabajos en zonas forestales	**Normal EPA**	**Limitar**	**Prohibir**	**Prohibir por Orden o Decreto**
Tránsito monte	**Normal EPA**	**Limitar**	**Prohibir**	**Prohibir por Orden o Decreto**
Circulación zonas forestales	**Normal EPA**	**Normal EPA**	**Prohibir**	**Prohibir por Orden o Decreto**
Comunicación otros organismos	**NO**	**SI**	**SI**	**SI**

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Medidas r. meteorológico

SITUACIÓN RIESGO	NORMAL	ALERTA	ALARMA	ALARMA EXTREMA
Puestos vigilancia	**Funcionamiento EPA**	**Alertar**	**Alerta extrema sin dejar vacías**	**Alerta extrema sin dejar vacías**
AAMM y FF	**Guardias Normal**	**Alertar**	**Reforzar guardias y limitar tareas**	**Reforzar guardias y suprimir otras tareas**
Módulos Parada	**Normal EPA**	**Adaptar**	**Adaptar s/ empleo herramientas exp.**	**Modulo D (parada)**
Autobombas	**Funcionamiento EPA**	**Alertar y patrullas**	**Alertar y patrullas s/ vacantes**	**Alertar y patrullas s/ vacantes**
Maquinaria	**Funcionamiento EPA**	**Alerta**	**Retén doble**	**Retén doble**
Medios aéreos	**Funcionamiento EPA**	**Suspender reconocimientos**	**Suspender reconocimientos**	**Suspender reconocimientos**
Ataque inicial	**Funcionamiento EPA**	**Despacho automático contundente**	**Despacho automático contundente**	**Despacho automático contundente**
Técnicos	**Calendario EPA**	**Alertar**	**Reforzar guardias**	**Reforzar guardias**

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Medidas r. meteorológico

Anticipación: Sistema de Alertas

2008	
Alerta nº	**Días en alerta**
1	19 y 20 de julio de 2008
2	23 y 24 de julio de 2008
3	3, 4, 5 y 6 de agosto de 2008
4	10 de agosto de 2008
5	25 de septiembre de 2008

2009	
Alerta nº	**Días en alerta**
1	22 y 23 julio 2009
2	26 julio 2009
3	4 al 6 agosto 2009
4	14 al 17 agosto 2009
4 ampliación	18 al 20 agosto 2009
5	31 agosto y 1 sept.

2010	
Alerta nº	**Días en alerta**
1	8 julio 2010
2	31 julio y 1 agosto de 2010
3	21 al 23 agosto 2010
4	26 agosto 2010

2011	
Alerta nº	**Días en alerta**
1	17 y 18 de agosto de 2011

Sólo 23% de los grandes incendios ocurrieron en situación de alerta

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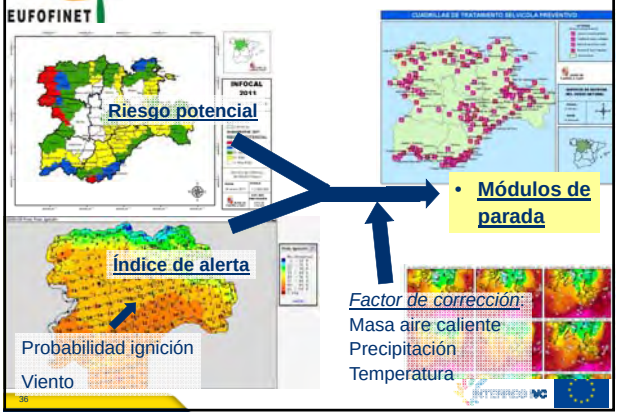
Indice de riesgo diario



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Índice de riesgo diario

MÓDULOS DE HORAS DE PARADA:

N: Sin parada

A: 2 horas / día cuadrilla

B: 4 horas / día cuadrilla

C: 6 horas / día cuadrilla

D: 8 horas / día cuadrilla

Variable Meteorológicas

		INDICE DE ALERTA			
		Prealerta	Alerta	Alarma	Alarma Extrema
RIESGO POTENCIAL POR COMARCAS	Muy bajo	N	N	N	A
	Bajo	N	N	A	B
	Medio	N	N	A	B
	Alto	N	N	B	C
	Muy alto	N	A	B	D

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Riesgo antrópico

- Cartografía de riesgo y estudio de áreas recreativas
- Cartografía de riesgo y estudio de líneas de ferrocarril

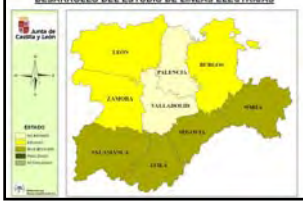
- Cartografía de riesgo y estudio de líneas eléctricas
- Cartografía de riesgo de urbanizaciones en interfase

Riesgo antrópico

DESARROLLO DEL ESTUDIO DE AREAS RECREATIVAS

DESARROLLO DEL ESTUDIO DE LINEAS DE FERROCARRIL

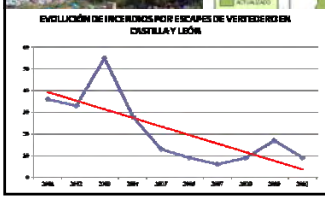
DESARROLLO DEL ESTUDIO DE LINEAS ELECTRICAS



DESARROLLO DEL ESTUDIO DE SITUACIONES DE RIESGO URBANIZACIONES EN INTERFASE

Riesgo antrópico

DESARROLLO DEL ESTUDIO DE SITUACIONES DE RIESGO VERTEDEROS



Se están consiguiendo disminuir:

- Continuas revisiones anuales, comunicación a responsables.
- Coordinación con Calidad Ambiental de la Consejería de Medio Ambiente.

Medidas riesgo antrópico

- Pasos en el análisis para cada situación de riesgo:
  - Localizarla.
  - Recoger información del estado.
  - Definir **medida correctora** general o/y particular en cada ubicación.
  - Establecer un nivel de valoración para este riesgo.
  - Crear un **mapa** del riesgo.
  - **Informar** al responsable.

Aplicaciones GIS

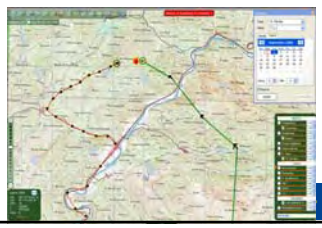
Simulador de incendios SIPRO

- SIPRO es una aplicación web online
- Usa mapas de topografía, combustible, humedad combustible vivo y fino muerto (estimada) y viento estimada.
- SIPRO usa como motor de cálculo la aproximación semi-empírica de Rothermel (también implementada en BEHAVE y FARSITE)
- Actualización predicciones meteorológicas 2 veces al día.

Aplicaciones GIS

Aplicación Emercarto

- Localización de las coordenadas de más de 300 medios mediante GPS.
- **Los medios mandan su posición cada minuto.**
- **Seguimiento de las trayectorias de los medios.**
- **Posibilidad de pulsar un botón de alarma y comunicarse directamente con el Centro Provincial de Mando.**



Aplicaciones GIS

Aplicaciones GIS

Perimetración. Proyecto NOMO

- Nuevo proyecto Perimetración de incendios, envío de la superficie y el trazado del incendio en TIEMPO REAL a Centros de Mando.
- Actualmente disponible en todas las comarcas.

Superficie 38,47 ha

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Conclusiones

- **La cartografía de riesgo es una herramienta fundamental en la toma de decisiones en un sistema que:**
  - Busca la anticipación
  - Realiza el despliegue de medios en función del riesgo (flexible, convoyes, escalonamiento de medios,…)
  - Necesita del análisis del riesgo para conocer si los trabajadores deben de trabajar en prevención o en extinción (módulos de parada)
  - Se basa en protocolos conforme al riesgo (quemas, artillería,…)
  - Adapta las medidas preventivas al riesgo (Puntual: declaración de alertas y permanente: épocas de riesgo)
- **Las aplicaciones GIS son una herramienta fundamental en la toma de decisiones:**
  - Para prevención y extinción (simulación, localización, perimetración)

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Gracias

Vicente Rodríguez Fernández
Jefe de Servicio de Defensa del Medio Natural
Consejería de Fomento y Medio Ambiente
Junta de Castilla y León.
rodfervi@jcyl.es

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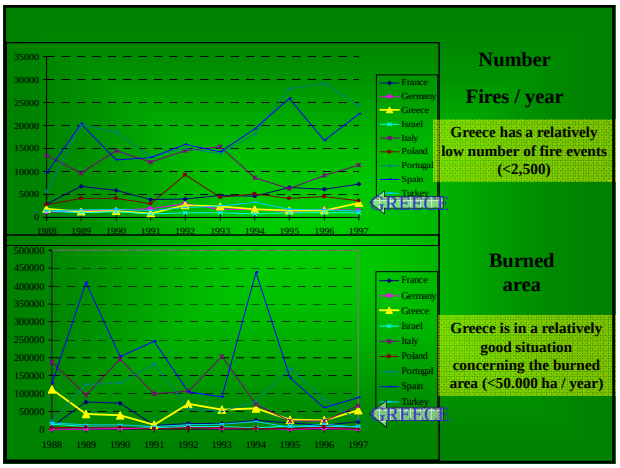
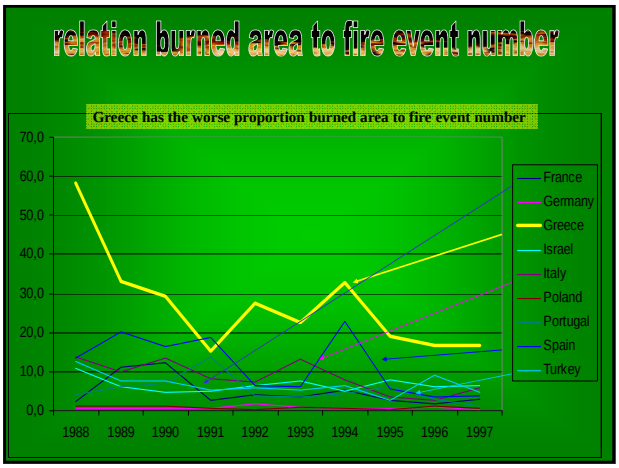
Prevention, fighting and management of forest fires are perhaps the most important issue in contemporary forestry. The problem of forest fires is of particular importance for Greece due primarily to a significant shift in the socioeconomic conditions over the last decades. Increased fuel loads as a result of urbanisation and forest abandonment and increased number of forest visitors result in both an increased number of forest incidents as well as increased fire intensity and burned area.





CONCLUSIONS

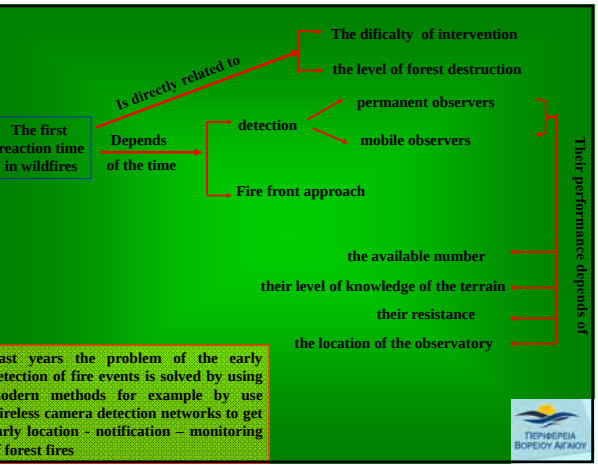
Despite Greece spends a large amount of money to combating forest fires and the fact they have acquired:

1. A great number of personnel involved (permanent and seasonal).
2. An important and expensive infrastructure.

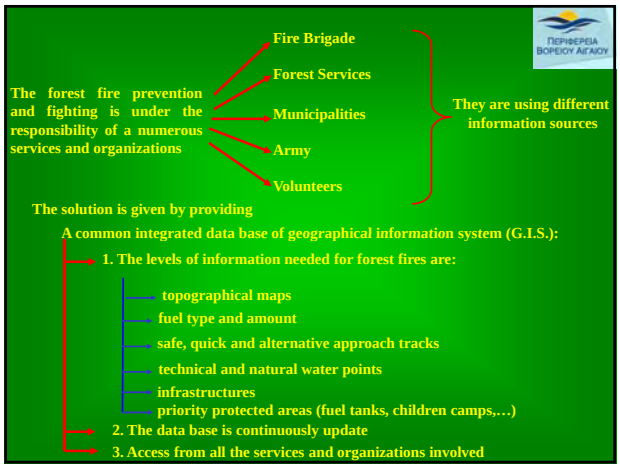
In consequence

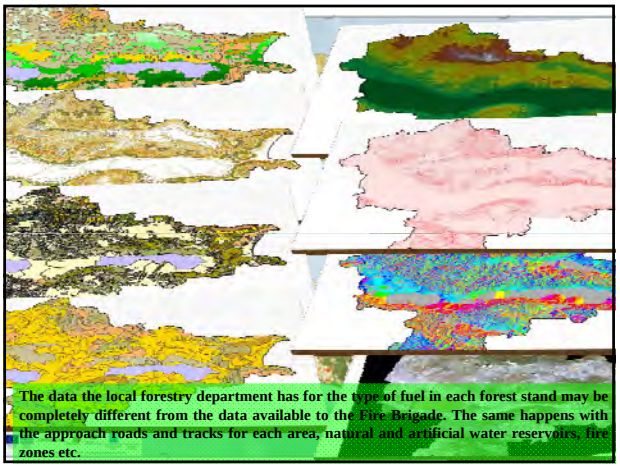
The low effectiveness has to be attributed to:

1. insufficiency in early detection of fire events,
2. insufficiency in early intervention,
3. insufficiency in coordination of services involved.
4. insufficiency in fire forest information of citizens.



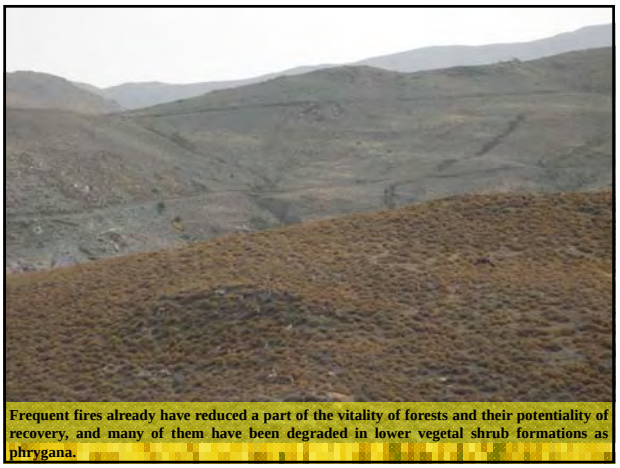
The SITHON system, a fully wireless optical imaging system, integrating a network of *in-situ* optical cameras linking to a multi-layer GIS database (Sithonia Peninsula, North Greece).





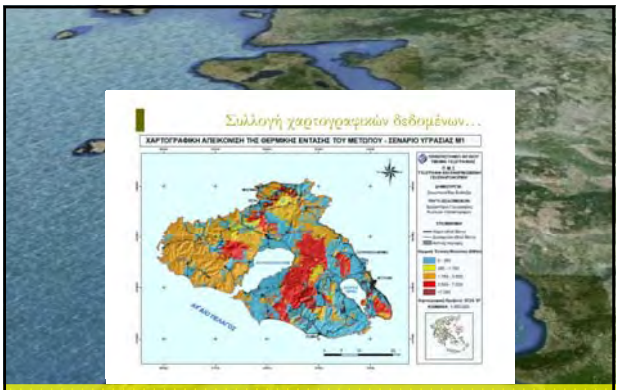
The data the local forestry department has for the type of fuel in each forest stand may be completely different from the data available to the Fire Brigade. The same happens with the approach roads and tracks for each area, natural and artificial water reservoirs, fire zones etc.

There is a geographical isolation of the islands from the mainland and by consequence from a direct terrestrial intervention

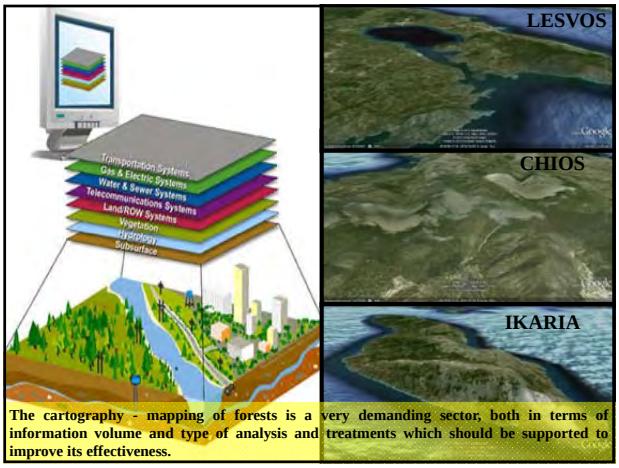


Frequent fires already have reduced a part of the vitality of forests and their potentiality of recovery, and many of them have been degraded in lower vegetal shrub formations as phrygana.

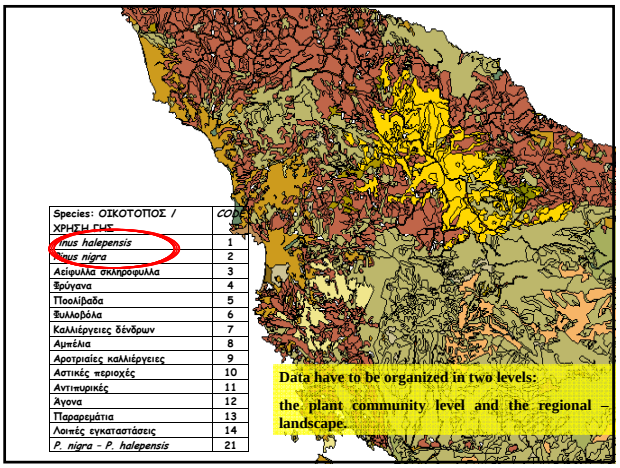
The "North Aegean Region" being aware of these problems and having estimate the higher forest fire risk and the necessity to improve the level of prevention get a partnership with the local university and national research centers in order to create and continually improve specific cartographic tools.



The cartographical material produced using in the GIS environment allows the Fire Brigade to control more effectively the area where the fire incident is located, to improve the time of first intervention and the coordination of ground and aerial interventions forces, so well as all the services involved.



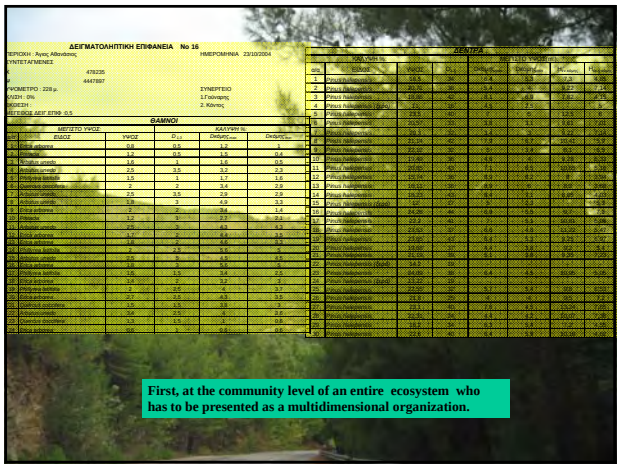
The cartography - mapping of forests is a very demanding sector, both in terms of information volume and type of analysis and treatments which should be supported to improve its effectiveness.



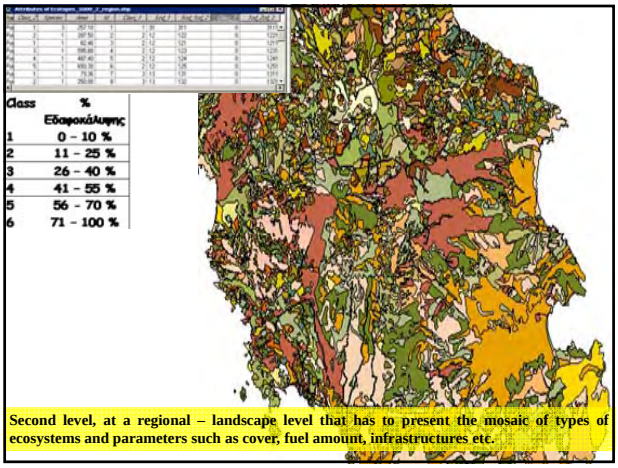
Species: ΟΙΚΟΤΟΠΟΣ / ΧΡΗΣΗ ΓΗΣ	CO
Pinus halepensis	1
Pinus nigra	2
Αείφυλλα σκληρόφυλλα	3
Ξηρύγανα	4
Πουλίβαδα	5
Βυλλοβόλα	6
Καλλιέργειες δένδρων	7
Αμπέλια	8
Αροτριαίες καλλιέργειες	9
Αστικές περιοχές	10
Αντιπυρικές	11
Άγονα	12
Παραρεμάτια	13
Λοιπές εγκαταστάσεις	14
P. nigra – P. halepensis	21

Data have to be organized in two levels:

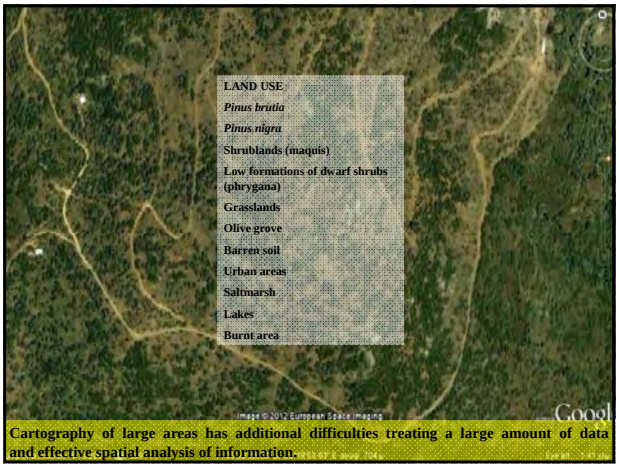
the plant community level and the regional – landscape.



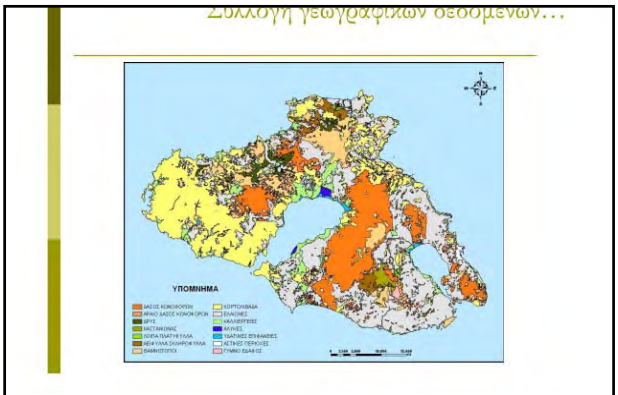
First, at the community level of an entire ecosystem who has to be presented as a multidimensional organization.



Second level, at a regional – landscape level that has to present the mosaic of types of ecosystems and parameters such as cover, fuel amount, infrastructures etc.

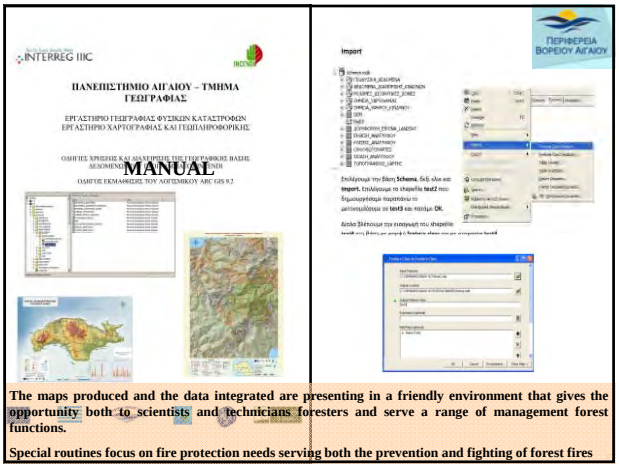


Cartography of large areas has additional difficulties treating a large amount of data and effective spatial analysis of information.



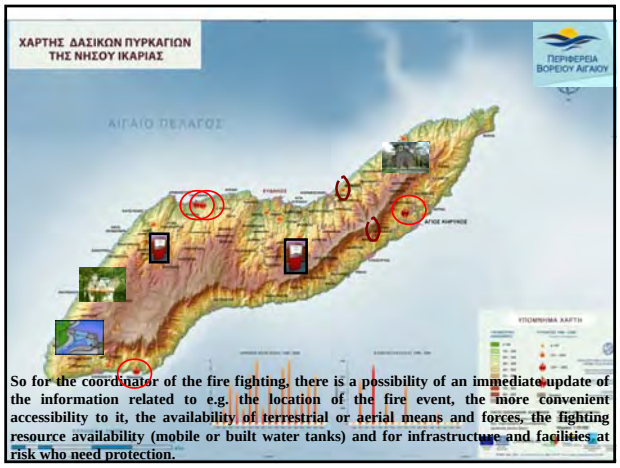
The produced maps aiming to post-fire restoration for the islands of Lesvos, Chios, Samos and Ikaria. The material is structured in thematic multilayer maps and interactive maps.

The main concern of the North Aegean Region is to provide to all services involved in forest fires a common data base as a modern management tool able to improve the effectiveness and the coordination of prevention and combating of forest fires, so well as restoration of burnt areas.

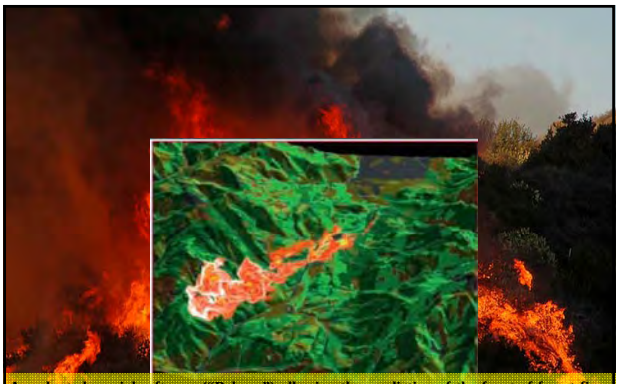


The maps produced and the data integrated are presenting in a friendly environment that gives the opportunity both to scientists and technicians foresters and serve a range of management forest functions.

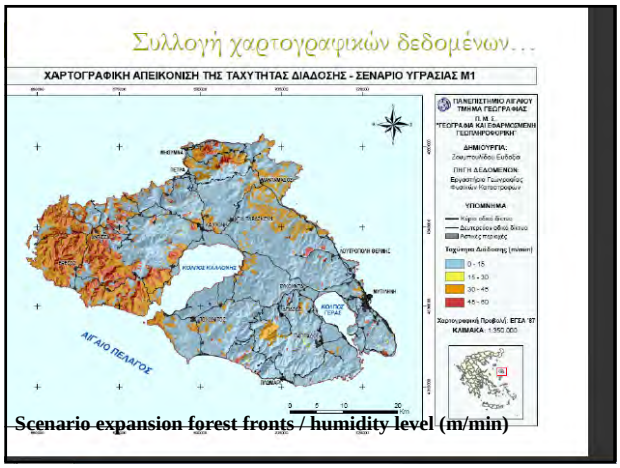
Special routines focus on fire protection needs serving both the prevention and fighting of forest fires



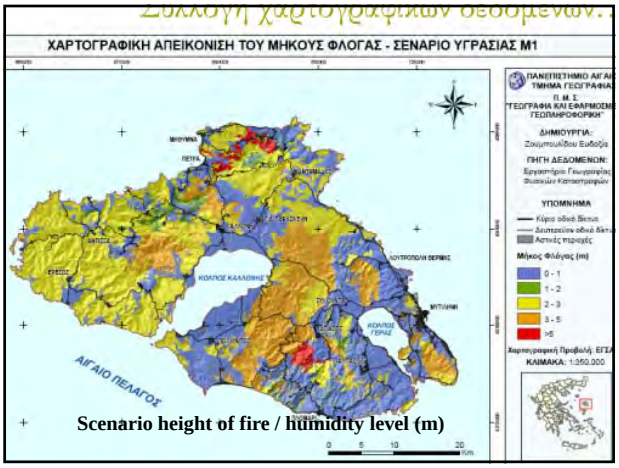
So for the coordinator of the fire fighting, there is a possibility of an immediate update of the information related to e.g. the location of the fire event, the more convenient accessibility to it, the availability of terrestrial or aerial means and forces, the fighting resource availability (mobile or built water tanks) and for infrastructure and facilities at risk who need protection.



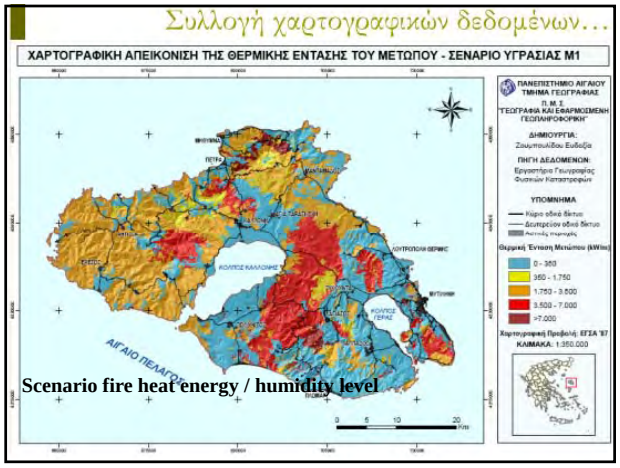
An adapted special software (“Behave”) allowing the prediction of the front of forest fires according the climatic parameters and the fuel type and amount of the vegetal formations in the fire event has been adapted and integrated. This is a very strong and useful decisions tool in the hand of the coordinator in order to carry out forecasting and scenario planning interventions



Scenario expansion forest fronts / humidity level (m/min)

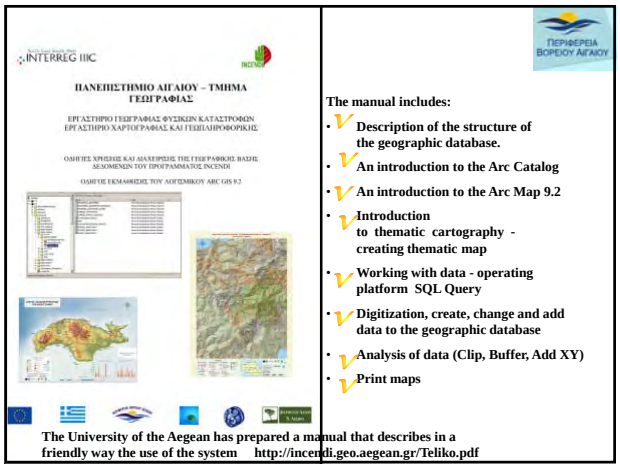


Scenario height of fire / humidity level (m)



Scenario fire heat energy / humidity level

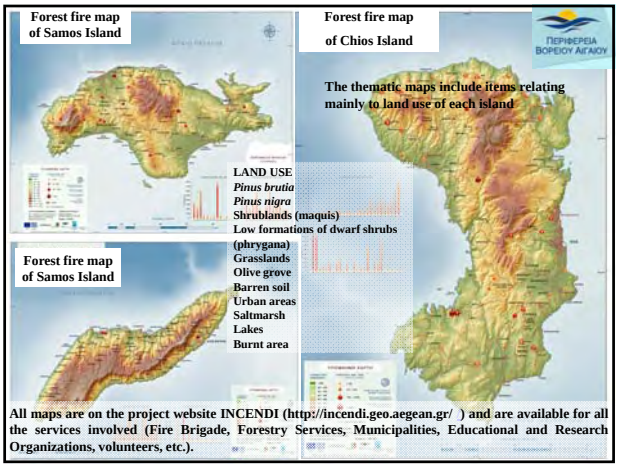
The restoration of burnt areas is facilitated by the production and printing of thematic maps of the burnt areas. In addition, a special report is produced and printed which declares, according the Greek law, the burnt area as reforestation area and the record of the fire event. Moreover, it can include information on the specific conditions of the burnt areas and the level and type of damages of the vegetal formations and the more appropriate species for reforestation.



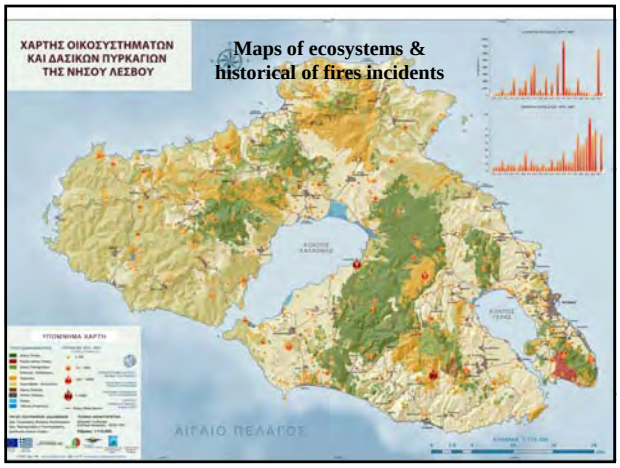
The manual includes:

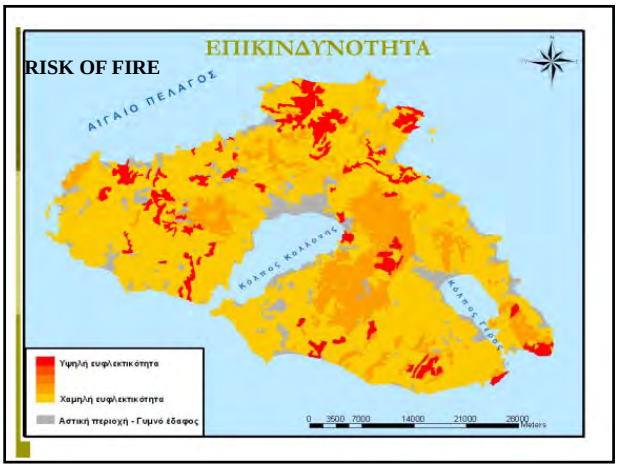
- Description of the structure of the geographic database.
- An introduction to the Arc Catalog
- An introduction to the Arc Map 9.2
- Introduction to thematic cartography - creating thematic map
- Working with data - operating platform SQL Query
- Digitization, create, change and add data to the geographic database
- Analysis of data (Clip, Buffer, Add XY)
- Print maps

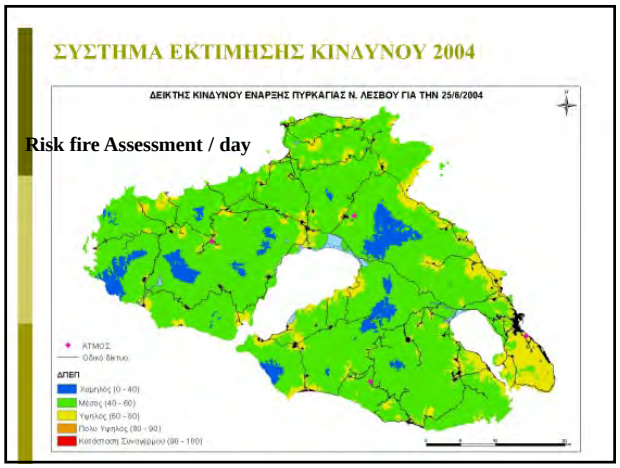
The University of the Aegean has prepared a manual that describes in a friendly way the use of the system http://incendi.geo.aegean.gr/Teliko.pdf

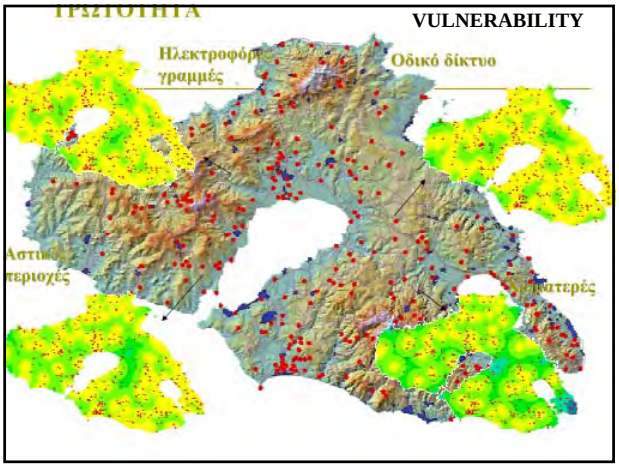


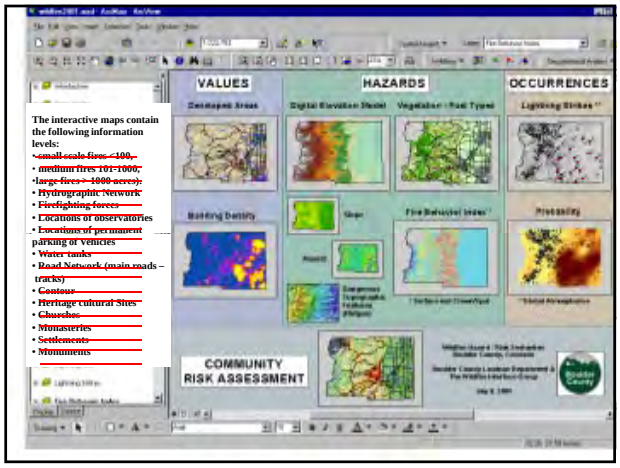
All maps are on the project website INCENDI (http://incendi.geo.aegean.gr/) and are available for all the services involved (Fire Brigade, Forestry Services, Municipalities, Educational and Research Organizations, volunteers, etc.).

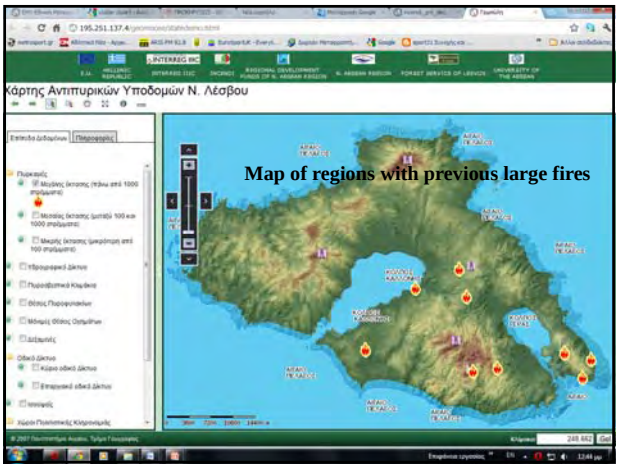


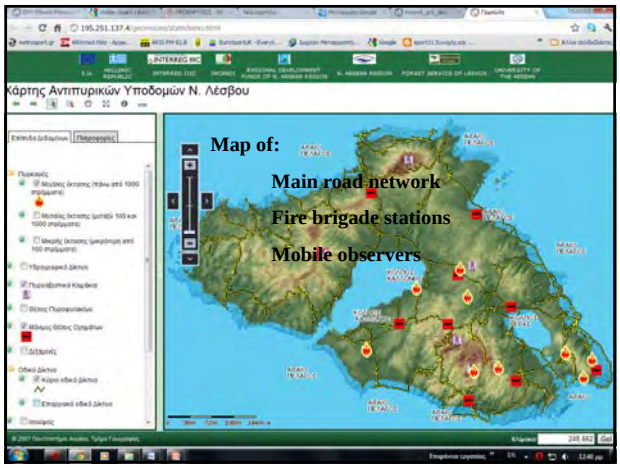


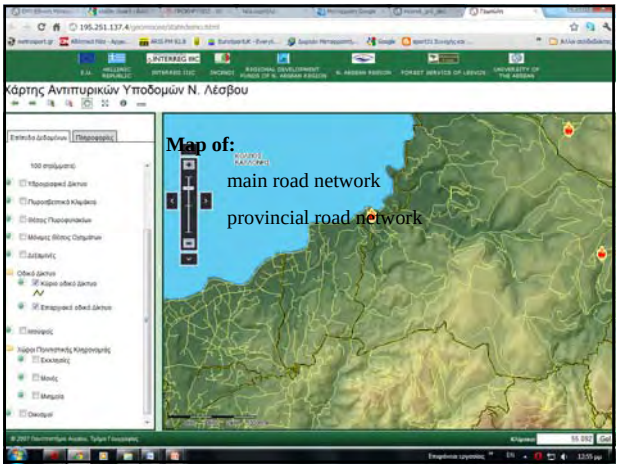


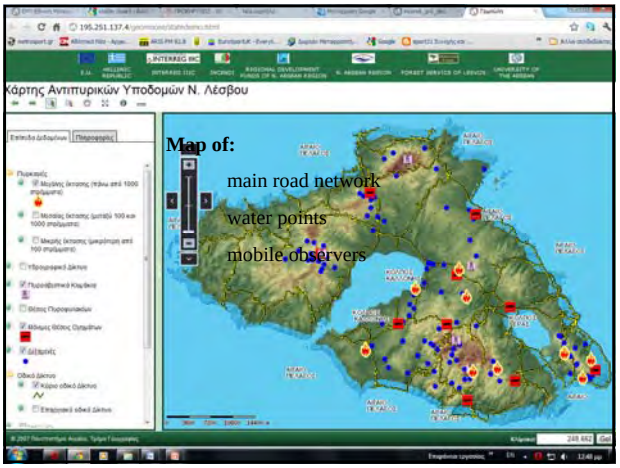

ΠΡΩΤΟΠΗΤΑ
VULNERABILITY
Ηλεκτροφόρ
γραμμές
Οδικό δίκτυο
Αστικ
περιοχές
ατερές

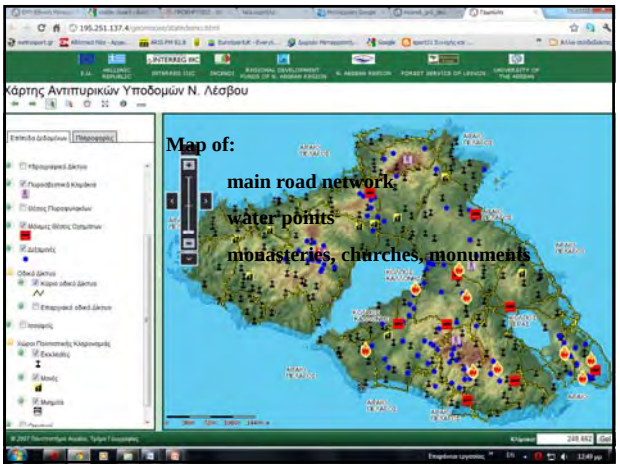

VALUES
HAZARDS
OCCURRENCES
COMMUNITY
RISK ASSESSMENT
The interactive maps contain the following information levels:
small-scale fires -<100,
medium fires 101-1000,
large fires > 1000 acres),
Hydrographic Network
Firefighting forces
Locations of observatories
Locations of permanent parking of vehicles
Water tanks
Road Network (main roads – tracks)
Contour
Heritage cultural Sites
Churches
Monasteries
Settlements
Monuments

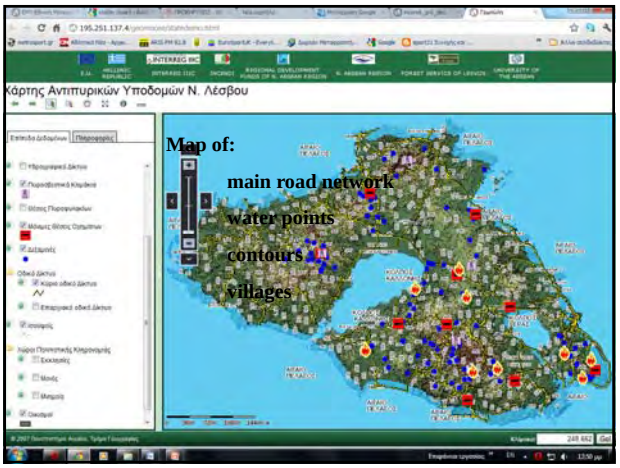

Χάρτης Αντιπυρικών Υποδομών Ν. Λέσβου
Map of regions with previous large fires


Χάρτης Αντιπυρικών Υποδομών Ν. Λέσβου
Map of:
Main road network
Fire brigade stations
Mobile observers


Χάρτης Αντιπυρικών Υποδομών Ν. Λέσβου
Map of:
main road network
provincial road network


Χάρτης Αντιπυρικών Υποδομών Ν. Λέσβου
Map of:
main road network
water points
mobile observers


Χάρτης Αντιπυρικών Υποδομών Ν. Λέσβου
Map of:
main road network,
water points
monasteries, churches, monuments

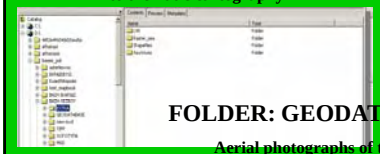

Χάρτης Αντιπυρικών Υποδομών Ν. Λέσβου
Map of:
main road network
water points
contours
villages

The full database available to users includes also:

The full database available to users includes also:

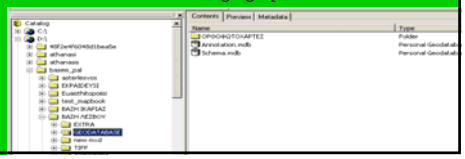
FOLDER: EXTRA

Utility data and information - related to thematic cartography



FOLDER: GEODATABASE

Aerial photographs of the islands, a data base of names and main geographic database



SUB-FOLDER: ANNOTATION

The names of the geographical features and streams -

SUB-FOLDER: SCHEMA

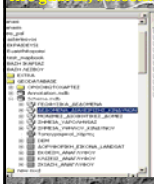
(BY CATEGORY RASTER FILES)

Geophysical data: contour, shoreline, geological data, wild life reserves, mountain tops, rivers, land uses

SUB- FOLDER: SCHEMA

(BY CATEGORY RASTER FILES)

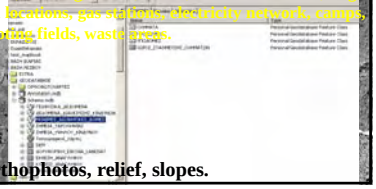
Data Risk Management: airports, heliports, monuments, & archaeological sites, hospitals, roads and tracks, villages, municipalities, vehicles in service, fire incidents, fire guards, schools.



SUB- FOLDER: SCHEMA

(BY CATEGORY RASTER FILES)

Permanent administrative structures: vehicles (permanently), staff, infrastructure, parkings., water points, drilling, tanks, dams, water reservoirs, high risk locations, gas stations, electricity networks, canals, shrublike, fields, waste areas.



Landsat, Orthophotos, relief, slopes.

The cartography – mapping - results

1st: The time of awareness and preparation of fighting forces is drastically reduced. This is achieved by:

- The immediate location of the fire event on the map.
- The prompt delineation of the fighting fire intervention area area.
- Information on infrastructure at risk (settlements, homes, farms, camping, etc.) and for fire protection (water tanks, etc. tanks, etc.) and
- Printout of the relevant record fire incident with coordinates and description of infrastructures) and a map of this, after action of the intervention area.
- Identification of the most appropriate route to reach the fire front regarding the length of the road, the quality of the terrain and the time of transition, so well as a printout of the relevant sheet and the corresponding operational maps.

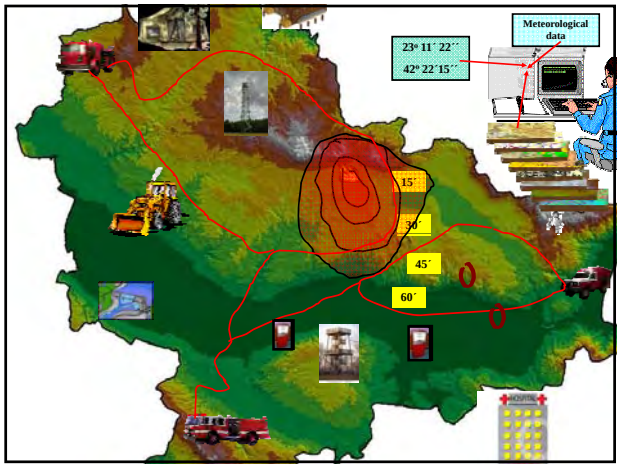
operational maps.

2nd: It improves the overall efficiency of the intervention and fighting forces since the process of the related information is faster and more reliable as follows:

•With a constant flow of information (from detectors or other means) of the front of fires and new fire incidents.

•Displays on-screen of the front or the fronts of the fire and are examined the alternative access routes and alternative fire fighting scenarios with simultaneous production of information sheets and maps.

•The topographic conditions and vegetation types are analyzed with the stored climatic data and the current climatic conditions at the time of the fire, allowing scenarios for the expansion of the front(s) of fire improving thus the conditions for an effective intervention.



GRACIAS
MERCI
TAK
THANKS
VĎAKA
ΠΕΡΙΦΕΡΕΙΑ
DZIĘKI
ΒΟΡΕΙΟΥ ΑΙΓΑΙΟΥ
ΕΥΧΑΡΙΣΤΩ
GRAZIE

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Use GIS- informations Slovak fire brigade.

Ing. Marián LOPUCH, PhD.

INTERREG IVC

EUROPEAN REGIONAL DEVELOPMENT FUND

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Slovak republic

- 68,2 % forest
- 9 national parks
- 1082 small protected areas
- 382 sites of European importance.

2

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Tatra National Park – TANAP

- 118 mountain lake
- 600 km mountain trails
- highest peak=> Gerlach – 2655m

3

4

consequences

attack forest biotic factors 2005-20010

Forest fire simulation software

-INPUT DATA:

- **relief of the simulation area**
- **climatic characteristics**
- **fuel model**

-OUTPUT DATA:

digital model of forest fire, depending on climatic conditions in time steps

relief of the simulation area

slope, elevation,aspect, fuel model and canopy cover

- **This GIS data information is in the format** ***.ASC**
- **Provided by:**
  National Forest Centre
  State Forests TANAP
  Ministry of Interior, Department GIS Information

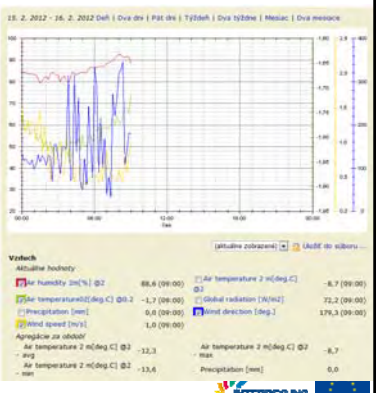
climatic characteristics

- max.-min. temperature of air,
- air humidity,
- cloud,
- wind direction
- wind intensity

On line:

Biometeorological monitoring

http://www.emsbrno.cz



fuel model

FUEL model includes:

- initial fuel humidity and for 1,10,100 hours,
- Min. and max. fuel humidity
- fire calorific value,
- volume the living or dead particles,
- depth of soilcover
- adjustment model

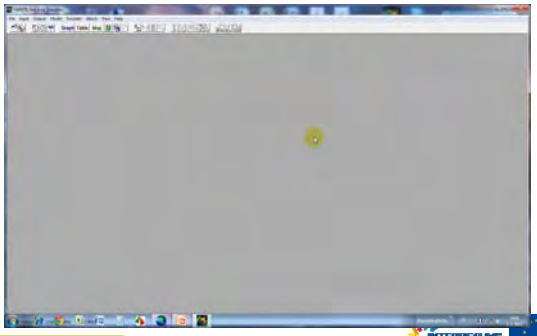
- **This information provided by:**
  Slovak Academy of Sciences
  Technical University of Zvolen, Department of Fire Protection

SLOVAK ACADEMY OF SCIENCES

9

Input data - FARSITE

1. Step :**INPUT DATA**

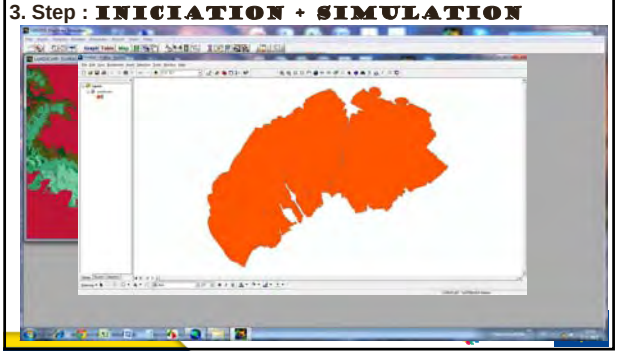


10

Output data - FARSITE

2. Step :**DRAIWING AREA**

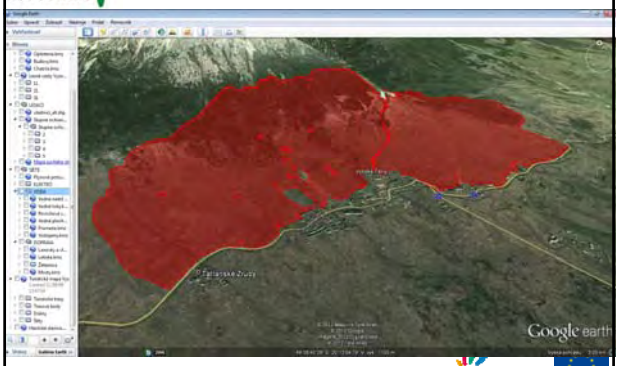
3. Step : **INICIATION + SIMULATION**



Output data - Google Earth

12

GIS support for the intervention of Comamnder



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Thank you for your attention.

Ing. Marián LOPUCH, PhD.

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Cartography of risk in interfaces – Evolutive cartography of vegetation sensibility

GP4 : cartography of fire risk

Workshop in Léon, 20-24 february 2012

Office National des Forêts

INTERREG IVC

EUROPEAN REGIONAL DEVELOPMENT FUND

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In France, the cartography of risk and hazard is used in many contexts and with many goals. In the frame of this workshop, we chose to focus on two recent and innovative practices that come out a few of our habits and potentially interest other partners :

- cartography of risk in the interfaces
- evolutive cartography of vegetation sensitivity

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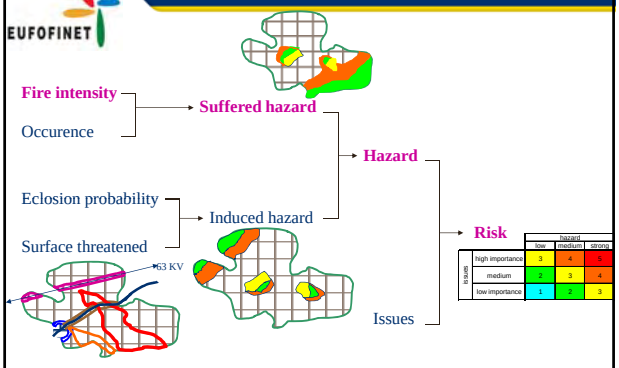
Static risk, or intrinsic risk

This risk relates to the physical characteristics of where it is described.

It is dependent on many characteristics which the main are vegetation and topography.

It may use notions of climate, but which will be determined

General facts on french cartography of risk



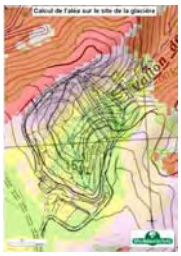
General facts on french cartography of risk

This risk is usually assessed by foresters (ONF or state services) or private consulting firms, because of their familiarity with the vegetation which is one of the overriding factors.

This risk can be assessed at different scales for different purposes :

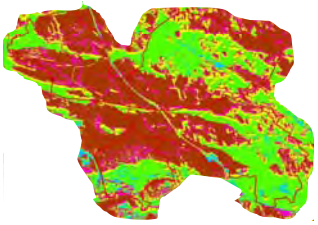
General facts on french cartography of risk

- On the scale of a punctual issue (residential district, public building, industrial establishment, specific patrimonial issue ...) to identify specific protection measures based on risk assessment



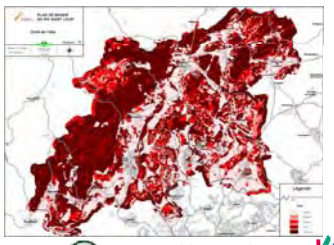
General facts on french cartography of risk

- at the scale of a municipality or a small massif, to take measures to regulate urbanization (definitions of areas unsuitable for building, of measures to new buildings, equipment for the protection of wildland-urban interfaces ...)



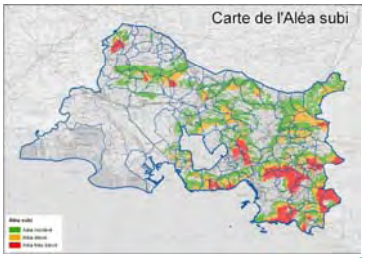
General facts on french cartography of risk

- On the scale of a massif, to define strategies for the protection of this massif (prevention, surveillance, control, reduction of risk areas ...) and / or set of equipment plans of this massif (tracks, water points, fuelbreaks ...).



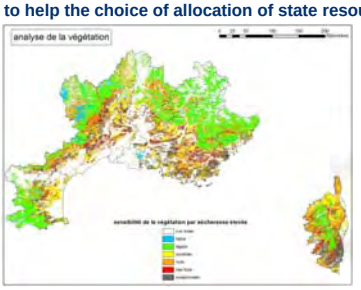
General facts on french cartography of risk

- On the scale of a department, to define departmental strategies for prevention (specific measures, surveillance network, specific plans ...) and firefighting, and prioritize municipalities and massifs.



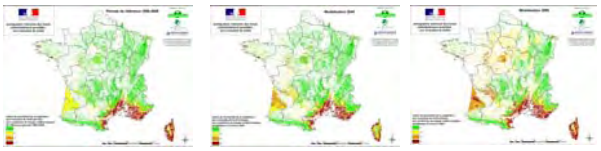
General facts on french cartography of risk

- At the interregional level, in order to define the general policy of prevention (balancing state means, including financial) and for firefighting to help the choice of allocation of state resources.



General facts on french cartography of risk

- Nationally, with simulated summer weather conditions in 2040 or 2060, in the context of an interministerial mission in charge of anticipating the effects of climate change on national policy for prevention and fighting against fire



Reference period (1989-2008) | Modeling 2040 | Modeling 2060

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Daily risk or evolving risk

Also often called "weather risk" or "weather danger" because it takes into account mainly the meteorological component which unlike other factors is changing quite rapidly.

During the summer season in South-eastern France (Mediterranean area), this risk is rated 2 times per day by Météo-France that calculate several indices (derived from the method of the Canadian Fire Weather Index - FWI) and bring expertise to define six levels of danger. Appraised levels of danger are published across 112 "weather zones" (5-9 per department).
In winter, only some indices continue to be calculated but no expertise is achieved.

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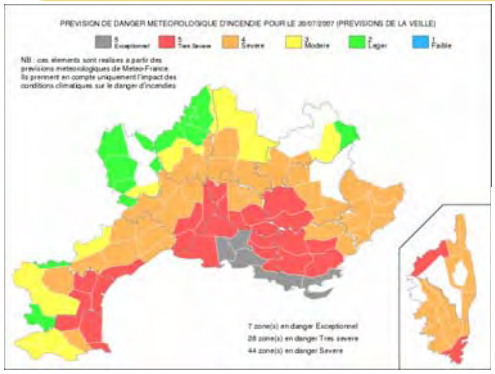

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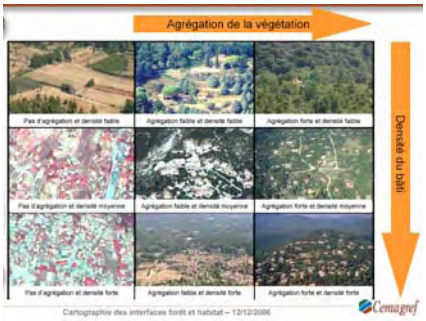
Cartography of risk in the interfaces

In the static cartography of risk at the scale of a municipality, of a massif or of a department, the most important areas to consider are the wildland-urban interfaces, because that's where are concentrated the highest issues (natural issues passing always in the background behind the protection of persons and goods).

To better define the risk levels and to adapt the measures, it appeared necessary to characterize these interfaces. A first work was done in 2006-2010 in the European research project FIREPARADOX by French research institute CEMAGREF (now IRSTEA) crossing habitat grouping types with aggregation of vegetation types.

A second study was conducted in 2010-2011 within the framework of European cooperation project PYROSUDOE in which ONF participated. This project has made progress in defining habitat grouping types and in defining areas of influence of these types, which seemed perfectible points in the previous work. The first results and their uses are the subject of this form of good practice

Results from CEMAGREF work :



Results from PYROSUDOE work :

<u>The four habitat types :</u>

Isolated habitat : groups from 1 to 3 buildings separated by more than 100m from other buildings

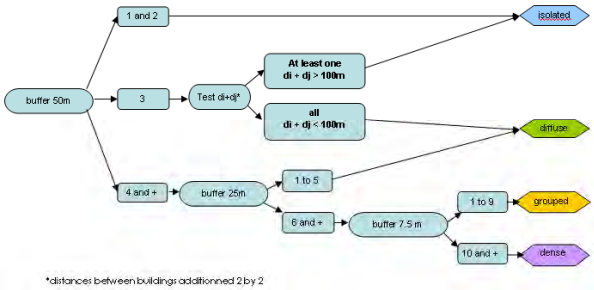
Diffuse habitat : groups from 1 to 3 buildings separated by less than 100m and more than 50m from other buildings

Grouped habitat : groups of 6 or more buildings spaced at intervals of less than 50m and more than 15m, or groups from 1 to 5 buildings spaced at intervals of less than 50m and 50m apart within a group of urban habitat, or groups from 6 to 9 buildings spaced at intervals of less than 15m.

Urban or dense habitat : groups of 10 or more buildings spaced at intervals of less than 15m

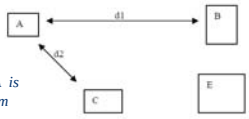
Once the buildings classified, they are grouped into habitat areas that are defined by buffers whose width depends on the type of habitat (50m for isolated habitat and diffuse habitat, 25m for grouped habitat, and 15m for dense habitat).

"Holes" with a surface lower than 1ha within a habitat area are integrated in this habitat area.

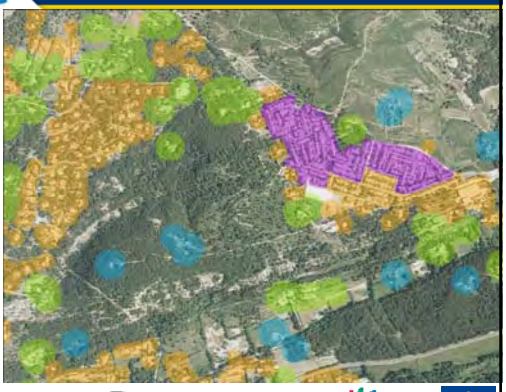


The test on groups of 3 buildings is used to identify isolated habitat in the sense of the following definition: "a building is not isolated if the sum of the distances separating it from two other buildings is less than 100m."

This definition is often used in France in the urban development measures to prohibit the construction of isolated buildings in high fire risk areas.



On this exemple, building A is not isolated if d1+d2<100m



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We then defined in these habitat areas peripheral areas and internal areas.

The peripheral areas are formed by the first row of houses facing the wildland. Considering that most houses do not exceed 20 meters in length, the peripheral areas therefore include the buffer surrounding the area (50, 25 or 15 m) with the addition of a buffer of 20 meters inland.

The parts in contact with other habitat areas or areas anthropized (infrastructure, activity zones ...) are not mapped as peripheral areas.

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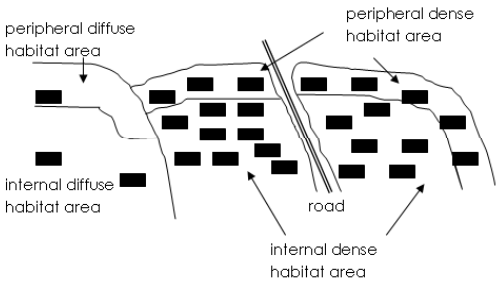

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Several uses are made of this mapping :

- It allows to refine the cartography of vegetation in these interface zones.

  Field observations of fire behavior during summer fires allowed to set rules for correcting raw maps of vegetation, such as :

  - classification of every types in the internal dense habitat area as incombustible,
  - subordination of certain highly combustible types located in peripheral dense habitat or internal grouped habitat areas into less combustible types, considering the high probability of clearing or irrigation in these areas.

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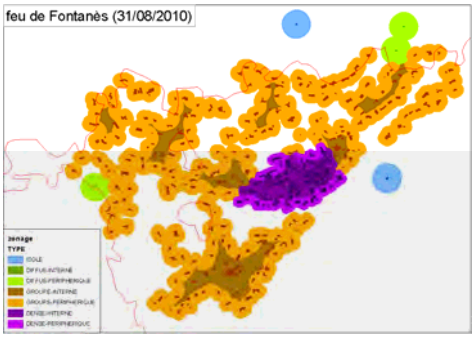
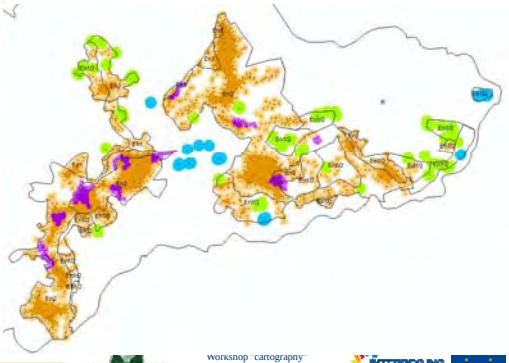
- At the departmental level, it has been used to make analysis to determine the policy of control of Legally Required Brushing in municipalities where there are the sectors most at risk which are diffuse habitat areas and peripheral areas
- At the scale of a massif, it helps better define the issues to protect and better orientate strategies and choice of equipment

- **On the scale a town, this characterization of the issues is used to define different levels of equipment and urban planning rules for the different habitat areas that do not have the same vulnerability to fire risk, but also to guide the urban planning policy of the municipality.**

Feedback after a fire showing the difference of vulnerability :



Zonage of different urbanization rules for different habitat types:



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Evolutive cartography of vegetation sensibility

To respond to a need of the Interministerial General Staff of Defence Zone South (Mediterranean region), which coordinates the activities of all extra-departmental resources (national resources and reinforcements from other departments or other zones), ONF in 2009 produced a map of sensibility of the vegetation.

This map is based on maps of stands made by the National Forest Inventory grouped into 31 types. Other factors such as biogeographic zones, altitude, sunshine, slopes, major soil types, are used to assign to these different types of combustibility indices, then translated into sensitivity levels taking the hypothesis extreme summer conditions (strong drought homogeneous throughout the zone).

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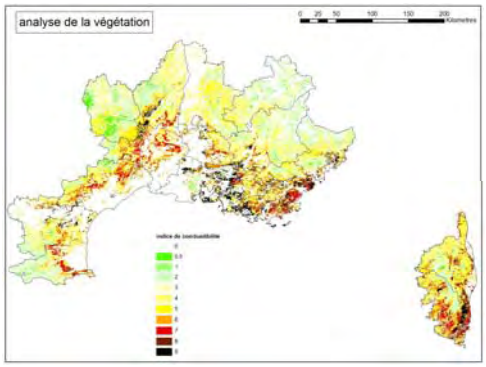

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During the seasons 2010 and 2011, ONF has developed a methodology which allows to modulate the sensitivity of vegetation according to the drought calculated by Météo-France.

Drought is an index into 5 levels calculated from the indices IH (humus index) and IS (soil index) of the Canadian method, themselves evaluated from the cumulative rainfall and evapotranspiration.

This index is calculated daily and spatialized (1km pixels), but changes very little rapidly in the absence of rainfall.

The modulated sensitivity map is generated 2 times a week plus intermediate production in case of heavy rainfall.

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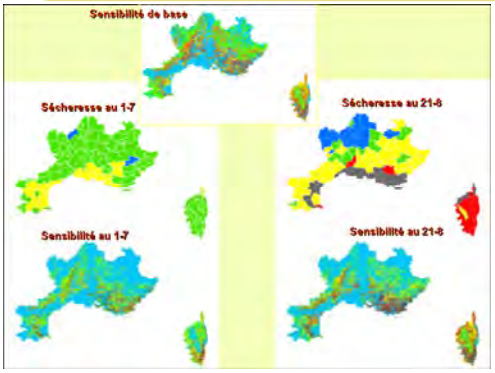
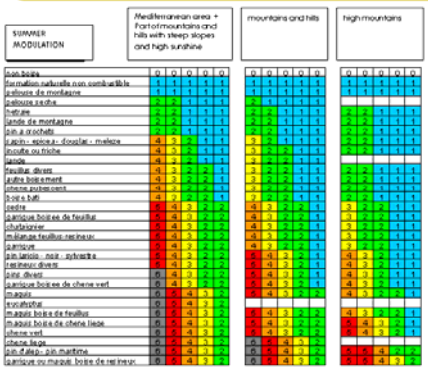


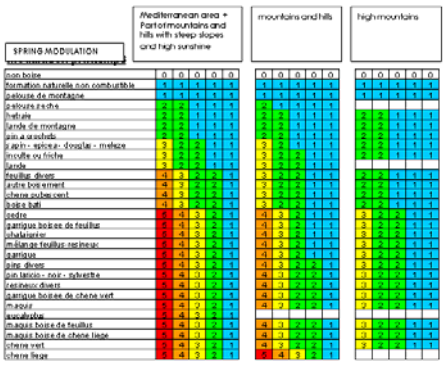
The first version of the modulation tested in 2010 consisted of increasing the combustibility index of 1 point in case of drought "very strong" and the decrease of 1, 2 or 3 point in case of drought "medium", "low" or "very low".

Feedback has shown some flaws to this method (overestimation of risk for "medium" and "high" drought, and poor evaluation in the hinterland) that has therefore evolved in 2011 :

Rather than a systematic offset of index, modulation is done by cross tables, which can take into account different behaviors, depending on stand type, biogeographic zones, slopes and sunshine.

A different modulation was also introduced for the start of the season (called "spring modulation ", versus "summer modulation ").





Evolutive cartography of vegetation sensibility

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drought 27 july 2010

Modulation « 2010 »

Modulation summer 2011 »

Evolutive cartography of vegetation sensibility

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Drought 23 may 2011

Modulation « 2010 »

Modulation « spring 2011 »

Evolutive cartography of vegetation sensibility

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Exemples of feedback

Evolutive cartography of vegetation sensibility

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Use of this tool combined to others to help on decision making

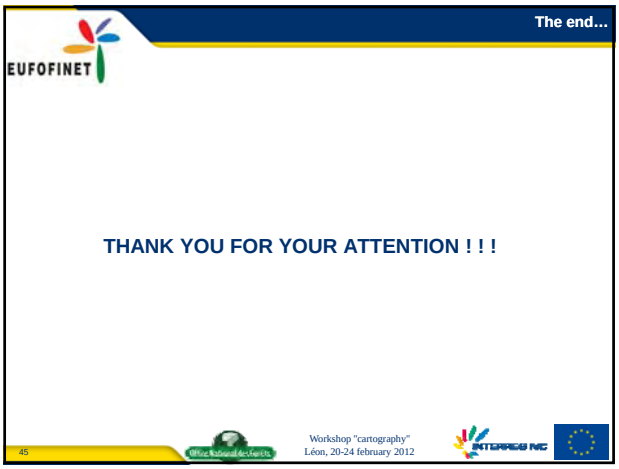
Weather danger

Natural issues

Historic of fires

Sensitivity vegetation

ETAT-MAJOR DE ZONE
DEFENSE SECURITE CIVILES


The end…
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Workshop "cartography"
Léon, 20-24 february 2012

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CARTOGRAPHY of RISK

Forest Research Institute

Józef Piwnicki
Ryszard Szczygieł
Bartłomiej Kołakowski

IBL

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Cartography of risk regarding forest fire management in Poland

Main aspects:

- **Classification of forest area in Poland**
- **Forest fire forecasting system**

Additional:

- **Forest Numerical Map**
- **National Forest Fire Information System**

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Classification of forest area in Poland

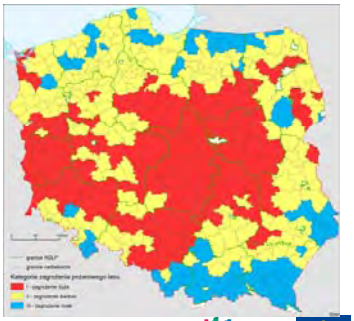
Forest fire risk category is calculated for each Forest District, every 10 years.

Forest fire risk category is based on:

- ✓ Number of forest fire during last 10 years for 1000 ha
- ✓ Type of forest stand (rich sites, poor sites, coniferous or broadleaves)
- ✓ Climatic factors: air humidity, share of days with litter humidity less than 15%
- ✓ Human factor (population density)
- ✓ Can be calculated for RD, province, subregions, districts

Categories:

- ✓ I – high fire risk (red)
- ✓ II- moderate fire risk (yellow)
- ✓ III- low fire risk (blue)



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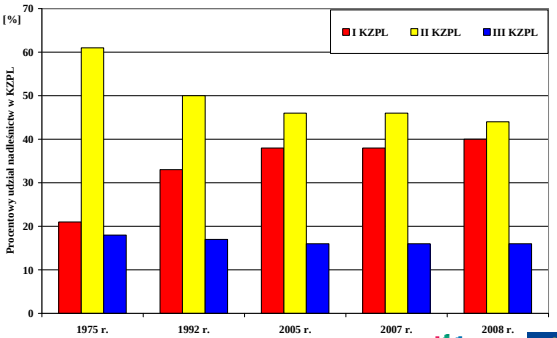
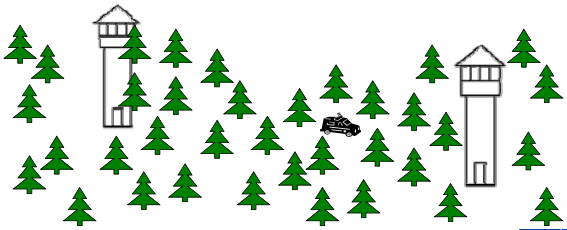


I CATEGORY

Forest District :terrain must be observed from at least two observation points (min. area 1000 ha)



I CATEGORY

Regional Directorate : access to every potential fire spot no longer than in 15 min by airplane - sufficient number of airports

I CATEGORY

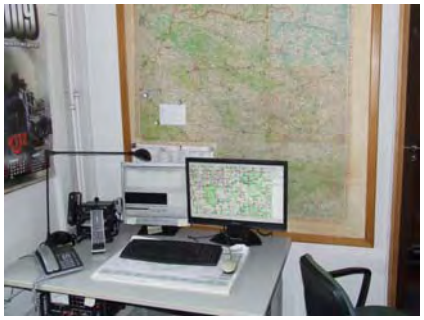
Forest district must be equipped with:

- ✓4WD vehicle with 400 l water tank and on-board fire fighting equipment : radiotelephone, GPS device, shovel, manual suppressor, axe, chainsaw and winch
- ✓ Floating pomp, plough for soil mineralization
- ✓Power generator
- ✓Tractor with suitable equipment : water cart min. 4000 l with pressure hoses
- ✓Wetting and foaming agents min. 200 l

I CATEGORY

- Water supplying point must be available in 3 km radius

I &II CATEGORY

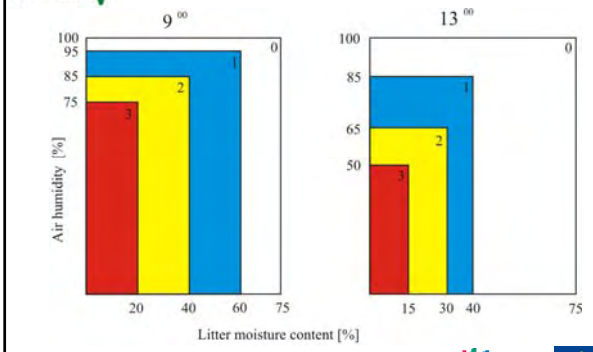


Forest Fire Forecasting System

Fores fire risk degree:

Every day (during the fire season which in Poland lasts from April till September) at 9:00 and 13:00 measurements of the following parameters:

- ✓ combustible material humidity (the index material is a sample of the upper layer of pine litter taken from pine stand aged 40-60, growing on the fresh forest site)
- ✓ air relative humidity (measurement at the height of 0.5 m in a specific measuring point)
- ✓ diurnal atmospheric precipitation, wind speed, temperature at different ground levels.



The purpose of forest fire risk forecasting is determination of fire occurrence possibility on a given day depending on dynamic weather changes.

Forest fire risk degree determines the type of organizational actions for which forest services (forest divisions or national parks) and rescue services are obliged on a given day.

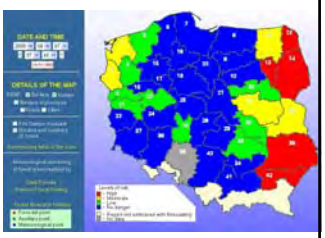
Protective measures of the RDST, FD and NP

No.	Type of Activity	Degree of Forest Fire Risk 0	1	2	3
1.	a) Alarm-command points activated (on duty)	-	+	+	+
	b) Maintenance of duties at the alarm-command points also after working hours	-	+	+	+
	c) Strengthening of duties at alarm-command points: plenipotentiaries of the chief forest officer present in the office or on stand by at home – with a transportation means	-	-	+	+
	d) Duties at observational points	-	+	+	+
	e) Dispatch of ground lookout patrols in particularly heavily endangered regions	-	-	-	+
	f) Dispatch of aerial patrols	-	-	+	+
2.	a) Personnel of special fire suppression equipment on stand by	-	+	+	+
	b) Personnel of other technical suppression equipment on stand by	-	-	+	+
3.	Public access to forest closed. Stand by for the whole Forest District or National Park personnel	-	-	-	+
4.	Take-off time needed for airplanes in the Forest Aerial Bases	-	15-20 min	to 10 min	to 5 min
5.	Coordination of activity by Regional Directorate of State Forests	+	+	+	+

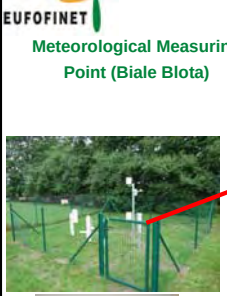
Forest fire risk degrees:

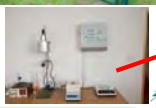
- ✓ 0- no risk (blue)
- ✓ 1- low risk (green)
- ✓ 2- medium risk (yellow)
- ✓ 3- high risk (red)

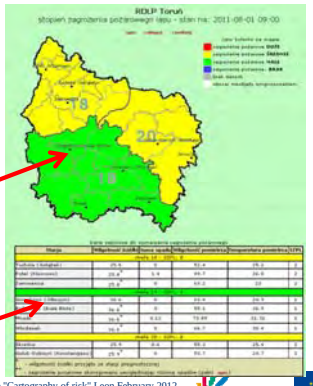
http://bazapozarow.ibles.pl/zagrozenie/



Meteorological Measuring Point (Biale Blota)







Cartography of risk

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The division of Poland's territory into forecast zones.

Cartography of risk

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Old type of the meteo station

Cartography of risk

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New type of the meteo station

Cartography of risk

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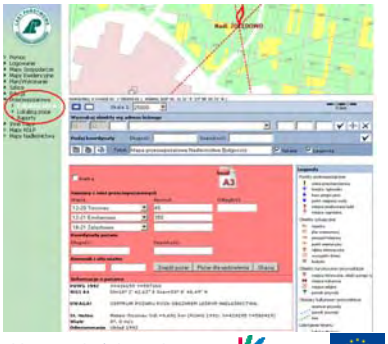
Forest Numerical Map

Location of equipment bases and other resources and tools for fire suppressions

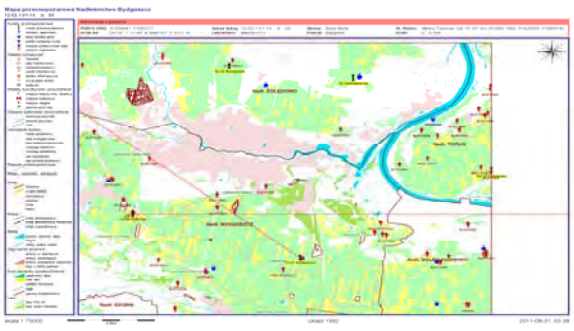
Aerial Firefighting Base, forest airport , other places suitable for firefighting planes

Operational-disposable map „Locate fire 2" is a part of eLAS server.

- It was developed for supporting the fire management.
- Outprints from the map can be a part of documentation of action taken during the fire



eLAS – the map of localisation of the forest fire (1 : 75 000)



National Forest Fire Information System (NFFIS)

Main purpose of the NFFIS:

✓Creating the nationwide base about forest, agriculture land and wasteland fires.

✓The NFFIS is a reliable data source about all forest fire sand cultivated lands in Poland.

✓The NFFIS enables the data management about forest fires and agriculture lands coming from three different sources (from the National Headquarters of the State Fire Service, the State Forests National Forest Holding and national parks) as well as makes reports and balance sheets formally of European Union.

Detailed data are made available in the different range, depending on authorizations of logged in user.

Accordingly seven user groups were formed, i.e.:

I -Administrators;

II -National parks -the level of the country;

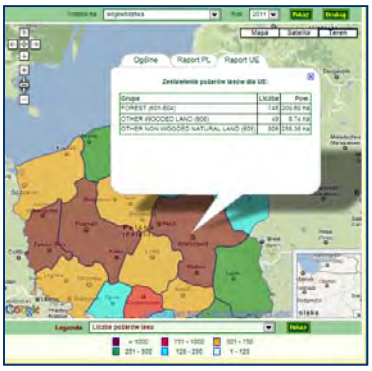
III -National parks -the level of the park;

IV -The General Directorate of the State Forests;

V -The Regional Directorate of the State Forests;

VI -The Central Statistical Office -the level of the country;

VII -The Central Statistical Office -the level of the province.

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Applications of GIS in the fight against forest fires in Galicia

1. Galicia and de forest fire
2. Priorities identified
3. XeoCode
4. Problems / solutions incurred
5. Result / Lessons learnt
6. Transferability of the specific good practice

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Applications of GIS in the fight against forest fires in Galicia

European meeting on cartography for risks and prevention

León, February 21-24, 2012

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Galicia and the forest fire

- Private character of the property.
- High production: 40% of the cut wood of Spain.
- Small plot size: Owner' high number with several pieces of land.
- Traditional use of the fire: 270,000 controlled burnings/year

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Galicia and the forest fire

Galicia:	2.039.574 ha	
Forest area:	69% area of Galicia	
	1.405.451 ha	
Woody area:	47% area of Galicia	
Type :	36% CONIFERS	
	40% BROADLEAVES	
	24% MIX OF BOTH	
Main species:	*Pinus pinaster*	28%
	Quercus robur	14%
	Eucaliptus globulus	12%
	Mix of *P. pinaster* and *E. globulus*	11%

Galicia and the forest fire

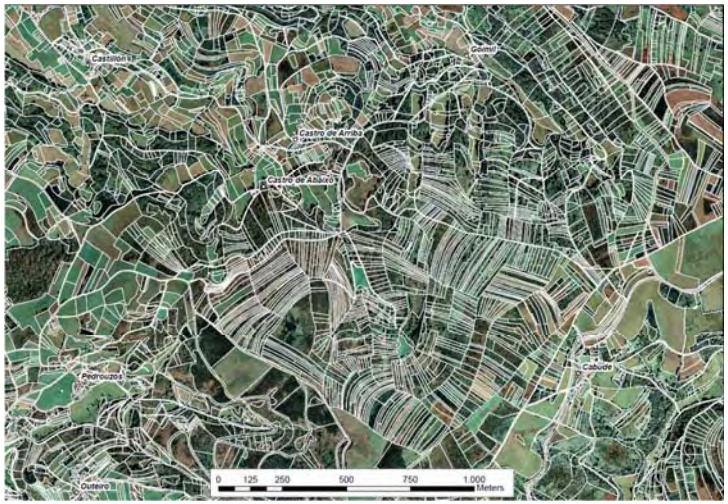
- High forest fires incidence:

  Period 1969-2008:

  46% of fires of Spain – 225,100 fires
  (minimum of 17% and maximum of 64%)

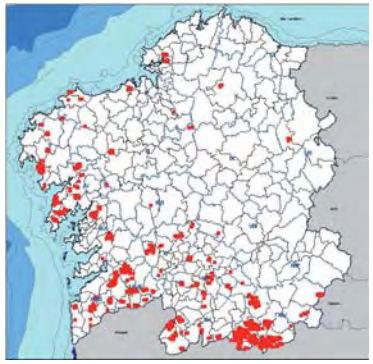
  25% of the burnt area of Spain – 1,728,000 has
  (minimum of 3% and maximum of 65%)

Galicia and the forest fire



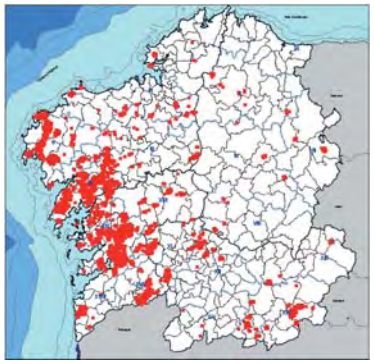
Galicia and the forest fire

Distribution of the fire in the day with greater number of fire for year (2005 and 2006)



Year 2005

1800 fires: 13th-25th/July



Year 2006

1968 fires: 3th-15th/August

Galicia and the forest fire

Number of fires and burnt area by forest fire size (1999-2008)

Galicia and the forest fire

	Nº
Workers	6.062

Means	983
Brigade	*640*
Aerial resources	*36*
Fire truck	*286*
Forward command post	*3*
Bulldozer	*18*

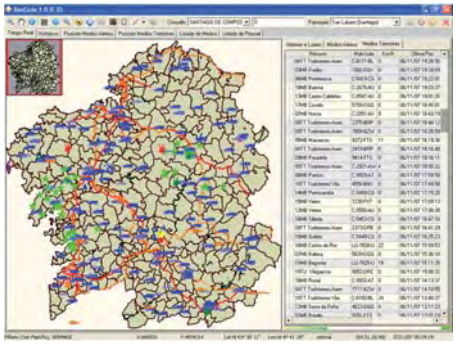
Galicia and the forest fire

Law 3/2007 of 9 April, prevention and defense against forest fires in Galicia

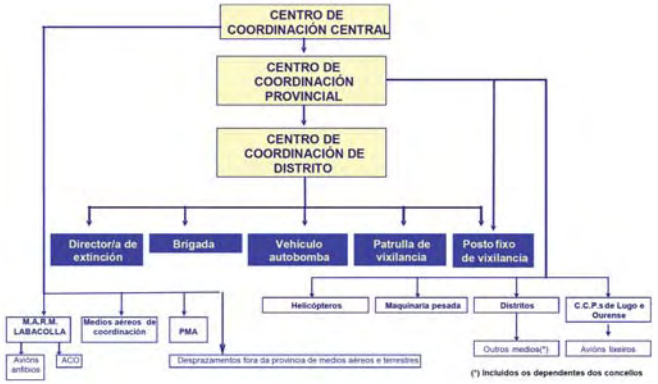
- Shall maintain a system of forest fires and keep records cartographic and computer of burnt areas and the networks of defense against wildfires of districts.
- To integrate all the necessary information in this system, will be regulated and standardized the data capture procedure.

Priorities identified

- The need for a simple visual environment that shows a global information in real time the status of the fires in Galicia.
- Need for a GIS to collect all information related to the prevention of forest fires.



Galicia and the forest fire



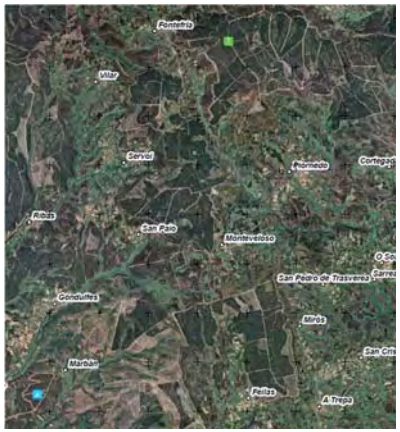
XeoCode

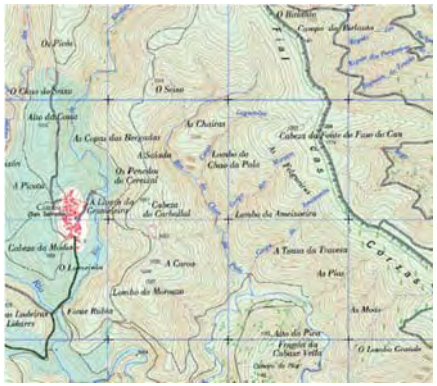
XeoCode is a **geographic information system** that can integrate, store, edit, analyze, share and display geographically referenced all the information necessary for the prevention and suppression of **forest fires in Galicia.**

There are different applications, planning instruments and information sources that provide to XeoCode the data that user wants to use.

XeoCode

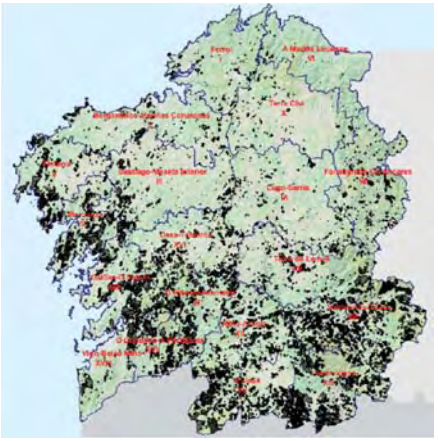
- Reference cartography





XeoCode

- Mapping of burnt areas

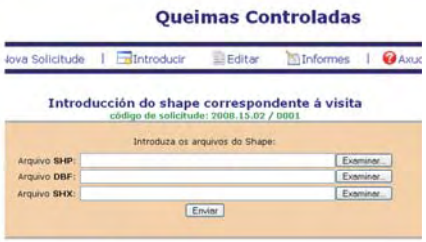


XeoCode

- Means of extinction

XeoCode

- Queco

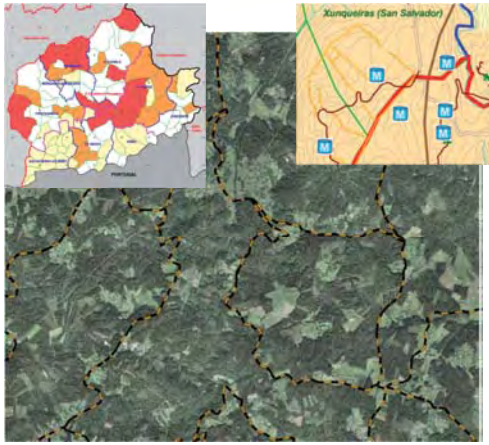


XeoCode

- Infraestructuras

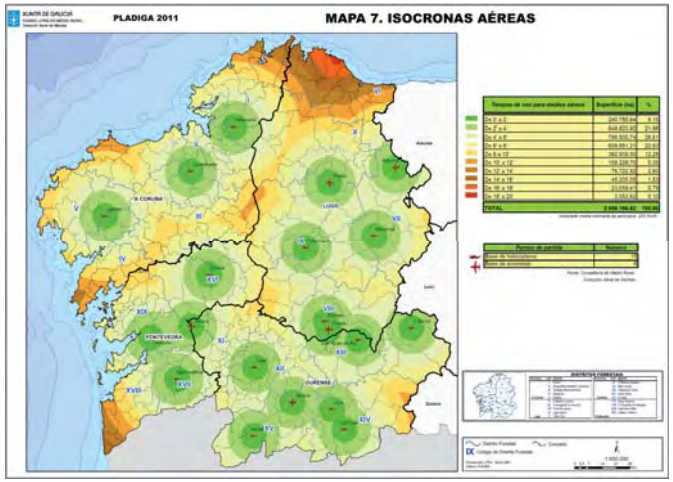
XeoCode

- Plans for prevention and protection against forest fires in each forest district



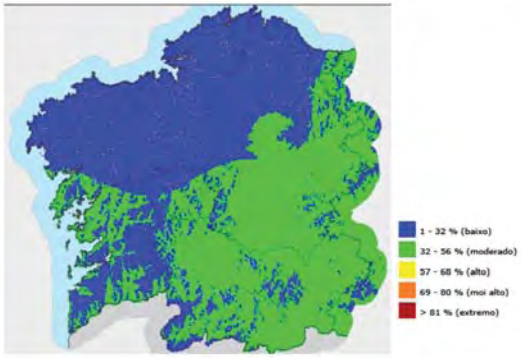
XeoCode

- PLADIGA



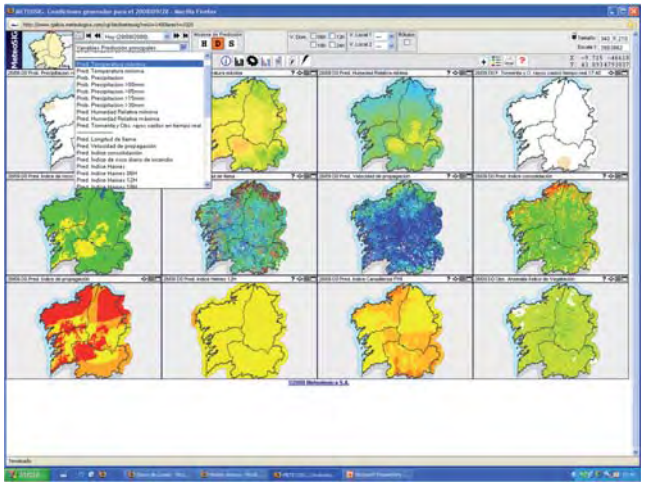
XeoCode

- IRDI



XeoCode

- Meteo

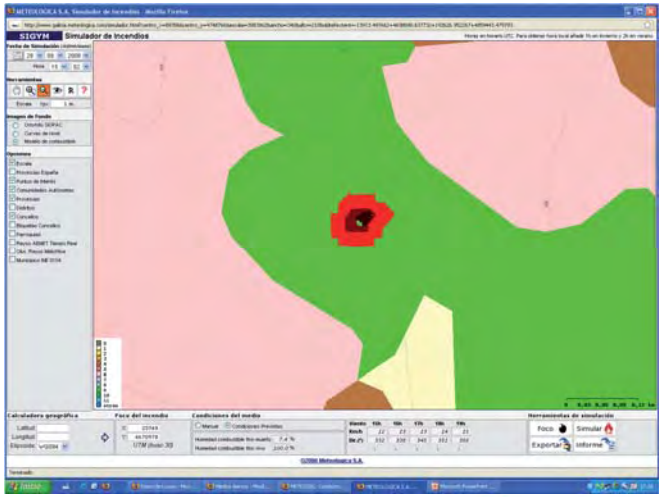


XeoCode

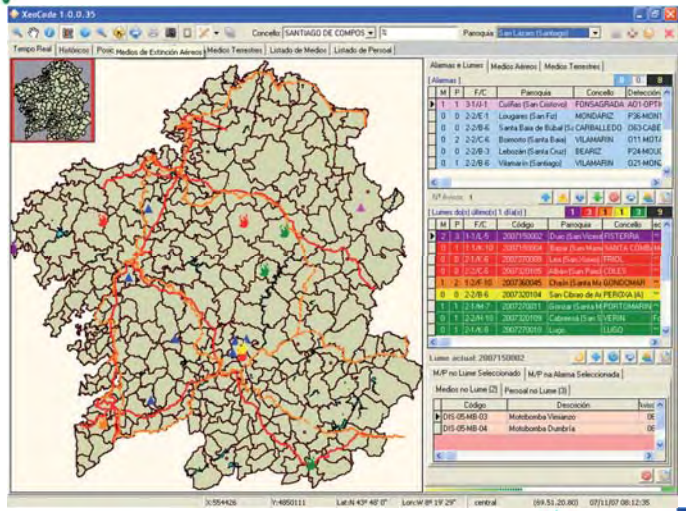
- CMA / PMA

XeoCode

- IRDI



Result / Lessons learnt



Problems / solutions incurred

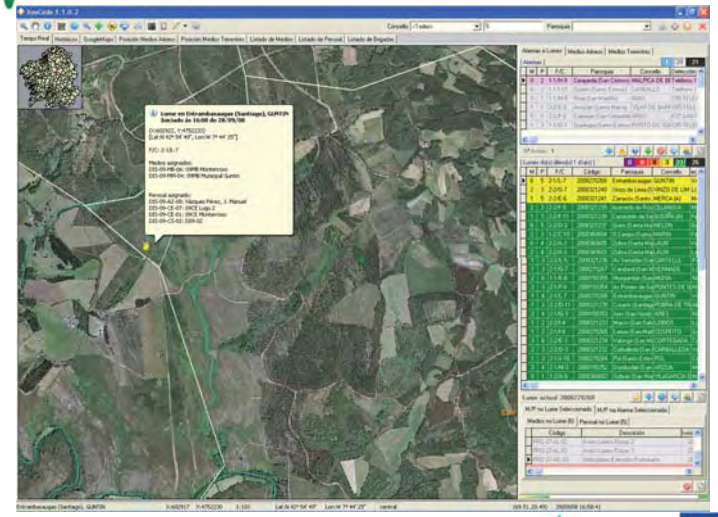
Implantation of GIS across the device

- Number of persons responsible for entering information and using it is very high.
- Many workers were not accustomed to managing computer systems.

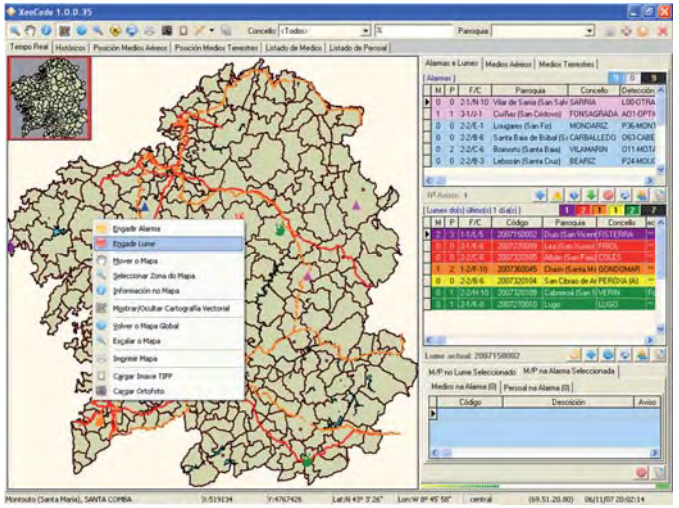
Solutions:

- Specific training for each professional category.
- Development of protocols to unify and standardize the information.
- Development of guidelines for managing the GIS.
- Support and monitor the data input from the central coordination center.

Result / Lessons learnt



Result / Lessons learnt



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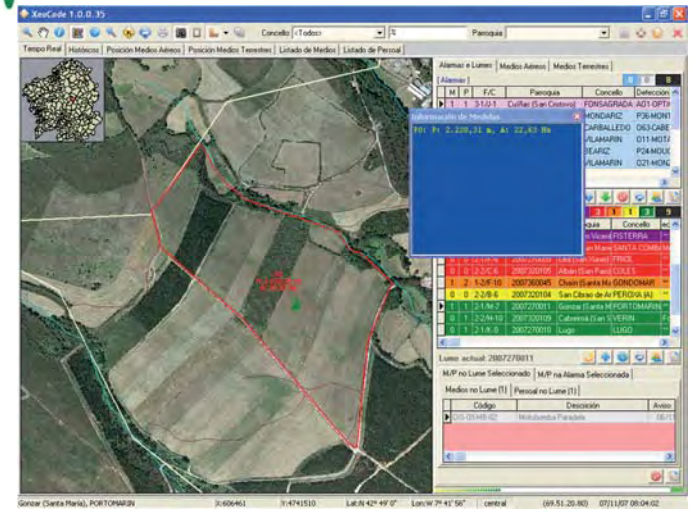
Result / Lessons learnt



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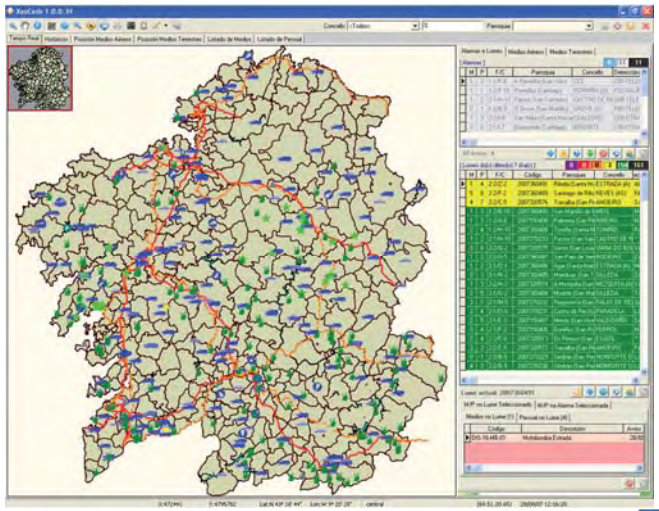
Result / Lessons learnt



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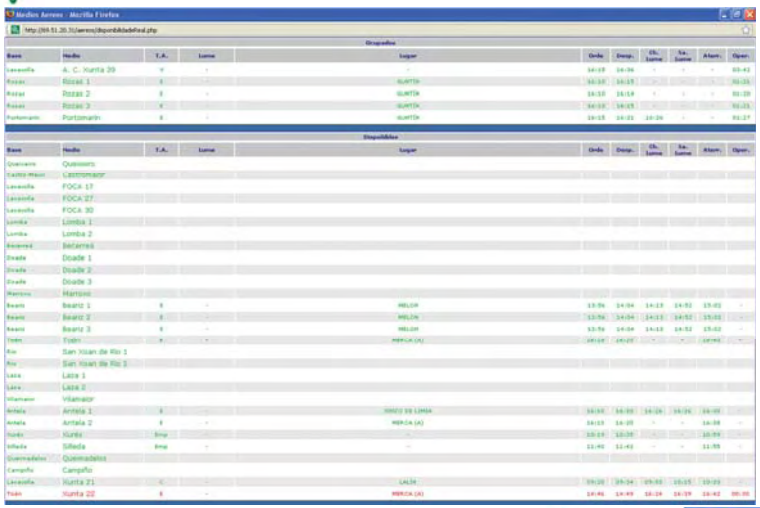
Result / Lessons learnt



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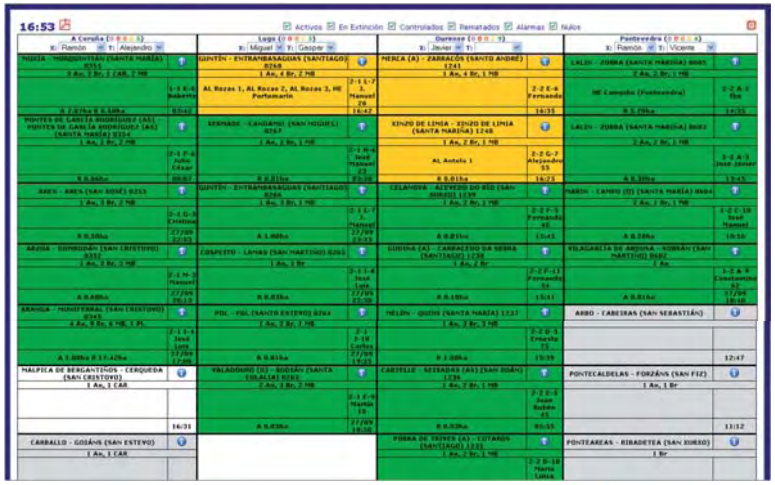
Result / Lessons learnt



Transferability of the specific good practice

Success Factors

Thanks largely to:

- Political will to improve the coordination, management and availability of information on preventing and extinguishing forest fires.
- Normative support through the law of forest fires in Galicia.
- Availability of funding.
- Demand by professionals of tools to facilitate decision making and allow for prioritizing actions.

Risk factors:

It is necessary to sustain the effort in updating information and standardizing the data so that XeoCode continue to provide its full potential.

Result / Lessons learnt

There is no systematic evaluation process and formalized. Use in all operations of extinction since 2007 has been revealed necessary improvements and these have been introduced.

All personnel in command and coordination employ XeoCode.

Applications of GIS in the fight against forest fires in Galicia

Thanks

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European meeting on cartography for risks and prevention

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EUROPEAN REGIONAL DEVELOPMENT FUND

Wildfire risk mapping: Peak District National Park, UK

Julia McMorrow

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Based on work conducted with Sarah Lindley (University of Manchester), Moors for the Future Partnership and the Peak District National Park Fire Operations Group

1

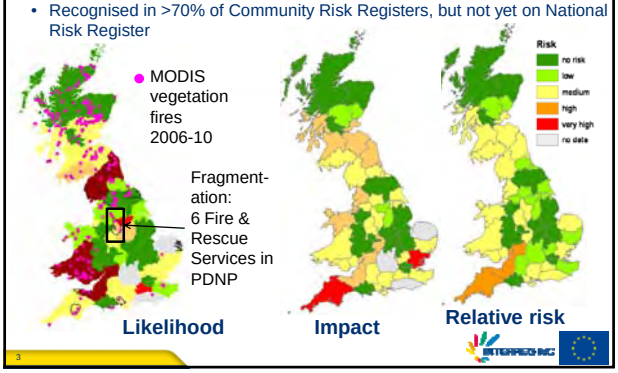
Presentation structure

1. Cartography of risk in the Peak District National Park (PDNP)
   - National and regional context
   - Academic & technical context
   - Multi-criteria evaluation (MCE) static risk map
2. How the map is used
   - Fire ponds, fire watches, fire breaks
   - Impact
   - Recommendations

2

Regional recognition and management of wildfire

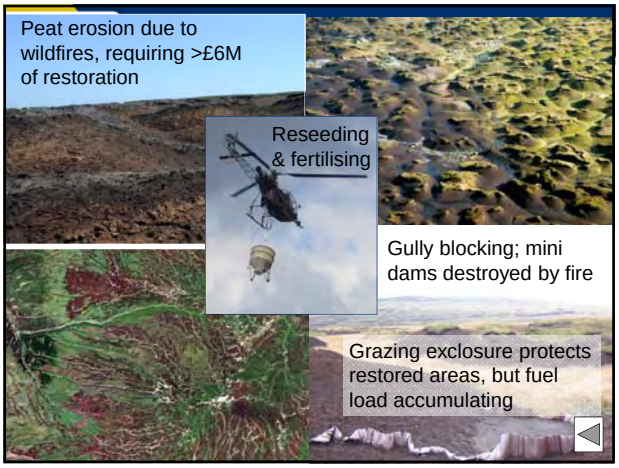
- Fragmentation: managed by >50 regional Fire & Rescue Services (FRS)
- Recognised in >70% of Community Risk Registers, but not yet on National Risk Register



3

PDNP regional context

- PDNP 1438 km^2, first National Park established 1951
- Flat plateau (not peaks!), open moorland and wooded valleys
- Blanket peat important carbon store, badly degraded by fire, pollution, etc → costly restoration



PDNP regional context 2

90% in private ownership
Home to 39,000 people; semi-natural, working upland landscape, 69% of land under agricultural subsidy

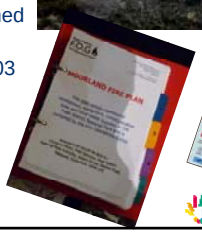
Multiple ecosystem services:
Biodiversity, carbon regulation, water supply, forestry, grazing, grouse shooting, outdoor recreation

13% is heather moor, mostly managed for grouse by burning -- controversial for biodiversity & wildfire

- Public access contributes to fire risk; 16M visitors pa. 36% is Access Land – closed at times of high fire risk, MOFSI (Met Office Fire Severity Index), Dense network of statutory rights of way remains open

PDNP regional context 3

- Wildfire management superimposed upon complex land use, land ownership and regulatory framework
  → restrictions on use of fire
- 354 fires of all sizes1976-2004
- 844 ha peat moorland burned on Bleaklow in the Easter Bank Holiday weekend 2003
- Fire Operations Group; highly successful partnership approach



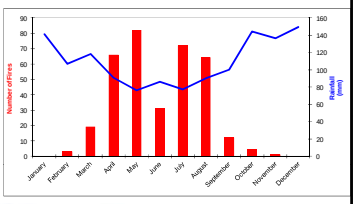
PDNP regional context 4

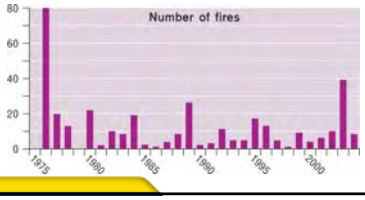
Stalybridge, July 20, 4 km2, 30 days, >£1M

Photo:Chris Ruddy, Pennine Helicopters

PDNP regional context 5

April-May and July-August are highest risk, due to the interplay between visitor numbers and the changing flammability of moorland vegetation

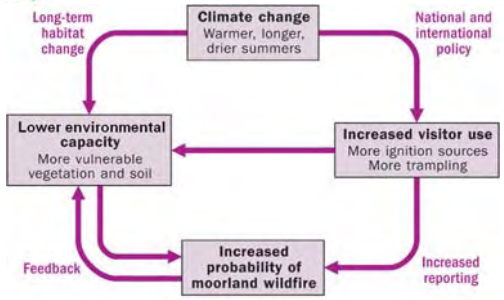




Wildfire, especially peat fires are a significant problem in drought years

9

PDNP regional context 3

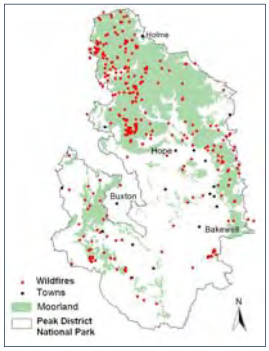


April-May and July-August are highest risk, due to the interplay between visitor numbers and the changing flammability of moorland vegetation

10

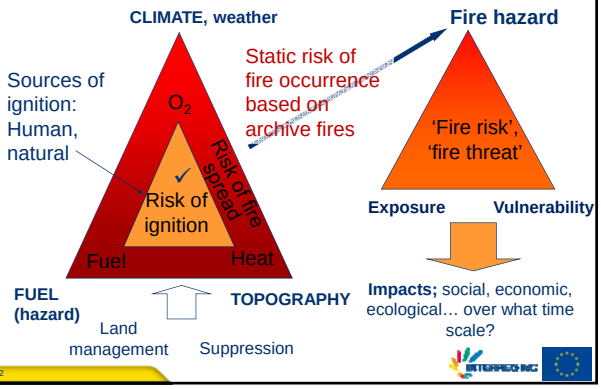
Academic & technical context

- Continuous record of fires in Rangers fire log since 1976
- Fire ground location, FRS data records rendezvous or call-out
- Clustered:
  - What factors explain this spatial pattern?
  - How does risk of fire occurrence vary over PDNP? (for fires of all sizes)
  - →GIS 'fire risk' map for FOG
- Technical context: FOG's limited access to GIS. FireGIS (operational access, location of resources, etc) in paper form



11

'Fire risk': which aspect of fire?



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Where is risk of ignition greatest?

Habitat

Aspect

Biomass. Land management (above ground fuel load). Substrate (below ground fuel)

Likelihood of drying

VULNERABILITY to ignition hazard

Distance from:

Settlements

Roads

Paths

Access Land

Car parks

Paths
- Public Rights of Way (PRoW), 'Waylines',
- Path popularity from visitor surveys

ACCESSIBILITY Source of ignition

13

5 stages in stakeholder workshop

Selecting	Which factors cause risk of ignition to vary spatially? e.g. vegetation, topography, access
Scoring	How should these factors be represented? e.g. vulnerability of each vegetation type
Weighting	What is the relative importance of each factor? e.g. Which is more important: vegetation or access? Foot or car access?
Testing	Which model predicts the pattern of risk best? How sensitive is it to variants of the input layers?
Mapping	How should the results be represented?

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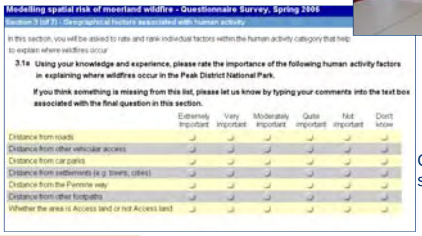
Incorporating expert opinion

Stakeholder input to:
- refine layers, scores and weights
- advise on map output



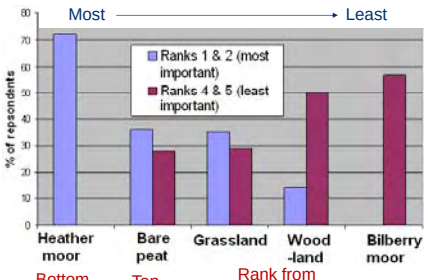
Stakeholder workshop

Online survey

15

Perceived fire risk of habitats

Online survey question: *'Rank the land cover types between 1 and 5, with 1 having the highest fire risk and 5 having the least'*



Very different to empirical scores because:
- Survey responses likely to be based on *number of fires*, not number per unit area
- Differing interpretations of 'fire risk', and of the 5 broad land cover types

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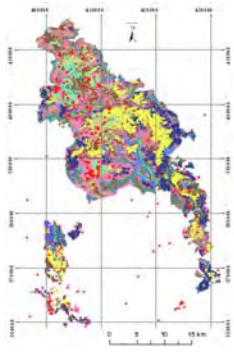
Which habitats are most vulnerable?



Each habitat assigned a fire risk score assigned:

- **Expert opinion**: online survey ranking 1-5. 'Traffic light' 1-3 score from stakeholder workshop. Great variation between stakeholders
- **Empirical score**
  = N(Reported fires per habitat)
  – N(Expected by habitat area)

Sensitivity analysis:

- **Class generalisation:**
  36, 18, 6 classes; 36 best
- **Precision of reported location**: class at fire point, modal class in 100, 200, 500 m buffers; no difference

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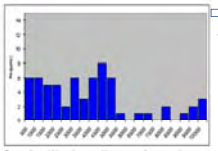
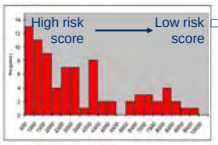
Scoring footpath layers: Frequency of fires with distance from path

Paths layers scored separately according to popularity then recombined. e.g. Pennine Way



Pennine Way long distance footpath; low popularity segment

- Scores proportional to frequency of fires in each distance buffer
- Strong distance decay away from most popular sections - most fires occur close to path



High popularity segment

High popularity layer

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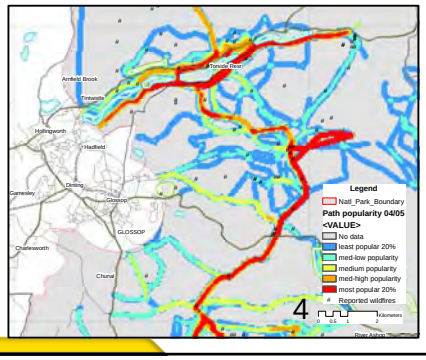
Relative path popularity

Relative path popularity 2004/5



- Popularity compiled from Visitor attitude surveys; digitised routes from *'Mark your route on the map'* question
- Used to score risk of fire with distance from path layer

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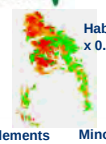
Scoring & weighting factors



Habitat x 0.23

+

Settlements x 0.158

Minor roads x 0.035

+

HiPop PW x 0.277

PRoW x 0.202

+

Waylines x 0.098

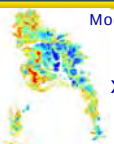
+

Initial stakeholders weights shown

Can produce perceptual risk maps based on contrasting user-defined weights

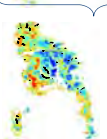
=

Model 6a



X

Open Water areas



Risk of reported fire
= weighted combinations of spatial layers

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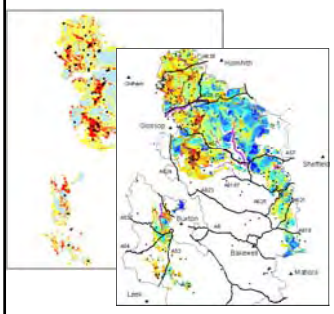
Model runs and testing



Different combinations of:

- Weightings: habitat *vs* access; foot *vs* car access (from workshop and others)
- Location buffers
- Number of habitat classes

Testing

- Developed with 60% of the fire points
- Tested with remaining 40%
- Two best models supplied for expert interpretation
- Averaged by stakeholders

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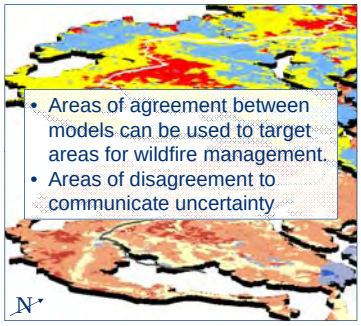
Communicating uncertainty

Best model

Value
Greater than 7.5 (max 9.5)
6.0 - 7.5
Less than 6
Pennine Way (top layer)

Difference from best model

Greater than -1 (max -2.3)
-1 - 0
0 - 1
1 - 2
Greater than 2 (max 3.0)
Pennine Way (bottom layer)



- Areas of agreement between models can be used to target areas for wildfire management.
- Areas of disagreement to communicate uncertainty

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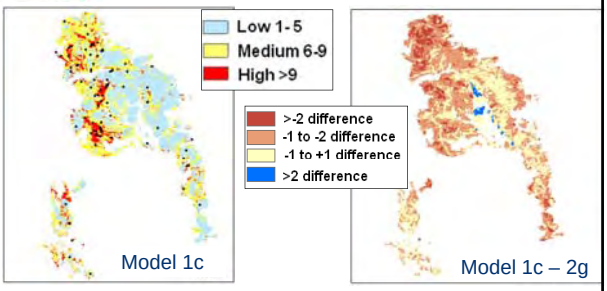
Communicating uncertainty



- Areas of agreement between models can be used to target areas for wildfire management.
- Areas of disagreement to communicate uncertainty

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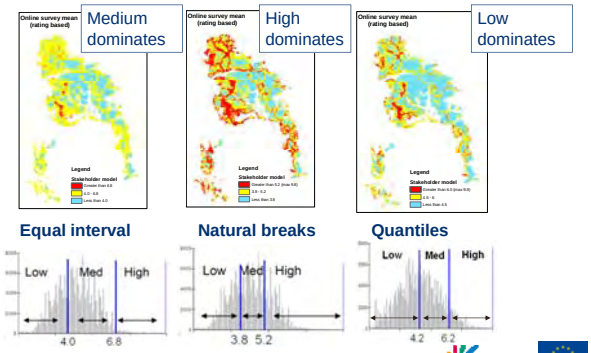
Thresholding the output



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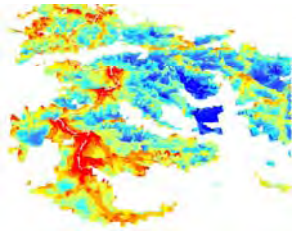
2. How the risk map is used



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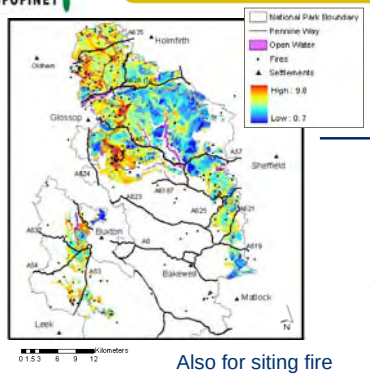
Application: fire pond location



Risk map

Helicopter turn round time

Candidate sites

Hydrogeology
Protected land, etc

Selected sites

Also for siting fire watch & fire breaks

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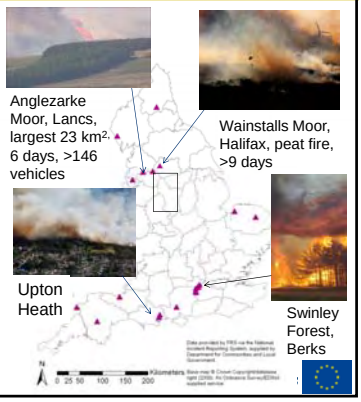
Impact

- *"Wildfire risk mapping has directly informed the design of our ranger early 'wildfire warning system'; a system that we estimate has prevented at least five potentially large incidents [since 2007]*" [PDNPA Head of Field Services, 2011]
- In spring 2011, 12 fires, largest 1 mile^2 (2.6 km^2)



Anglezarke Moor, Lancs, largest 23 km^2. 6 days, >146 vehicles

Wainstalls Moor, Halifax, peat fire, >9 days

Upton Heath

Swinley Forest, Berks

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Key recommendations

- Differing interpretations of 'risk': workshop better than online survey
- Flexibility in map output; provide digital data
- Fire ground location needed, not call-out or rendezvous point.
- Burned area needed; GPS fire scar perimeter since 2003
- Cross-referencing with Fire Service incident number
- Governance; PDNPA's leadership of FOG maintains fire database continuity & quality

Peak District National Park

Fire Operations Group

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Thank you

Report and policy brief available

julia.mcmorrow@manchester.ac.uk

www.fires-seminars.org.uk

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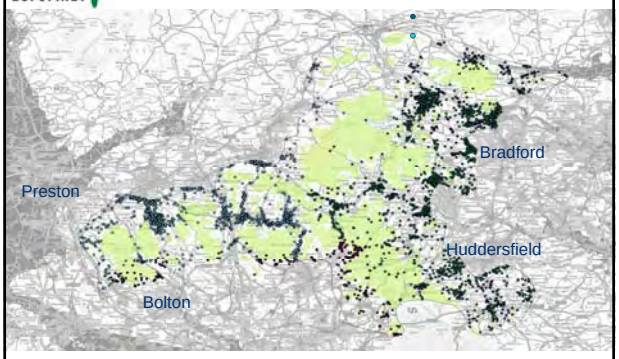

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3. UK spring 2011 wildfires

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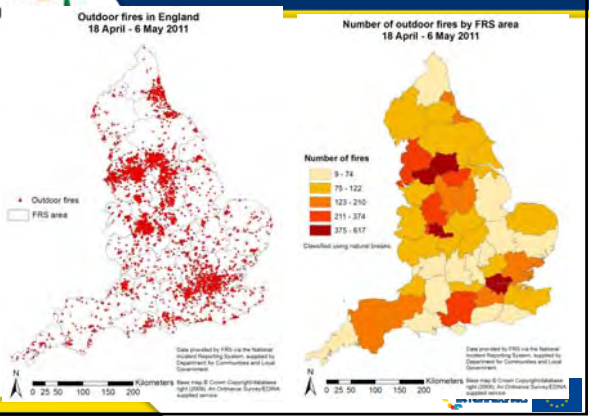

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Regione Toscana

Cartography of Risk Experiences in Tuscany

Giacomo Pacini – Enrico Marchi

Donor partner: Regione Toscana - Italy

Workshop León – Spain
21 - 22- 23 February 2012

INTERREG IVC

EUROPEAN REGIONAL DEVELOPMENT FUND

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In Tuscany the cartography of risk is developed at different levels, and namely:

1. Static risk map
2. Dynamic risk map
3. ODIF Map
4. IRM Map

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1. STATIC RISK MAP

✓ The model takes into account the most important parameters that characterize the Mediterranean ecosystem and affect the wildfire events.

✓ The input parameters for the model are:

1. FOREST FIRE DATABASE (AIB);
2. ROAD NETWORK AND URBAN AREAS;
3. REGIONAL FOREST INVENTORY
(forest regional inventory at 400 m);
4. DTM (elaborated at 90 m to make the layer easier to use);
5. METEO DATA (metereological station network) .

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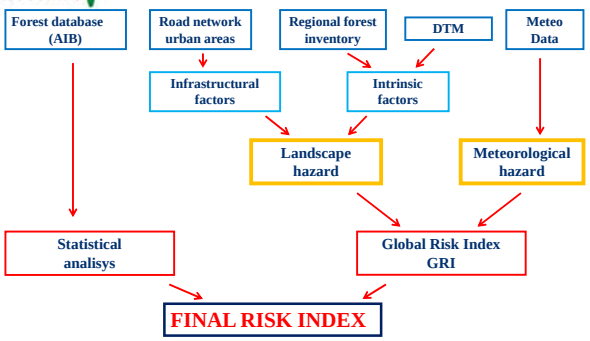

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1. The Landscape hazard

1.1 Intrinsic Factor → • The Intrinsic Factor is obtained considering morphological features as topography (slope and aspect), land use and vegetation cover ;
• considers also the influence of vegetation on the fire ignition and its consequent behaviour.

1.2 Infrastructural Factor → • Is obtained considering urban areas and road network; in particular it involves road network density for square kilometers and considers the distance from the urban areas.

Finally the Landscape Hazard is computed in raster format as a weighted sum of the previous factors

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2. Meteorological hazard

• The main factors are climatic and microclimatic conditions and vegetation status;

• Start and spread of a forest fire are strongly conditioned by the past and present meteorological situation and by the vegetation water content;

• Meteorological factors are combined by the model to elaborate two different meteo-related hazards:
  • Thermal Hazard Factor (THF), computed by means of the maximum air temperature analysis ;
  • Drought Hazard Factor (DHF), that takes into account the net rain and the days-since-rain number

• **This analysis is performed on the daily data but produces a seasonal index.**

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The landscape and meteorological hazard are mathematically combined in the model to obtain the Global Risk Index (GRI)

⇉ the global index may be integrated with the statistic information elaborated from the Region (AIB)

⇉ finally we obtain the Final Risk Index in raster format that can be superimposed on a topographic regional map.

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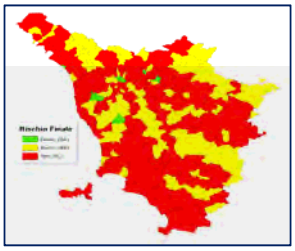
The final risk can be visualised at **two different levels;** a raster layer with the Global Risk classes (**Three classes**) expressed for each pixel, or a Final Risk (global + statistic) that shows the risk for each Municipality (Three classes: low; medium; high).



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✓The Final Risk for each Municipality is used to develop the forest fire prevention planning and grant funds for developing prevention activities.

✓ This map is included in the Operational Plan for fire prevention of Tuscany Region (2009 – 2011);

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2. DINAMYC RISK MAP

This index is calculated applying the Fire Weather Index (FWI) (Canadian index)

In order to calculate and map the index the following steps are followed:

1. meteorological data collection from the regional station network;

2. Daily spazialization of the meteorological variables by means of
↳ algorithm **daymet** (www.daymet.org) implemented by LaMMa (pixel= 1km)

3. Calculation of the following indices included in the Canadian method:
- FFC (Fuel moisture - indicator of the relative ease of ignition and the flammability of fine fuel).
- FWI (is a numeric rating of fire intensity).

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Maps produced

- **Hazard map.** Represents the distribution of the risk on the basis of the data collected (pixel 1km).

- **Forecast hazard map**:
Based on the forecast models developed by LaMMA
The forecast models allow to calculate and map the maximum hazard for three days;
run0 - the same day of the data
run1 - the day after
run2 - 2 days after

Average values are calculated for each Municipality and each index: FFC (run0 - run1 - run2) e FWI (run0 - run1 - run2)

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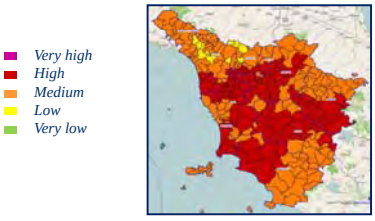
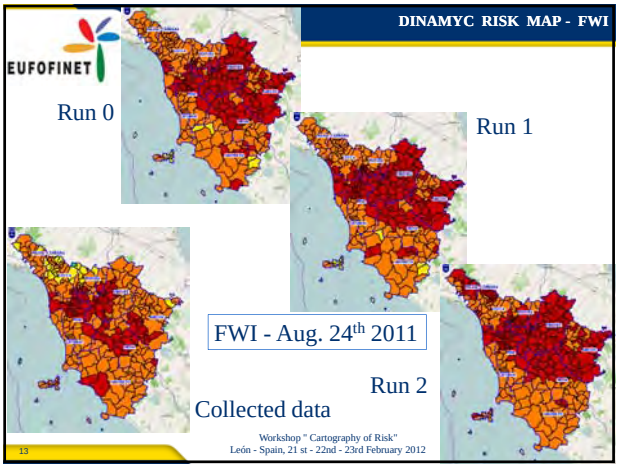
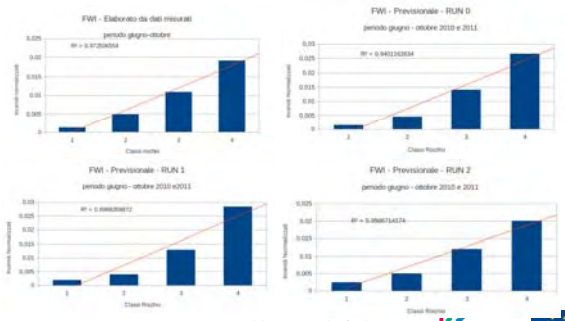
•**Five risk classes** are given for both indices: *very low; low; medium; high; very high*;
•The maps are available on the net by means of a web service based on the standard of the Open Geospatial Consortium.





The Fire Weather Index (FWI) fits quite well the Tuscany conditions



Use of the maps

On the basis of the daily bulletin of the dinamic risk level each Province has to provide at:

- The assessment of the risk level in each operational area, i.e. the area in charge at each fire boss;
- if the FWI for the day and the next two days is high, sharing the high alert level among the firefighter agencies and organizations in the area.

The high alert level requires:

- the improvement of surveillance and patrolling activity in the area;

- the assessment of the ground firefighting engine availability in order to guarantee their readiness.

If the FWI and the wind speed are both high each Province has also to alert the “police” agencies (National Forest Service, Provincial police, Municipality police) in order to organize patrolling activity. This activity is necessary to avoid dangerous behaviours of citizens and arsonist.

3.ODIF MAP

✓Assessment of the efficiency and effectiveness of firefighting;
✓ODIF analyses several factors affecting the suppression activities carried out by aerial and ground resources;
✓ODIF model was applied to 70,000 hectares and is still in experimental phase.

✓ ODIF is the combination of two main indices:

1. GROUND OPERATIONAL DIFFICULTY INDEX (*GODI*)
2. HELICOPTERS OPERATIONAL DIFFICULTY INDEX (*HODI*)

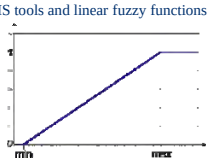
GROUND OPERATIONAL DIFFICULTY INDEX

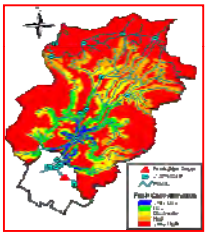
1.VAT (vehicles access time) determines the efficiency in initial attack

2.VST (vehicles supply time) determines the difficulties in water refuelling

3. FOD (firefighters operational difficulty) describes the difficulty for firefighters to reach the burning area from the closest road.

VAT – VST - FOD are determined using GIS tools and linear fuzzy functions



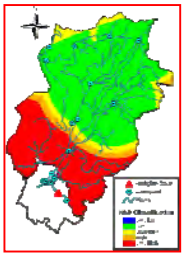


GODI value in each pixel is determined by a weighted sum of the previous variables.
Weights are determined by AHP analysis

HELICOPTER OPERATIONAL DIFFICULTY INDEX

1. HAT (helicopters approach time) determines the efficiency in the initial attack

2. HST (helicopters supply time) determines the difficulties in water refuelling



HODI has been calculated using the same procedure applied to GODI

Data input

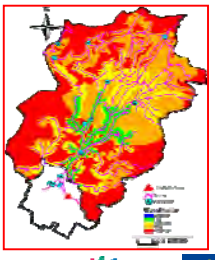
- DTM (digital terrain model) with 10 m of resolution
- Geographical data of infrastructures (road network, water point, helicopter and firefighter bases)

❖ **Ground Operational Difficulty Index (*GODI*)**=
(VAT*0.455) + (VST*0.289) + (FOD*0.256)

❖ **Helicopters Operational Difficulty Index**
(***HODI***)= (HAD*0.345) + (HSD*0.655)

⇩

ODIF= (GODI*0.712) + (HODI*0.288)



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RESULTS:

✓ **Maps in raster format where each pixel is the value of ODIF index**

✓ **Four classes:**

Class 1: LOW RISK; planning and prevention are not necessary;

Class 2: MODERATE RISK; There may be some specific procedures and prevention activity (*organizing and managing forest patrolling*);

Class 3: HIGH RISK; Medium and long term planning (*scheduling fuel management actions; planning forest fire infrastructure allocation and features)*

Class 4: VERY HIGH RISK; Specific procedures of prevention and planning of infrastructure - short-term

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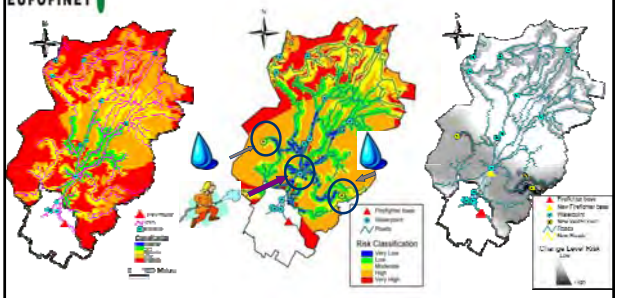

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4. IRM MAP

- Map of infrastructure risk in Wild-Urban Interface areas
- **Based on the operational guidelines of the National Department of Civil Protection.**

-A wildland-urban interface (WUI) refers to the zone of transition between unoccupied land and human development;
- These lands and communities adjacent to and surrounded by wildlands are at risk of wildfires

The map was built for the province of Florence and is still in experimental phase.

"Touristic infrastructure" (such as hotel, camping, residence, ect.) ware taken into consideration (many people may be threatened by forest fire during the fire season).

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The work follows these steps:

- Identification of tourist structures in the Province of Florence

- Definition of a survey sheet

- Census on the structures → - volunteer firefighter associations
- Civil Protection office – Province of Florence

- Collection of data in a database

- Risk analysis and mapping

IRM MAP

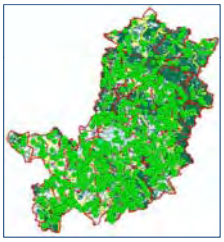

PROVINCIA FIRENZE

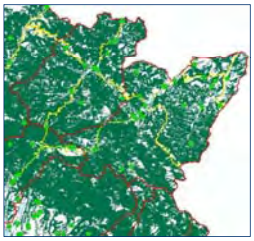
C.V.T.

APPENDICE AI FINI DI ANTINCENDIO BOSCHIVO

IRM MAP METHODOLOGY

Then the data were uploaded to GIS in relation to vector information concerning wooded areas





IRM INDEX METHODOLOGY

The tables for the assignment of values are as follows :

FOREST CONTACT	No contact	0
	Limited contact	1
	Continuous contact on uphill or lateral side	2
	Continuous contact on downhill side or completely surrounded	4

DISTANCE MAIN ROADS (Km)	= 0	0
	0,05 ÷ 0,5	1
	0,5 ÷ 1,5	2
	≥ 1,5	3

SLOPE	Flat	0
	Steep	1
	Very steep	2

Firefighting vehicles ACCESSIBILITY	YES	0
	NO	1

PRESENCE OF Dangerous STRUCTURES	YES	1
	NO	0

Urbanized	0
Coltivated	1
Wetland	2
Abandoned forest	3
Deciduous forest	4
Conifer forest	5

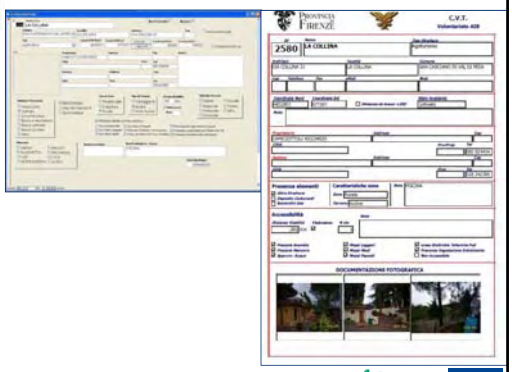
ENVIRONMENT SURROUNDING

HIGH	Over 14
MEDIUM	Up to 14
LOW	Up to 10

Total hazard

IRM RESULTS

	MARRADI	SCANDICCI	GAMBASSI TERME
STRUCTURES WITH HIGH HAZARD	3	0	0
STRUCTURES WITH AVERAGE HAZARD	3	6	8
STRUCTURES WITH LOW HAZARD	10	6	13

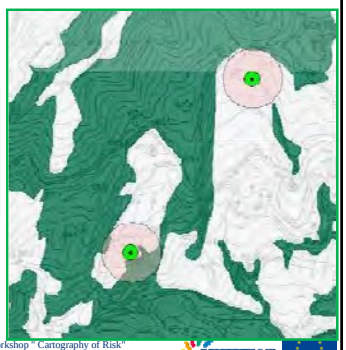


Recent development

The input variables:

1. **Slope;**
2. **Historical fire incidence;**
3. **Vegetation (Fuels);**
4. **ODIF Index**

In the risk analysis a buffer of 250 m around the structure was taken into consideration



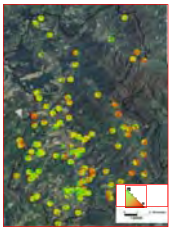
In the model, the values of the variables were normalized and spatialised using a linear function

IRM = weighted sum of the variable values

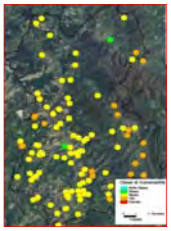
IRM=[(IS*0.099)+(IF*0.191)+(IV*0.338)+(ODIF*0.372)]

Weights are determined by AHP analysis

The final product is a pixel map classifying five levels of risk useful to decision makers in planning prevention action and in establishing priorities.



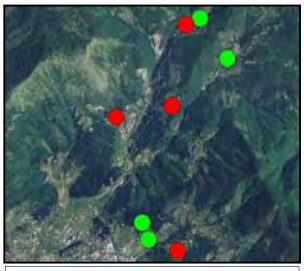
Value	Level	Class
0.00 –0.20	Very low	0
0.21 – 0.40	Low	1
0.41 – 0.60	Medium	2
0.61 – 0.80	High	3
0.80 – 1.00	Very High	4



Which actions after this analysis?

Vegetation (green points) and fire-fighting difficulties (red points) are the two variables we can act on.

Municipality	Medium Vuln.	Variables	High Vuln.	Variables
Calenzano	6	3 vegetation 3 ff difficult	2	1 vegetation 1 ff difficult
Greve in Chianti	93	80 vegetation 13 ff difficult	23	13 vegetation 10 ff difficult
Scandicci	25	24 vegetation 1 ff difficult	5	3 vegetation 2 ff difficult



Variable dominance on vulnerability (Calenzano Municipality)

- The study of WUI involves multiple disciplines and consequently requires the cooperation of various actors (forest fires specialists, fire brigade specialists, researchers);
- The study only evaluates variables connected to the forest sector, but the model could easily be adjusted to accept data from different fields (i.e. the evaluation of building characteristics and materials).

Many thanks for your attention

Which weight for different variables? Analytic Hierarchy Process (AHP)

When a number of variables must be compared, the major difficulty consists in assigning the level of importance (weight) that each variable must assume in the model. AHP is a mathematical method for relating subjective preferences (interview) of an individual or a group of individuals within a decision-making process. A group of experts (forest/firefighting workers, researchers, rural citizens) was interviewed in an effort to identify these values. The AHP allowed the opinions of these decision-makers to be compared, and consequently provided for a more objective quantification of the factors analyzed.

Values for parallel comparison	
Value	Value definition
1	Equal weight
3	Low difference
5	High difference
7	Very high diff.
9	Total prevalence

EUROPEAN MEETING ON FOREST FIRES PREVENTION
Workshop "Cartography of Risks"
21st-23rd February 2012, León, Spain

Forest Fire Risk Cartography:

Methodology and Appliances

Viviane Ascenso
Batalha Municipality

Model of Forest Fire Risk in Portugal: Methodology

- The methodology to create the FOREST FIRE HAZARD MAP and the FOREST FIRE RISK MAP was defined by the National Forest Authority and all the municipalities in Portugal had adopted this methodology, using the tools of the Geographic Information Systems (GIS).

$$\text{Risk} = \underbrace{\text{Susceptibility} \times \text{Probability}}_{\text{Hazard}} \times \underbrace{\text{Vulnerability} \times \text{Economic Value}}_{\text{Consequences}}$$

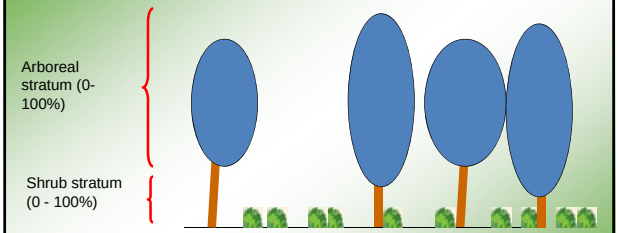
Source: J. C. Verde and J. L. Zêzere

Assessment of Forest Fire Hazard using the Land Use Map and Fuel Model Map

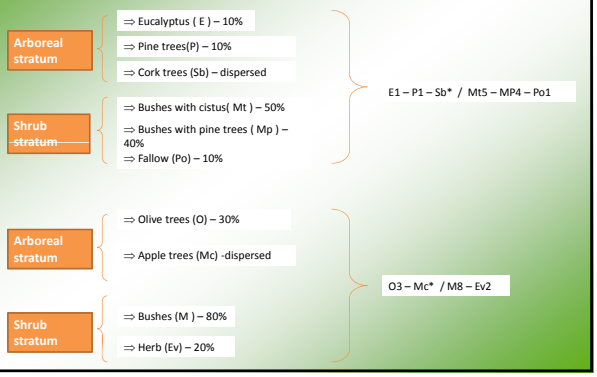
LAND USE CARTOGRAPHY

New concepts:	Characterization of land use by species and by strata of forest
Data base:	All the homogenous polygons of the land use are introduced on the data base
Collection of data:	Strict delimitation of the polygons + fieldwork data collection
The data base is created using GIS	In order to quickly build several thematic maps that can ensure the multiple use of information

Assessment of Forest Fire Hazard using the Land Use Map and Fuel Model Map



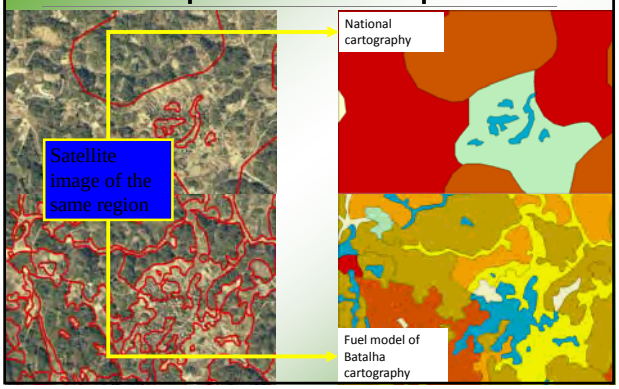
Assessment of Forest Fire Hazard using the Land Use Map and Fuel Model Map



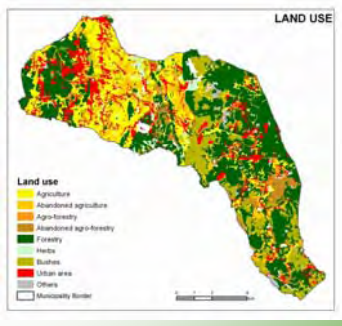
Assessment of Forest Fire Hazard using the Land Use Map and Fuel Model Map

GROUP	TYPE	DESCRIPTION
Without fuel	0	Relevant
Herbaceous	1	Low herb
	2	Low herb with some bushes
	3	High herb
Shrub	4	High bushes more than 2m
	5	Low bushes
	6	Medium bushes
	7	Medium bushes more flammable
Leaves on the soil	8	Small leaves
	9	Big leaves
Remains of cuts	10	Fallen trees
	11	Small remains of cuts
	12	Big remains of cuts
	13	Big acumulations of wood

Assessment of Forest Fire Hazard using the Land Use Map and Fuel Model Map

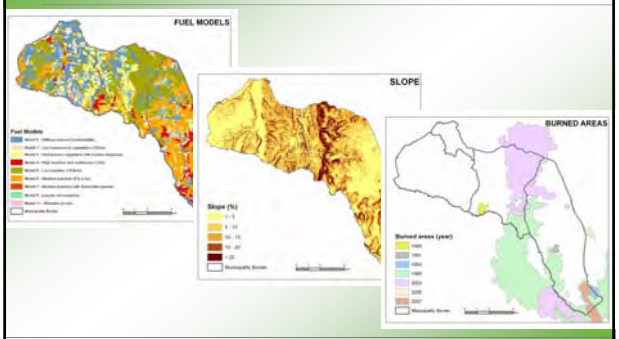


Assessment of Forest Fire Hazard using the Land Use Map and Fuel Model Map



Forest Fire Risk Cartography: Methodology and Appliances

Assessment of Forest Fire Hazard using GIS



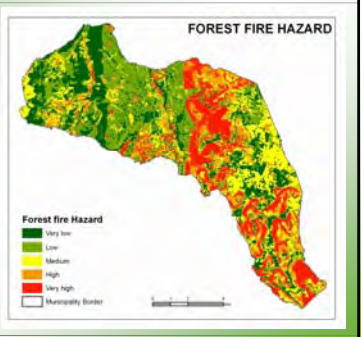
Forest Fire Hazard: Methodology

SUSCEPTIBILITY / PROBABILITY / HAZARD

FUEL MODELS
X
SLOPE
X
BURNED AREAS (RETURN PERIOD)

=

FOREST FIRE HAZARZ



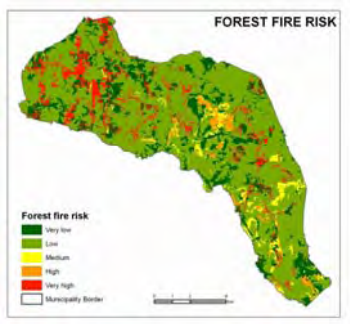
Forest Fire Risk: Methodology

HAZARD / CONSEQUENCES / RISK

FOREST FIRE HAZARD
X
VULNERABILITY
X
ECONOMIC VALUE

=

FOREST FIRE RISK



Forest fire hazard: Appliances

- The Forest Fire Hazard is the most important map to plan and execute the policies of forest fire prevention in Portugal.
- By the Decree-Law n.º 17/2009, 14th January, on the classes HIGH and VERY HIGH, of the FOREST FIRE HAZARD MAP, it is forbidden to:
  - Construct any kind of buildings, like houses, industries, commerce or service buildings.
- All the interventions and investments to improve and build new forest roads, water tanks, lookout towers, forest fuel management and other infra-structures need to ensure the information of the FOREST FIRE HAZARD MAP.

The Forest Fires in Batalha Municipality

The Forest Fires in Batalha Municipality

- Over the past 2 decades, Batalha municipality was strongly affected by big fires;
- In 1995, in a forest fire with 4200ha ,burned in Batalha Municipality 1400ha of forest;
- In 2003, in a fire with 2700ha, burned in Batalha municipality 1200ha1 of forest;
- In the last 2 decades, 42% of the forest burned in Batalha Municipality.

Burned areas in Batalha Municipality

Forest Fire Defense in Batalha Municipality

After 2003 Fire

Biggest concern with the forest defense against fire

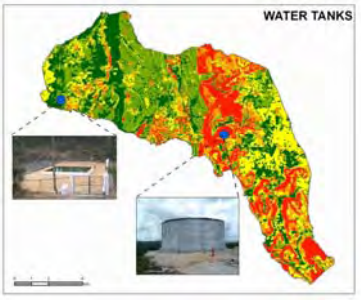
Increased investment in preventive and surveillance of fire

Creation of the Forestry Technical Office
Preparation of the Municipal Plan of Defense Against Forest Fires

Forest fire hazard: Appliances Using Geographic Information System (GIS)

- By the Decree-Law n. 17/2009, 14th January, municipalities has obligations in the forest fire defense and needs to invest in prevention.
- The investments needs to carefully focus on the most dangerous areas, using the tools of GIS software and using the FOREST FIRE HAZARD MAP.

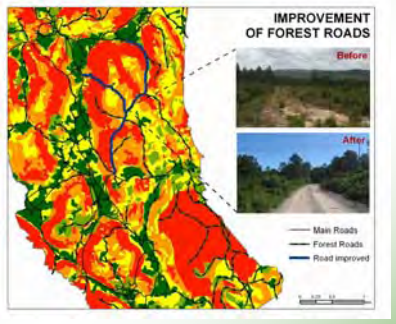
Forest fire hazard: Appliances Water tanks investments



Water Tank *Calvaria de Baixo*
Width: 10m
Length: 10m
depth: 4m

Water Tank *Serra da Andorinha*
Ray: 5m
Height: 4m

Forest roads investments



***Forest roads improved in 2007* = 10,6 km**

***Forest roads improved in 2008* = 11,7 km**

Fuel Management investments

Constitution of the Forest Team in 2007

Fuel management in Urban Areas

Fuel management in Urban Areas

Industrial Parks Investments

Industrial Parks Investments

Fuel management in Forest Roads

Fuel management in Forest Roads

PRODER (funded project) investments

The importance of prevention

Forest Fire Risk Cartography:
Methodology and Appliances

Viviane Ascenso
Batalha Municipality
viviane.ascenso@cm-batalha.pt
or gtf@cm-batalha.pt

FIELDTRIP PROGRAM

- 09h00 – 10h00 Objectives and presentation of the fieldtrip
- 10h00 – 13h00 Transfer to 1st demo, focused on burns.
- 13h00 – 14h00 José Carlos García (Junta de Castilla y León) Presentation of preventive works (thinning, pruning and clear-cuts operations; firebreaks)
- 14h00 – 15h00 Lunch break
- 15h00 – 16h15 Transfer to 2nd demo, focused on firebreaks.
- 16h15 - 17h30 Transfer to 3rd demo, focused on thinning, pruning and brush-out works.
- 17h30 – 18h00 Transfer back to the Defense against Fire Center.
- 21h00 Official dinner. Meeting point: Hotel Tryp hall

1

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FOREST FIRES PREVENTION STRATEGY IN CASTILLA Y LEÓN

INTERREG IVC

EUROPEAN REGIONAL DEVELOPMENT FUND

CASTILLA Y LEÓN

A VALUABLE TREASURE TO PROTECT

CASTILLA Y LEÓN

1.- Big dimension

- 9,4 mill ha total surface
- 4,8 mill ha forestry surface
- 3,0 mill ha wood f. surface

2.-Small population and density

- 2,5 millions inhabitants
- 27 inhab./km2

3

CASTILLA Y LEÓN

An hetoregoneus territory

Of diversity!

4

CASTILLA Y LEÓN

A landscape modellled by the settlement

CASTILLA Y LEÓN

With two tools

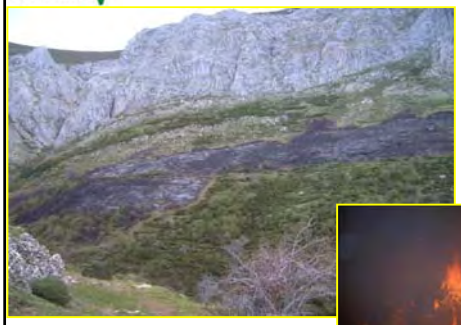
Farming...

And livestock!

CASTILLA Y LEÓN

And a tool...

Fire!



MARCO DE COMPETENCIAS

CyL es una Comunidad Autónoma con plenas competencias en la gestión del medio natural

Real Decreto 1504/1984 De traspaso de Funciones y Servicios del Estado a la Comunidad Autónoma de Castilla y León en materia de **Conservación de la Naturaleza**

En todos los ámbitos:

montes, caza y pesca, espacios protegidos, industrias forestales

A todos los niveles:

Político

Regulador: Normativo y legislativo

Control: Guardería Forestal, con apoyo SEPRONA

Financiero: Con apoyo UE y Gobierno Central

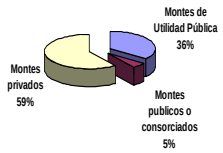
Forest fires competences

Forestry law 43/2003 State of Spain
Forestry law 3/2009 de 6 de abril of Castilla y León

- **JUNTA CYL**: Forest fires prevention and suppresion
- **STATE**: National resources deployment to help autonomous regions
  National security boards

FORESTRY MANAGEMENT ISSUES

FORESTRY PROPERTY



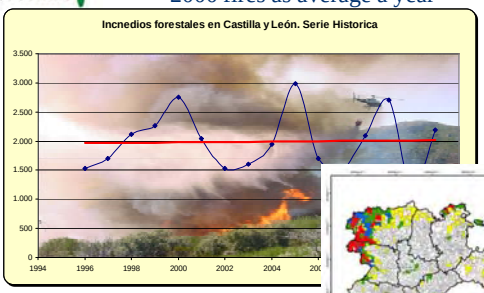
- **9,4 mill ha Total surface**
- **4,8 mill ha forestry surface**
- **3,0 mill of wood f. surface**

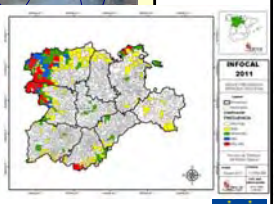
41% of the forestry surface is managed by the region

DIAGNOSIS: Some circunstancies ocurring together accumulate forestry fires

- **Weather conditions.**
- **Abandonment of traditional uses. Fuel**
- **Lack of economical interest of the forest. Wood value above all.**
- **Traditional use of fire. As farming tool to use the vegetation, most bush.**

2000 fires as average a year





Most of fires are located in the west-north areas of the region

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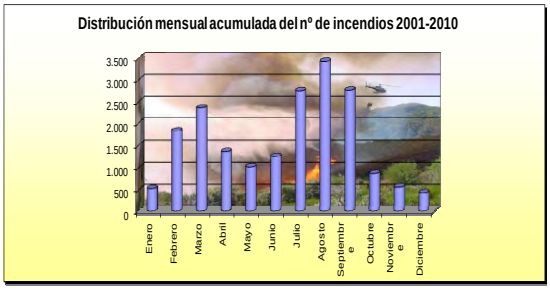
ANNUAL DISTRIBUTION WITH TWO PEAKS: WINTER-SPRING AND SUMMER



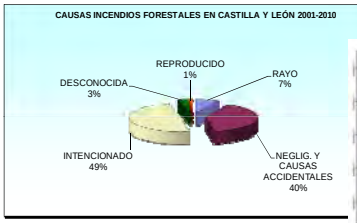
Because the atlantic ocean and mediterranean influence

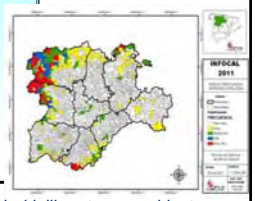
13

EUFOFINET

FOREST FIRES PROBLEM

CAUSES





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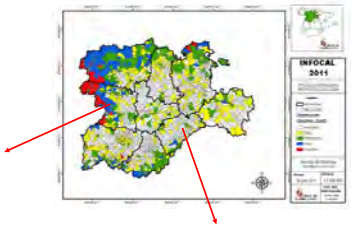

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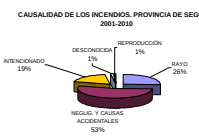

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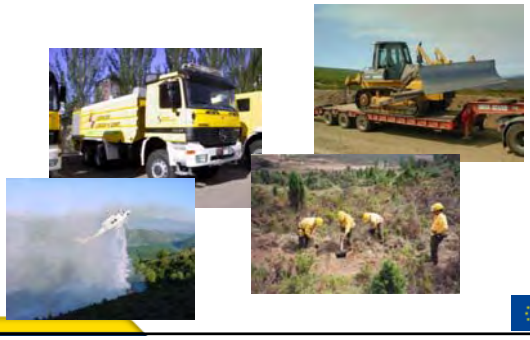

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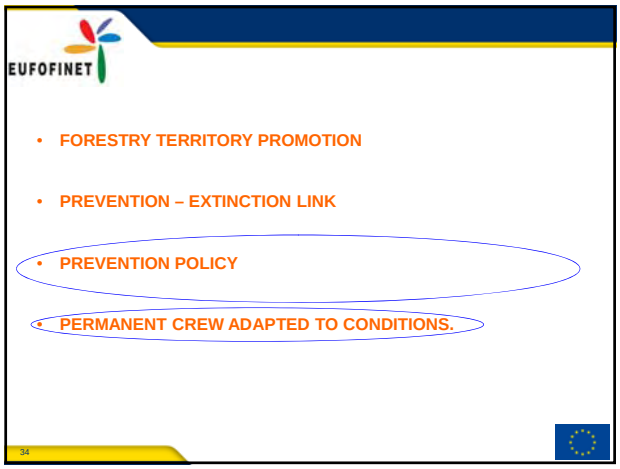
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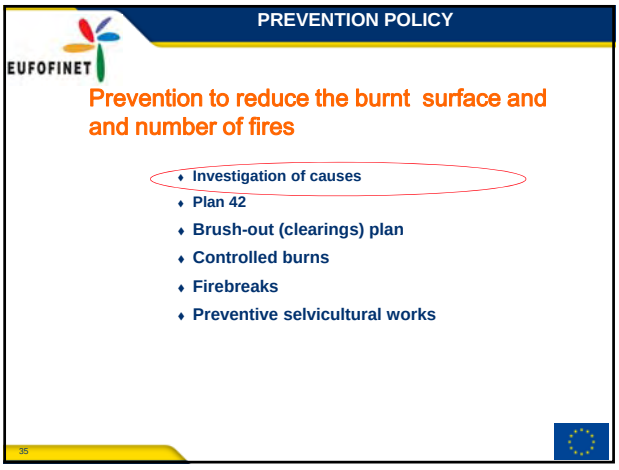
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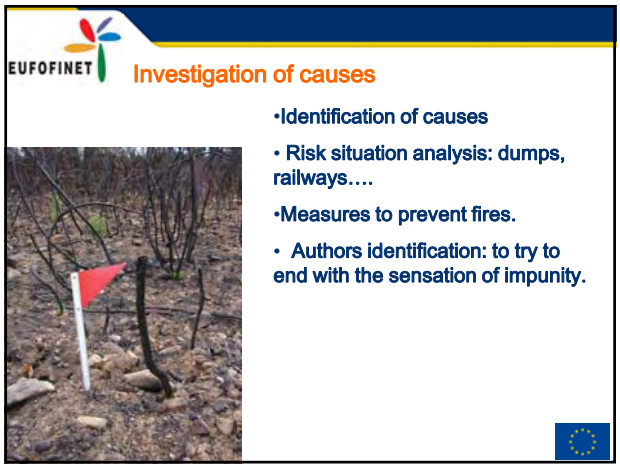
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THANKS FOR YOUR PATIENCE!

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FIELDTRIP PROGRAM

- 09h00 – 10h00 Objectives and presentation of the fieldtrip
- 10h00 – 13h00 Transfer to 1st demo, focused on burns.
- 13h00 – 14h00 José Carlos García (Junta de Castilla y León) Presentation of preventive works (thinning, pruning and clear-cuts operations; firebreaks)
- 14h00 – 15h00 Lunch break
- 15h00 – 16h15 Transfer to 2nd demo, focused on firebreaks.
- 16h15 - 17h30 Transfer to 3rd demo, focused on thinning, pruning and brush-out works.
- 17h30 – 18h00 Transfer back to the Defense against Fire Center.
- 21h00 Official dinner. Meeting point: Hotel Tryp hall

1

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FOREST FIRES PREVENTION STRATEGY IN CASTILLA Y LEÓN

INTERREG IVC

EUROPEAN REGIONAL DEVELOPMENT FUND

CASTILLA Y LEÓN

A VALUABLE TREASURE TO PROTECT

CASTILLA Y LEÓN

1.- Big dimension

- 9,4 mill ha total surface
- 4,8 mill ha forestry surface
- 3,0 mill ha wood f. surface

2.-Small population and density

- 2,5 millions inhabitants
- 27 inhab./km2

3

CASTILLA Y LEÓN

An hetoregoneus territory

Of diversity!

4

CASTILLA Y LEÓN

A landscape modellled by the settlement

CASTILLA Y LEÓN

With two tools

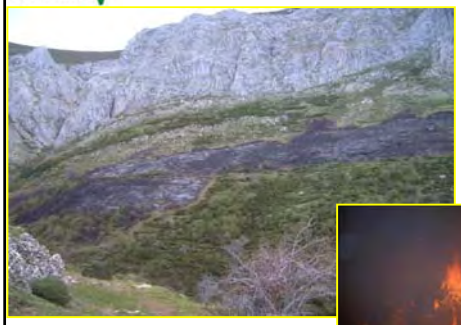
Farming...

And livestock!

CASTILLA Y LEÓN

And a tool...

Fire!



MARCO DE COMPETENCIAS

CyL es una Comunidad Autónoma con plenas competencias en la gestión del medio natural

Real Decreto 1504/1984 De traspaso de Funciones y Servicios del Estado a la Comunidad Autónoma de Castilla y León en materia de **Conservación de la Naturaleza**

En todos los ámbitos:

montes, caza y pesca, espacios protegidos, industrias forestales

A todos los niveles:

Político

Regulador: Normativo y legislativo

Control: Guardería Forestal, con apoyo SEPRONA

Financiero: Con apoyo UE y Gobierno Central

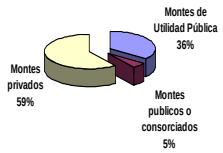
Forest fires competences

Forestry law 43/2003 State of Spain
Forestry law 3/2009 de 6 de abril of Castilla y León

- **JUNTA CYL**: Forest fires prevention and suppresion
- **STATE**: National resources deployment to help autonomous regions
  National security boards

FORESTRY MANAGEMENT ISSUES

FORESTRY PROPERTY



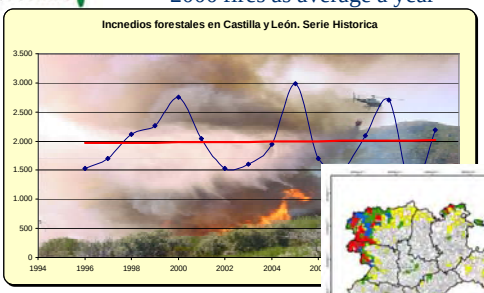
- **9,4 mill ha Total surface**
- **4,8 mill ha forestry surface**
- **3,0 mill of wood f. surface**

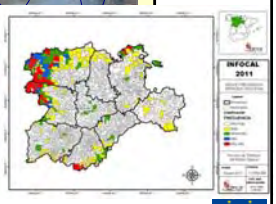
41% of the forestry surface is managed by the region

DIAGNOSIS: Some circunstancies ocurring together accumulate forestry fires

- **Weather conditions.**
- **Abandonment of traditional uses. Fuel**
- **Lack of economical interest of the forest. Wood value above all.**
- **Traditional use of fire. As farming tool to use the vegetation, most bush.**

2000 fires as average a year





Most of fires are located in the west-north areas of the region

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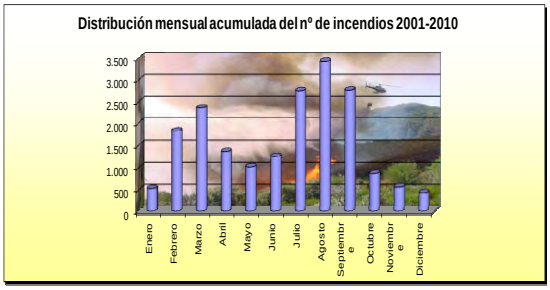
ANNUAL DISTRIBUTION WITH TWO PEAKS: WINTER-SPRING AND SUMMER



Because the atlantic ocean and mediterranean influence

13

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FOREST FIRES PROBLEM

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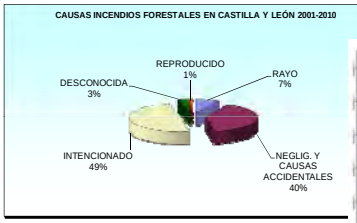

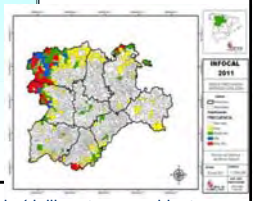

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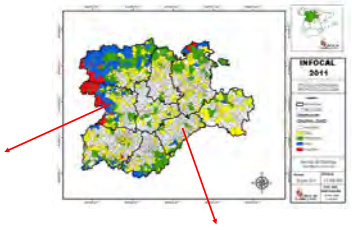

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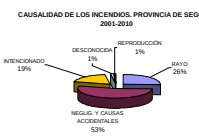

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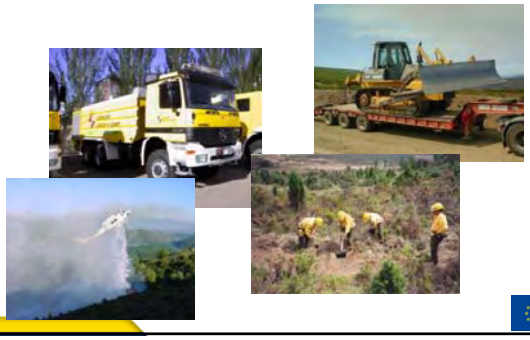

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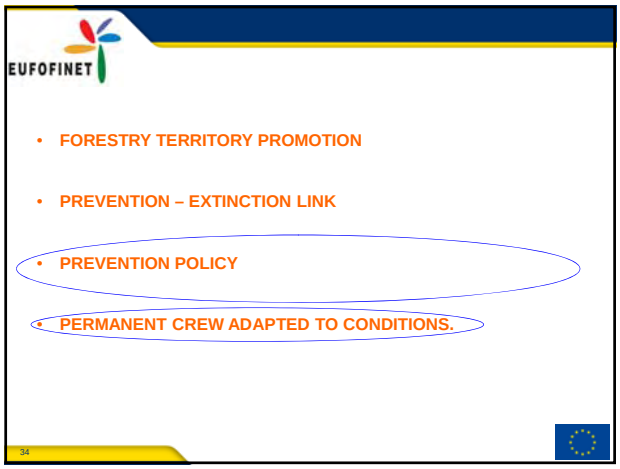
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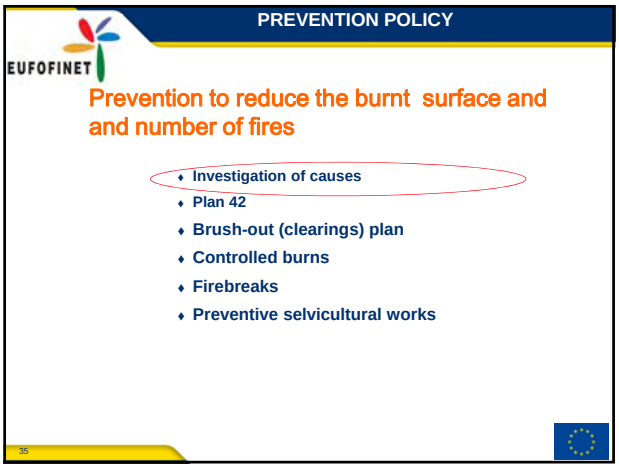
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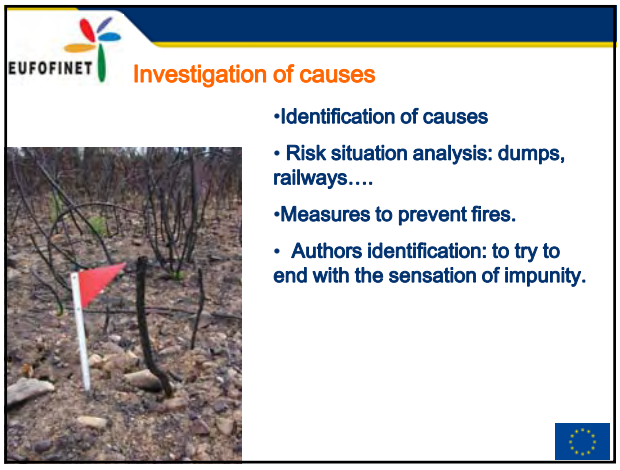
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FOREST COMBUSTIBLE MATERIAL AND FIRE RISK

PRESCRIBED FIRE

Junta de Castilla y León

Tragsa

FUNDAMENTS

ELIMINATION OF COMBUSTIBLE VEGETATION THROUGH ITS TREATMENT WITH FIRE

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¿WHERE IS IT DONE?

- Terrain covered with bushes which make traditional cutting difficult or impossible
- Bush low cover near or in forest (protects the trees)
- Stripes parallel to roads and firebreaks (enhancement of its efficacy as firebreaks)

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¿ON WHICH ESTATES?

- PRIVATE PROPERTY. BOTH OWNERSHIP AND MANAGEMENT IS PRIVATE
- LOCAL ENTITIES' ESTATE. FOREST MANAGEMENT IS COMMISSIONED TO THE REGIONAL FOREST SERVICE

¿HOW IS IT AUTHORISED?

- PRIVATE ESTATE: the owner requires an authorisation. The Regional Forest Service appraises it and may issue a conditional authorisation
- PUBLIC ESTATE: the owner requires an authorisation or the Regional Forest Service acts *ex oficio*. Conditional issuance of authorisation is also possible

¿WHO EXECUTES IT?

- PRIVATE ESTATE: the applicant
- PUBLIC ESTATE: the local entity by its own means or the Regional Forest Service through means from the fire prevention deployment

IT IS MANDATORY TO FULFILL ALL CONDITIONS ESTABLISHED IN A CONDITIONAL AUTHORISATION

PRESCRIBED BURNING OBJECTIVES

- PROTECTION OF VALUABLE FORESTS
- ~~LIGHTENING COMBUSTIBLE~~ UNDER TREES
- TERRITORIAL CONTINUITY BREAKING
- ENHANCEMENT OF PASTURES AND GAME-HUNTING HABITAT

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LINEAR BURNING SUPPORTED ON A ROAD

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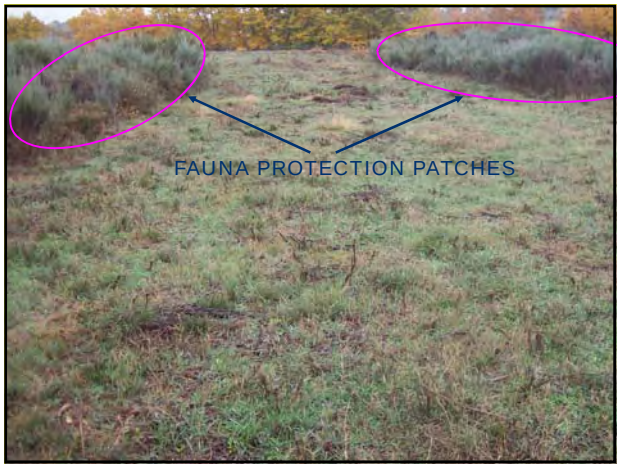

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METEOROLOGICAL WINDOW: CONCEPT

- Time interval which meets the conditions for a prescribed burning to behave according to its objectives
  - General suitable period in Castilla y León: 1 November to 30 March (fresh weather and humid soil).

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METEOROLOGICAL WINDOW: FIELD DATA

- Relative moisture range
- Temperature range
- Wind speed range
- Soil moisture
- Litter moisture (HCFM)
- # of days without rain (>30 mm)
- Propagation speed (optional)
- Fire height (optional)

EUFOFINET

METEOROLOGICAL WINDOW:
GENERAL PRESCRIPTION FOR BUSH BURNING

VARIABLE	RANGE
TEMPERATURE	0 - 15 ºC
RELATIVE MOISTURE	30 - 50 %
WIND SPEED	2 - 15 Km/h
SOIL MOISTURE	50 - 100 %
LITTER MOISTURE (H.C.F.M.)	5 - 15 %
DAYS WITHOUT RAIN (SHADOW)	5-12 Days
DAYS WITHOUT RAIN (SUN)	3-8 Days
ATMOSPHERIC STABILITY	

EUFOFINET

METEOROLOGICAL WINDOW:
GENERAL PRESCRIPTION FOR UNDER-TREES BURNING

VARIABLE	RANGO
TEMPERATURE	–2 - 15 ºC
RELATIVE MOISTURE	30 - 45 %
WIND SPEED	5 - 20 km/h
SOIL MOISTURE	50 - 100 %
LITTER MOISTURE (H.C.F.M.)	7 - 15 %
FLAME HEIGHT	0,5 m
PROPAGATION SPEED	Variable whenever fire height is OK
BURNING PATTERN	Less agressive: rear and side

EUFOFINET

BURNING TECHNIQUES

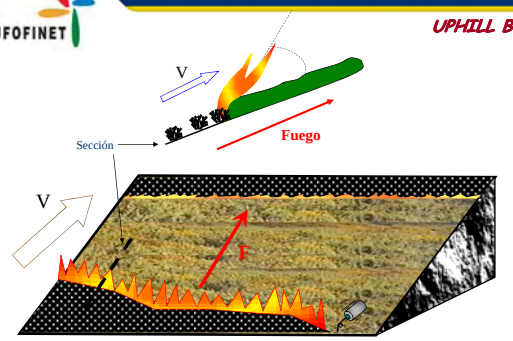
+

-

- Uphill burning (head)
- Uphill burning (stripes)
- Uphill burning (dots)
- Side burning
- Downhill burning (rear or tail)

EUFOFINET

UPHILL BURNING



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BURNING TECHNIQUES

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- Uphill burning (head)
- Uphill burning (stripes)
- Uphill burning (dots)
- Side burning
- Downhill burning (rear or tail)

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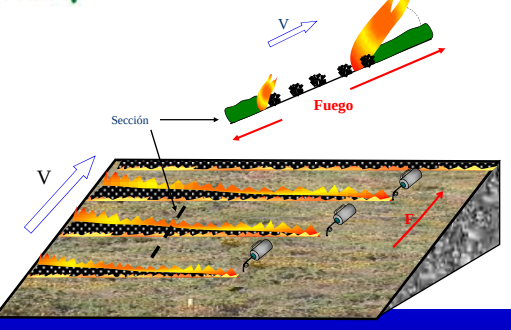
UPHILL BURNING (STRIPES)



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BURNING TECHNIQUES

\+

- Uphill burning (head)
- Uphill burning (stripes)
- Uphill burning (dots)
- Side burning
- Downhill burning (rear or tail)

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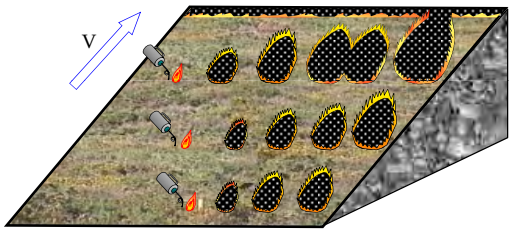
UPHILL BURNING (DOTS)



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BURNING TECHNIQUES

- Uphill burning (head)
- Uphill burning (stripes)
- Uphill burning (dots)
- Side burning
- Downhill burning (rear or tail)

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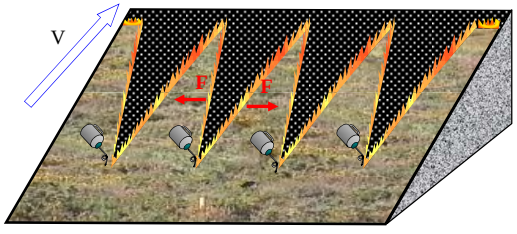
SIDE BURNING



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BURNING TECHNIQUES

- Uphill burning (head)
- Uphill burning (stripes)
- Uphill burning (dots)
- Side burning
- Downhill burning (rear or tail)

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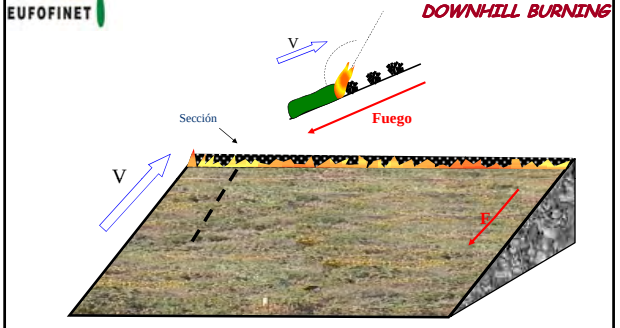
DOWNHILL BURNING



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BURNING TECHNIQUES

- Uphill burning (head)
- Uphill burning (stripes)
- Uphill burning (dots)
- Side burning
- Downhill burning (rear or tail)

Time consumption
Propagation speed
Efficiency
Flame height
Difficulty of controlling

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Thank you for your attention

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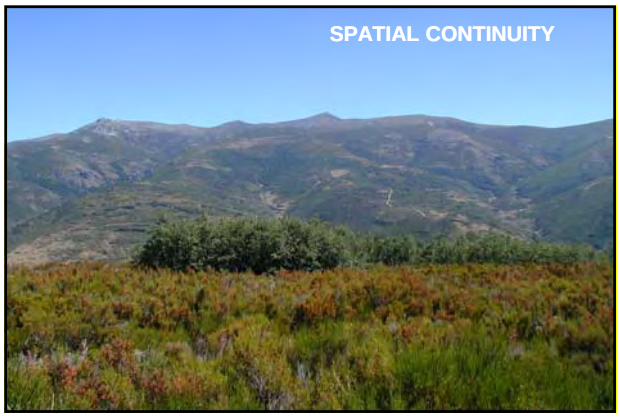
FOREST COMBUSTIBLE MATERIAL AND FIRE RISK

PREVENTION ACTIVITIES



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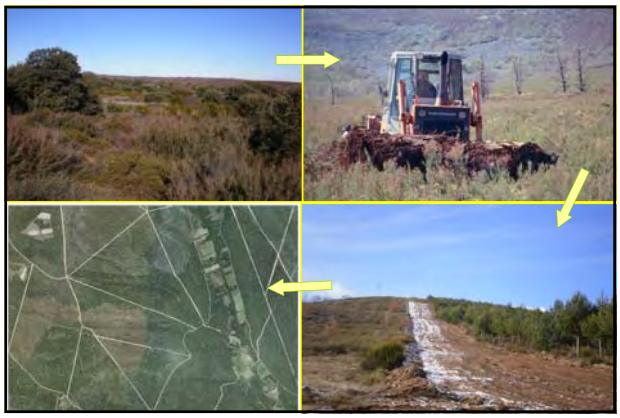
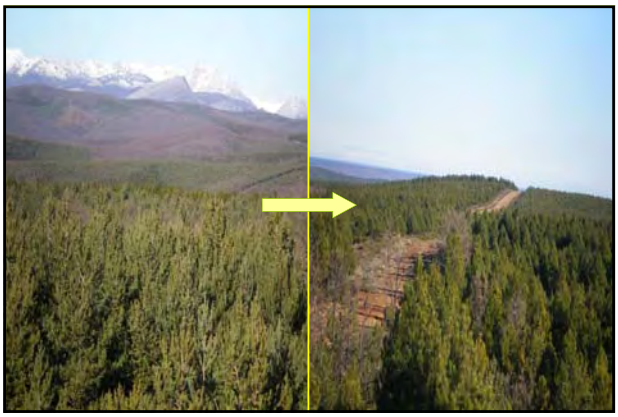
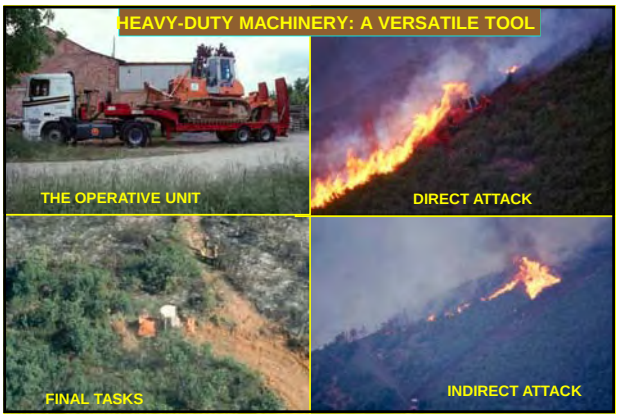
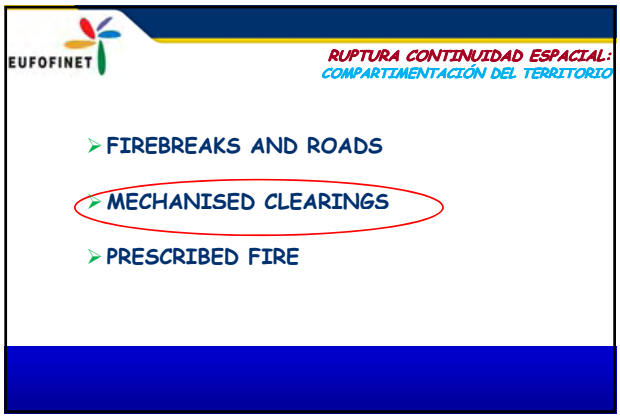
BREAKING SPATIAL CONTINUITY:
TERRITORY COMPARTMENTALISATION

- FIREBREAKS AND ROADS
- MECHANISED CLEARINGS
- PRESCRIBED FIRE






HEAVY-DUTY MACHINERY: A VERSATILE TOOL
THE OPERATIVE UNIT
DIRECT ATTACK
FINAL TASKS
INDIRECT ATTACK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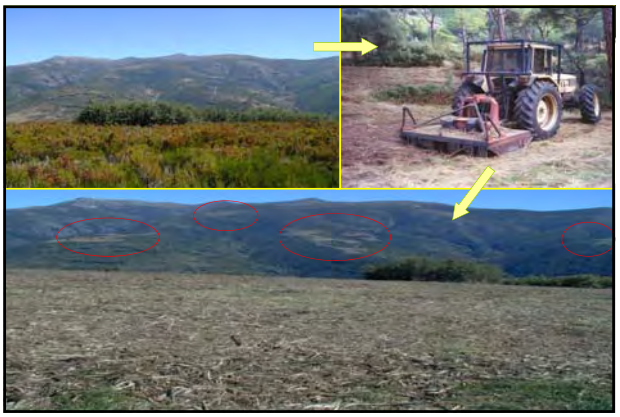
RUPTURA CONTINUIDAD ESPACIAL:
COMPARTIMENTACIÓN DEL TERRITORIO
FIREBREAKS AND ROADS
MECHANISED CLEARINGS
PRESCRIBED FIRE



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RUPTURA CONTINUIDAD ESPACIAL:
COMPARTIMENTACIÓN DEL TERRITORIO

- FIREBREAKS AND ROADS
- MECHANISED CLEARINGS
- PRESCRIBED FIRE

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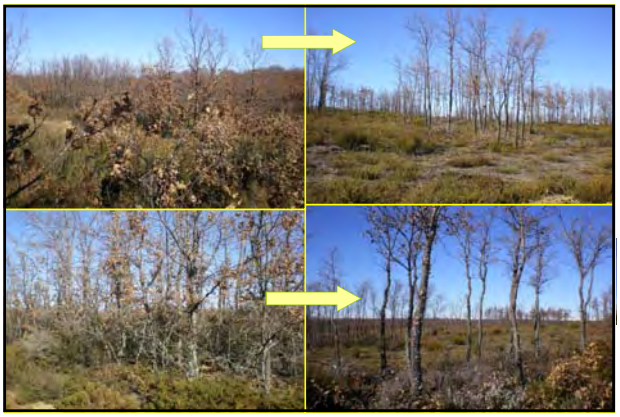
VERTICAL AND HORIZONTAL VEGETATION CONTINUITY

EUFOFINET

BREAKING VEGETATION CONTINUITY

SILVICULTURAL TREATMENT WITH DISPOSING OF RESIDUES

- TRITURATION
- FIREWOOD
- GATHER AND BURN



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BREAKING VEGETATION CONTINUITY

SILVICULTURAL TREATMENT WITH DISPOSING OF RESIDUES

- TRITURATION
- FIREWOOD
- GATHER AND BURN

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BREAKING VEGETATION CONTINUITY

SILVICULTURAL TREATMENT WITH DISPOSING OF RESIDUES

- TRITURATION
- FIREWOOD
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BREAKING VEGETATION CONTINUITY

SILVICULTURAL TREATMENT WITH DISPOSING OF RESIDUES

- TRITURATION
- FIREWOOD
- GATHER AND BURN

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DISPOSING OF RESIDUES:
GATHER AND BURN

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PREVENTION INFRASTRUCTURES

- TERRITORY VIGILANCE
- WATER-LOADING POINTS

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PREVENTION INFRASTRUCTURES

- TERRITORY VIGILANCE
- WATER-LOADING POINTS

EUFOFINET

THANK YOU FOR YOUR ATTENTION

CONTENT

- Conclusions of some recent international events
- Challenges in fire management
- Existing European fire management networks
- Forest fire prevention network ?

FAO Forestry

FIRE MANAGEMENT IN THE 20TH SESSION OF COFO (2010)

The Committee on Forestry invited countries to strengthen:

- fire management in REDD-plus programmes
- fire management in landscape management
- fire prevention/suppression cooperation
- community involvement in the prevention of wildfires

FAO Forestry

FIRE MANAGEMENT IN THE 20TH SESSION OF COFO (2010)

The Committee encouraged FAO to promote:

- regional and international cooperation
- exchange among countries on vegetation fire management

FAO Forestry

GLOBAL ASSESSMENT OF MEGA-FIRES (2011)

- Mega-fires exceed suppression capacity of countries with modern tools and techniques
- Contributing factors:
  - global warming
  - vulnerable condition of fire-prone landscapes,
  - population shifts

FAO Forestry

GLOBAL ASSESSMENT OF MEGA-FIRES (2011)

- Land management actions or omissions carry significant wildfire-related risks
- More balanced wildfire protection approaches at landscape scale are needed

FAO Forestry

FIFTH INTERNATIONAL WILDLAND FIRE CONFERENCE (IWFC),

May 2011, South Africa

Under the auspices of FAO and UNISDR, the conference recommended increased action on, *inter alia*:

- Reducing the use of fire on agriculture land
- Public participation (community based approach)
- Applying international principles (International Guidelines)

FAO Forestry

FIFTH INTERNATIONAL WILDLAND FIRE CONFERENCE (IWFC),

May 2011, South Africa

- Systematic application of advanced fire management
- More international cooperation in fire management
- Integration of fire management at landscape level
- More participation of RFCs in using Fire Management Guidelines and Hyogo Framework

FAO Forestry

HYOGO FRAMEWORK FOR ACTION

Sub headline

- 10-year plan to make the world safer from natural hazards.
- Adopted by 168 Member States of the UN (2005)
- Goal is to substantially reduce disaster losses by 2015 by building the resilience of nations and communities to disasters.

DEVELOPMENT OF A CORPORATE DISASTER RISK REDUCTION STRATEGY

FAO's **Strategic Objective I**, "to improve preparedness for and effective response to food and agriculture threats and emergencies":

- Draft corporate strategy for disaster risk reduction by FAO
- Intersector approach, including fire management, to better respond to the needs of member countries.
- Based on Hyogo Framework for Action 2005-2015 to build the resilience of nations to disasters.

GLOBAL CHALLENGES IN FIRE MANAGEMENT

Sub headline

- Global call to integrate fire management in landscape management (policies and laws)
- Importance to consider climate change
- Need for consistence/integration of fire management and other risk management
- Need for participatory approaches

EXISTING NETWORKS IN EUROPE FAO/UNECE TEAM OF FIRE SPECIALISTS

Sub headline

- link in communication and cooperation between fire scientists, managers and policy makers
- Europe +

EXISTING NETWORKS IN EUROPE
EXPERT GROUP ON FOREST FIRES (EU)

Sub headline

- a platform for exchange of information and best practices regarding forest fire management between national and EU level
- EFFIS provides harmonized information on forest fire danger, active fires, and fire damages in Europe
- Europe+

SILVA MEDITTARANEA WORKING GROUP ON FOREST FIRES

Sub headline

- Drafting of guidelines for bilateral agreements on cooperation in the prevention and control of forest fires;
- Decentralized regional database on forest fires in collaboration with the EFFIS.
- Dissemination throughout the Mediterranean of the daily fire-risk forecasts prepared by EFFIS
- S-Europa +

FOREST FIRE PREVENTION NETWORK ?

Sub headline

1. Added value regarding existing networks ?
2. Response to challenges in fire management ?
3. Objectives ?
4. Members: countries, scientists or practitioners etc ?

thank you!

The European Forest Fire Expert Network

Jesús San Miguel
European Commission Joint Research Centre
Institute for Environment and Sustainability
Ispra, Italy

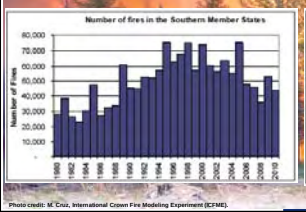
Workshop "Cartography of Risks" Open Forum "A new European Regional Forest Fires Prevention Network" León, Spain 21st-22nd-23rd February 2012

Outline

1. Forest fires in Europe
2. Role of the European Commission in forest fire management
3. Development of the European Forest Fire Information System
4. The Expert Group on Forest Fires – EFFIS Network
5. Framework for current / future EU forest fire related activities
6. Points for consideration in view of future activities on fire prevention.

Fires in Europe

Every year:
65,000 fires on average
500,000 hectares burned
Casualties and heavy economic impact



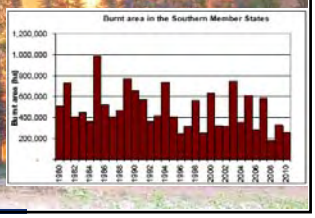
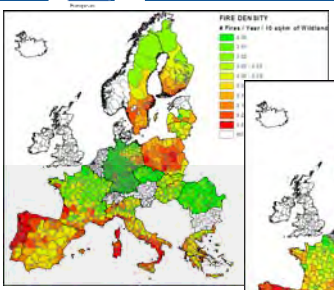
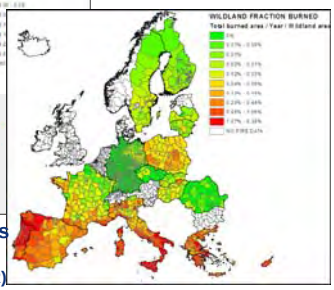


Photo credit: M. Cruz, International Crown Fire Modeling Experiment (ICFME).

Fire regimes in Europe – Spatio/temporal distribu



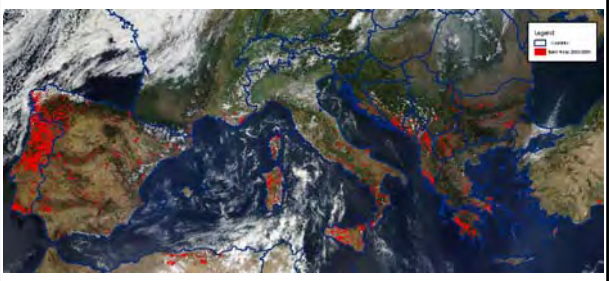
Approx. 65,000 wildfires per year



Approx. 500,000 hectares burned per year in EU
(85% in PT, ES, FR, IT and GR)

San-Miguel-Ayanz and Camia, (2009)

Fires in Europe



Rapid Damage Assessment (MODIS 250 m – 2000 to 2009)

Role of the EU in the International Collaboration on Forest Fires

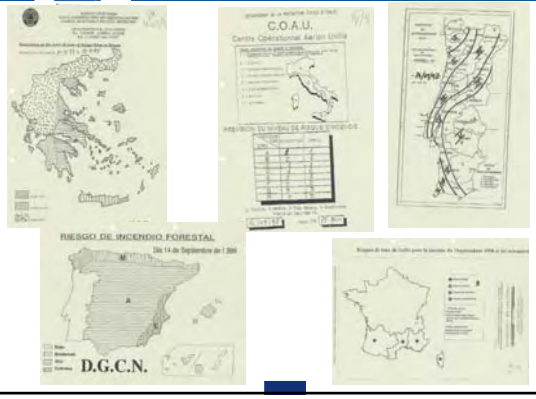
- The European Union, through the European Commission (EC), supports national/international actions aimed at:
  - Enhancing forest fire information and prevention
  - Reducing forest fire damages and enhancing regeneration of areas affected by fires
  - Remediating catastrophic damages in cases of forest fire critical events
  - Improving knowledge on forest fires through cooperation and research projects
  - Harmonizing information and developing forest fire information systems
  - Increasing preparedness and enhancing cooperation in forest fire fighting
- The European Commission (EC), the executive body of the EU, implements the above actions in cooperation with relevant services in the countries, in agreement with guidelines provided by the European Parliament (EP).
- The EC implements the actions through European Regulations, European Directives and the collaboration with the European Countries.

Contribution of European Commission Directorate Generals to forest fire monitoring

The European Commission is organized in thematic Directorate Generals (DGs) which are responsible for the above actions. DGs that are active in the forest fire arena include:

1.Environment (ENV - forest fire monitoring / fire prevention in relation to climate change)
2.European Commission Humanitarian Office (ECHO - International collaboration in forest fire fighting – Civil Protection Monitoring and Information Center (MIC))
3.Joint Research Centre (JRC - research, databases, European Forest Fire Information System (EFFIS) supporting the requirements of the other EC Services and transferring research into operation
4.Agriculture and Rural Development (AGRI - Rural Development Regulation – prevention, afforestation, reforestation of affected areas)
5.Regional Development and Planning (REGIO - EU Solidarity Fund in case of crisis situations (Portugal 03, Greece 07, ...) – INTERREG regional projects of cooperation e.g. ALPFFIRS, PYROSUDOE, MED-Protect, ...)
6.Research (RTD – finances forest fire research projects; currently FUME, FIRESMART, SAFER) – call for fires and security regarding operational issues
7.Climate Action (CLIMA - overall umbrella for activities dealing with Climate Change)

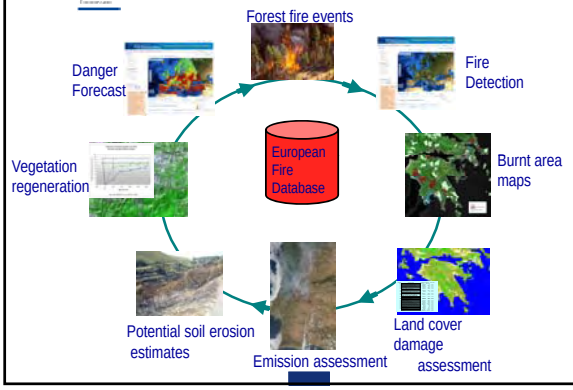
The need for harmonization Development of EFFIS - 1998



Development of EFFIS

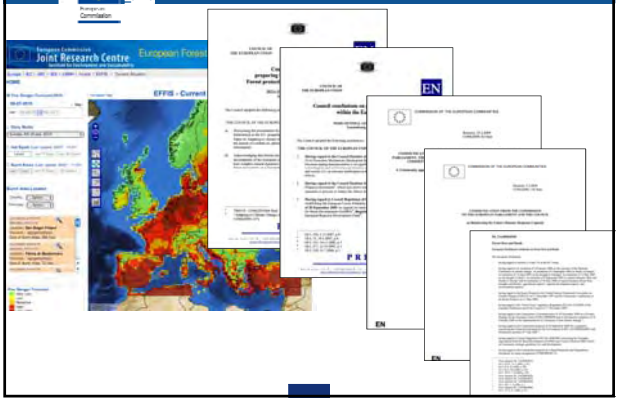
- The European Forest Fire Information System (EFFIS) has been established by the Joint Research Centre (JRC) and the Directorate General for Environment (DG ENV) of the European Commission (EC) in close collaboration with the Member States and neighbor countries.
- It supports the services in charge of the protection of forests against fires in EU and neighbor countries, and provides the EC services and the European Parliament with harmonized information on forest fires in Europe.
- Aims at providing up-to-date, reliable information on forest fires at the European level, providing European level assessments during both pre-fire and post-fire phases, thus supporting fire prevention, preparedness, fire fighting and post-fire evaluations.
- EFFIS is intended as complementary system to national and regional systems in the countries, which provides harmonized information required for international collaboration on forest fire prevention and fighting and in cases of trans-boundary fire events.

Fire monitoring in EFFIS



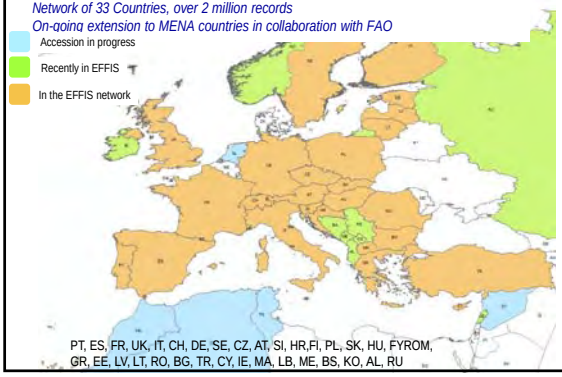
EFFIS development - Today

Improved fire management and support to fire related policies



EFFIS network – Expert Group on Forest Fires (EGFF)

Joint effort of national and EC services
Network of 33 Countries, over 2 million records
On-going extension to MENA countries in collaboration with FAO



Coordination – dissemination activities

Expert Group on Forest Fires meetings – Zaragoza (April 2011)/ Ispra (Nov. 2011)

Mediterranean Forest Week, Avignon (April 2011) in col. with FAO

Workshop on extension of EFFIS to Middle East and Northern African countries (Oct. 2011) in col. with FAO.

Annual report on "Forest Fires in Europe 20XX"

Framework for current/future EU forest fire related activities

- Follow-up of EC Communication on prevention of natural and man-made disasters, 2009 (fire risk mapping – 2012)
- Follow-up of the EC Communication on reinforcing the Union's Disaster Response Capacity, 2008 (Civil Protection contingency plans for int. cooperation - 2013)
- Council conclusions on forest fire prevention in the EU, 2010
- Council conclusion on preparing forests for climate change, 2010
- European Parliament Resolution on the the EC Green Paper, 2011 calls for
  - Fire prevention measures in relation to climate change
  - Establishment of a legislative proposal for forest fire prevention
  - Legislative proposal on forest information
  - Support to research on the influence of forests in weather patterns
  - .....
- WG on Forest Information in the EU supporting all forest related policies, including forest fires
- WG on a new EU Forestry Strategy & Forest Action Plan
- HORIZON 2020 – Research and innovation will interface with a wide spectrum of Union policies, including sustainable agriculture and forestry
- Adaptation to climate change - protecting our limited natural resources against climate change
- Securing ecosystem services from forests

Point for consideration in view of future activities on fire prevention

- **Cooperation on fire management at European level is organized around the EGFF since 1998.**
- **The EGFF includes EU and non-EU countries in Europe and the Mediterranean region.**
- **Collaboration on fire management exists among countries and major international organizations (EU, FAO, UNECE).**
- **A series of initiatives related to fire prevention are currently on-going at European level**
- **However, there is a need to enhance information and communication on forest fire prevention at national and regional levels.**
- **Future fire initiatives should build on existing knowledge and aim at filling information/management gaps.**

Thank you!

effis@jrc.ec.europa.eu
http://effis.jrc.ec.europa.eu

Regional Union of Municipalities of Attica PEDA Junta de Castilla y León cesefor EUFOFINET

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European Forest Fire Networks

The creation of a European Forest Fire Network as a main result of the project

Regional Union of Municipalities of Attica PEDA Junta de Castilla y León cesefor EUFOFINET

From A to Z for the creation of a(nother ?) European Forest Fire Network

Regional Union of Municipalities of Attica PEDA Junta de Castilla y León cesefor EUFOFINET

A. Reasons to bring into being a Network of Forest Fire Experts

Localized collaborative efforts might be the key to find common language, common goals, and partnerships

Regional Union of Municipalities of Attica PEDA Junta de Castilla y León cesefor EUFOFINET

B. A Forest Fire Experts Network in Europe

OR

A Network for the Forests in Europe?

C. The stakeholders of this Network

D. The goal of the Network

E. The Network's role

- To disseminate information flux between Ministries, Regional Authorities, Municipal authorities, Fire services and Forestry services.
- To identify applicability of guiding rules and instructions amongst all levels
- To identify compliance to the rules amongst all levels

F. Overall Objectives of the Network

- Bring stakeholders together to identify, describe and find solutions to the barriers to restoration and fuel treatment implementation.
- Integrate intra-agency resource (e.g., fuels and fire planners, silviculture, wildlife biologists and ecologists) values and goals into a common vision

F. Overall Objectives of the Network

- To obtain a collaboratively derived desired condition for managed forests **at the landscape scale** to increase support for project implementation.
- Develop on-the-ground demonstrations and implementation of desired conditions
- Design a monitoring plan to measure progress towards desired conditions

G. Regional Objectives:

- Go-to source of fire science information in the region
- Enhance communications, feedback, and partnerships between scientists and users
- Reduce barriers to use of science
- Enhance and incorporate efforts with existing local collaboratives and regional consortiums
- Monitor individual and possible consortium processes

I. Network's mission

- facilitate communications between the fire management stakeholders and the science/research community
- facilitate communications with other similar consortia,
- accelerate awareness of and application of fire science information by managers

J. The new Networks's moto

Trust in science is important if practitioners are to integrate scientific information into management decisions (Pacific Northwest Research Station, Program Manager, R. James (Jamie) Barbour 2007).

K. Governing principles

L. General Principle

"within the broader community, there exist talented people that can make things to happen"

Principle 1. Openness and Transparency
Principle 2. Participation
Principle 3. Quality Assurance
Principle 4. Proportionality
Principle 5. Coherence
Principle 6. Ethics

M. Interchanges between the Networks' people and Institutions- Authorities

N. Scope of the Network

Local, Regional, National,
Pan European

O. Architecture of the Network

Localized nodular mode architecture

P. Organization

- **Principal Investigator (PI) (the person in charge of the Network)**
- **Co- Principal Investigator (co-PI)**
- **Steering Committee**

P. Organization

- **Local node antennas of the Steering Committee**
- **Facilitator** (i.e. to help Network members understand their common objectives and assists them to plan to achieve them without taking a particular position in the discussion)

Q. Steering Committee Synthesis

- For the first year, 5 committee members will serve one year terms, 5 members will serve 2 year terms.
- Thereafter all terms will be two years. In the event that a member can no longer participate due to retirement, illness, or reassignment, the Committee will seek immediate replacement.

Q. Steering Committee Synthesis

Local node antennas of the Steering Committee serve for 5 years. In midterm, that is in 2,5 years a replacement member is working hand by hand with the local node antenna SC member.

Members of the SC cannot serve more than two consecutive terms.

R. The tools to search and enlist experts into the Network

S. Products and activities (project types)

Fire Regimes Fuels Fire Behaviour Remote Sensing Atmospheric, Climate, Soils Wildlife	Botanical Social & Economic Aspects Technology Transfer Synthesis & Symposiums Decision Support Unclassified

T. Tasks of Network's experts

1. Problem calibration 2. Project delineation 3. Problem solution	4. Stakeholders consensus level 5. Project delineation 6. Project priority 7. Efficiency and efficacy oriented actions and implementations (vs. policy oriented)

U. Network evolution

- Unofficial (social/experts or experts/experts network)
- Localized
- Regional/Local node
- Excellency node-Competition of nodes (i.e based on the number of projects/actions evolved through the network and implemented by stakeholders

V. Funds

The Network will seek for financial support by the European Commission.

In addition, other fund might be offered on a voluntary basis from organizations participating in the activities of the WGs - projects.

W. Sustainability

Funding and acceptance would secure prolonged viability of the network.

X. Evaluation

- The number of Excellency nodes
- Once a year, an evaluation voting of all members, decide as per the continuation of the Network.

Y. Drawing experience from existing networks

Z. Actions to shorten time till the kick-off of the Network?

1. Recommendation of the Nets Committee to cater for the preparatory actions
2. Selection of the Agenda of actions of the Network for year 1 (Networks' dowry off EUFOFINET would be the action plans and the glossary of terms)

EUFOFINET

FENet (Forests in Europe Network)

For an effective Pan-European collaboration in forest fires

Pool of experts from linked projects

PROMPT

EFFMIS (European Forest Fire Monitoring using Information Systems) (common partners FRI,Poland and CESEFOR, Spain)

CLIMADAPT project (common partners ONF, North Aegean)

FOREST CITIES ……

Thank you for your attention

Ευχαριστώ για την προσοχή σας

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EFFMIS

INTERREG IVC

EUROPEAN REGIONAL DEVELOPMENT FUND

Project Overview

Ass. Prof. Yiannis Bakouros
University of Western Macedonia
GREECE

23 February 2012, EFFMIS, Leon, Spain

EFFMIS is an INTERREG IVC Capitalisation project,
financed by the European Union's Regional Development Fund

EFFMIS

Overview

- Partnership
- Problem description
- Objectives
- Components
- Methodology

EFFMIS

Project Overview

Name: European Forest Fire Monitoring using Information Systems
Acronym: EFFMIS
Programme: INTERREG IVC (3rd call for proposals)
Type of Intervention: Capitalization project
Priority: 2 - Environment and risk prevention
Sub-theme: Natural and technological risks (including climate change)
Approval date: 28 June 2010
Official start date: 1 November 2010
Duration: 24 months
Total Budget: 1,772,030.00
ERDF contribution: 1,453,135.50

EFFMIS

Project Partnership

Organization	Acronym	Country
University of Western Macedonia	UoWM	Greece
Hellenic Ministry of Environment, Energy and Climate Change	MINENV	Greece
University of Patras	UoP	Greece
San Marco Project Research Centre – University of Rome "La Sapienza"	CRPSM	Italy
Coventry University	CU	United Kingdom
Executive Forest Agency	EFA	Bulgaria
Forest Research Institute	FRI	Poland
Institute of Forestry	IF	Lithuania
Batalha Municipality	BM	Portugal
Slovenian Forestry Institute	SFI	Slovenia
Castilla and Leon Wood & Forest Services Center	CESEFOR	Spain

Problem Description

- Issues to be addressed
  - early detection and visualization of fire propagation
  - forecasting of danger zones based on "fire environment" analysis
  - risk assessment during panic evacuation
  - optimal spatial distribution of service vehicles
  - fire suppression services routing
  - rule-based knowledge representation and scenario management
  - post-fire impact assessment
- According to region's "fire environment":
  - topography
  - weather (precipitation and humidity, temperature and winds)
  - forest type

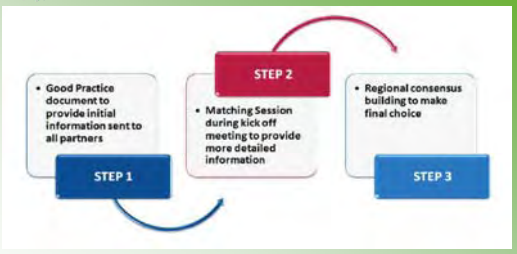
Project objectives

- Leverage effects in usage of IS for forest fires detection and management through joint learning and actions:
  - transfer previously identified GPs increasing the capacity of responsible for forests monitoring authorities and research institutes
  - raise awareness on potential tools for increasing the effectiveness of relevant IS at regional level through a GP mainstreaming guide based on project experience
  - enable constant flow of knowledge transfer between European regions
  - establish a methodology of adaptation of GPs to the individualities of each region
- Effective and efficient management of structural funds:
  - improve the management of structural funds with regards for environmental sustainability through the transfer and exchange on GPs
  - promote the involvement of regional stakeholders in forest protection actions and interregional cooperation
- Contribution to cohesion in Europe:
  - help bridge the gap between more and less advanced regions in EU

Project Components

- 3 interrelated Components:
  - Component 1: Management and coordination
  - Component 2: Communication and dissemination
  - Component 3: Exchange of experiences dedicated to the transfer of good practices into EU Structural Funds mainstream programmes
- Project transfer activities (Component 3) are divided into a 3 step sequence:
  - Transfer - Planning and preparation of transfer of identified good practices
  - Development of action plans for each region
  - Development of mainstreaming guide

Methodology to be followed: Selecting GPs



- 3 training & matching sessions to presented the initiative in greater detail
- regional stakeholders involvement is important
- analysis at regional level to choose the GPs
- final decision on GPs for import before the second project meeting

Methodology to be followed: Transfer Process

Transfer Process: Transfer tools (1)

- Help desks
  - organized by the exporting regions
  - to offer advice, documentation and support for regions intending to transfer, adapt and implement a specific Good Practice
  - answer questions remaining after transfer activities
  - guaranteed response time of two weeks
- Transfer workshops
  - 2 transfer workshops/region
  - organized from the exporting region or experts on the theme, followed by questions and answers and in-depth discussion
  - in-depth and focused discussion on the overall transfer concept or on specific aspects
  - participation of external experts as presenters and speakers

Transfer Process: Transfer tools (2)

- Study visits
  - chance to see the GPs in action
  - structure of events depending on GPs:
    - ✓ introductory presentations from those implementing the Good Practice
    - ✓ visits to companies involved
    - ✓ visits to the areas where the system is implemented
- Staff exchanges to identify how the GP could be adapted to the specific regional context
  - combined with Transfer Workshops
  - experts from the exporting region visit the importing region
  - experts from the importing region visit the exporting region

METHODOLOGICAL APPROACH and IMPLEMENTATION PROGRESS OF GP TRANSFER PROCESS (C3)

METHODOLOGICAL APPROACH

GP Evaluation Process – 1st ITERATION

THE PROCESS

- UoP provides template 'GP Evaluation Matrix'
- ***STEP 1.1: Preparing the GP Evaluation Matrix***
- ***STEP 1.2: Completing the GP individual sheets in the matrix***
- ***STEP 1.3: Completing the GP Evaluation matrix***
- ***STEP 1.4: Results integration into a consolidated GP Evaluation Matrix***

METHODOLOGICAL APPROACH and IMPLEMENTATION PROGRESS OF GP TRANSFER PROCESS (C3)

GP Evaluation Process – 1st ITERATION

IMPLEMENTATION OF THE PROCESS

Date	Activity
STEP 1.1	PREPARING THE EVALUATION MATRIX
12/09/2011	All partners receive Evaluation matrix delivered by UoP
14/09/2011	All partners respond with additions to the Evaluation Matrix, according to the methodology described below.
STEP 1.2 & 1.3	COMPLETING THE EVALUATION MATRIX
15/09/2011	UoP delivers the final version of the Evaluation Matrix to all partners for completion of GP Evaluation sheets (as described below)
23/09/2011	All partners deliver their completed GP Evaluation sheets to UoP
STEP 1.4	CONSOLIDATING THE EVALUATION MATRIX
16/09/2011	UoP delivers final integrated & complete version of Evaluation Matrix, which should be the basis for discussing at SG4 meeting and finalising the GP Transfer Matrix.
30/09/2011	SG4 meeting: discussion on Evaluation results, bilateral meetings for clarifications, Discussion on the GP Transfer Matrix and Process

METHODOLOGICAL APPROACH and IMPLEMENTATION PROGRESS OF GP TRANSFER PROCESS (C3)

METHODOLOGICAL APPROACH

GP Evaluation Process – 1st ITERATION

- ***STEP 1.1: Preparing the GP Evaluation Matrix***
  - Partners asked to review the GP Evaluation Matrix template and to add those elements/services of their GPs not included
  - UoP - filters and integrates input into the approved ***GP Evaluation Matrix template***
- ***STEP 1.2: Completing the GP individual sheets in the matrix***
  - Each Exporting Partner completes a GP Evaluation sheet for each GP they present to the project
  - Individual GP Evaluation Sheets analyze services/elements and emphasize particular characteristics that make it stand out

METHODOLOGICAL APPROACH and IMPLEMENTATION PROGRESS OF GP TRANSFER PROCESS (C3)

METHODOLOGICAL APPROACH

GP Evaluation Process – 1st ITERATION

- ***STEP 1.3: Completing the GP Evaluation matrix***
  - Partners fill in the GP Evaluation matrix sheet
    - simply ticking services/elements included in each GP
- ***STEP 1.4: Results integration into a consolidated GP Evaluation Matrix***
  - UoP consolidates all partner inputs on the template into Consolidated Matrix
  - The **GP Evaluation matrix sheet presents an aggregated view of the services/elements provided by all GP**

METHODOLOGICAL APPROACH and IMPLEMENTATION PROGRESS OF GP TRANSFER PROCESS (C3)

METHODOLOGICAL APPROACH

GP Evaluation Process - 2ND ITERATION

- ***STEP 2.1: Enhanced GP Evaluation Matrix template***
  - After discussions at SG4 meeting the template was enhanced by UoP
  - Enhanced Template shared in Google docs https://docs.google.com/spreadsheet/ccc?key=0AnDXHquOKEuRdHV5NGtlSVFjOWlxTEpjaFhyY2FyRGc&hl=en_US
  - Partners asked to review enhanced Template
  - Partners asked to **complete individual GP Evaluation sheets by 15/10/2011**

METHODOLOGICAL APPROACH and IMPLEMENTATION PROGRESS OF GP TRANSFER PROCESS (C3)

METHODOLOGICAL APPROACH

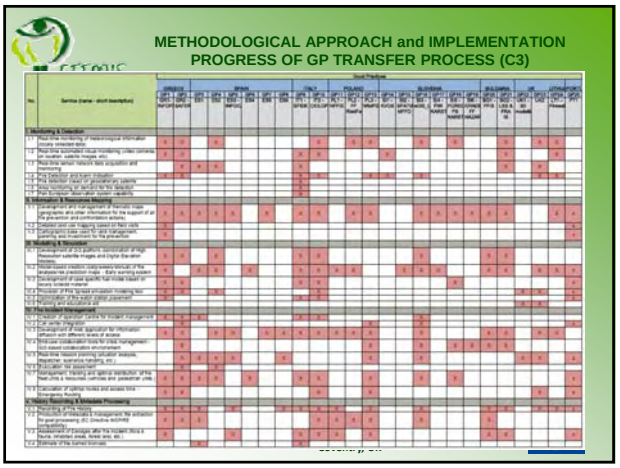
GP Evaluation Process - 2ND ITERATION

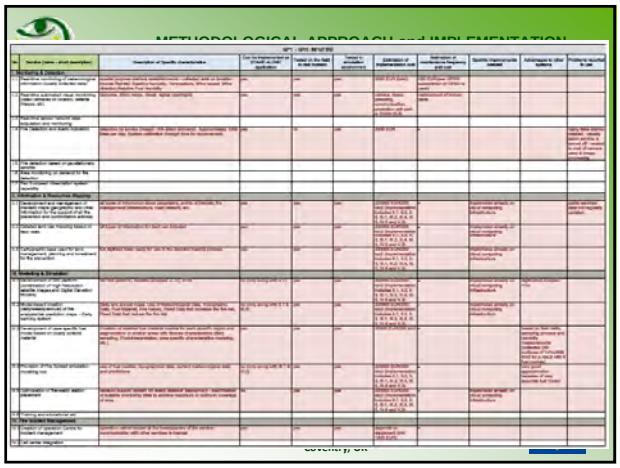
- ***Enhanced GP Evaluation Matrix template***

Services grouped in 5 general categories	**I. Monitoring & Detection** **II. Information & Resources Mapping** **III. Modeling & Simulation** **IV. Fire Incident Management** **V. History Recording & Metadata Processing**
Each GP sheet includes additional 8 Indicators/ information benchmarks	❖ Can be implemented as STAND ALONE application ❖ Tested on the field - in real incident ❖ Tested in simulation environment ❖ Estimation of implementation cost ❖ Estimation of maintenance frequency and cost ❖ Specific improvements needed ❖ Advantages to other systems ❖ Problems reported in use

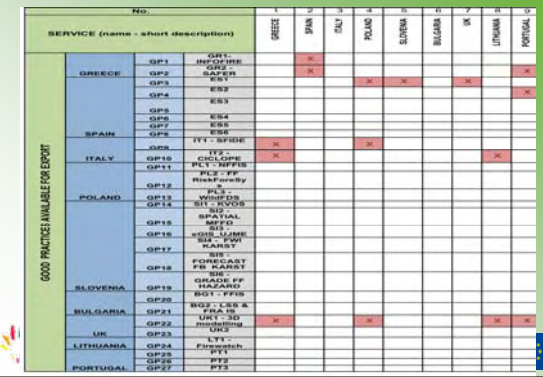
GP Evaluation Matrix Services Components

at. I: Ionitoring & etection	**Cat. II: Information & Resources Mapping**	**Cat. III: Modeling & Simulation**	**Cat. IV: Fire Incident Management**	**Cat. V: History Recording & Metadata Processing**
Real-time onitoring of eteorological nformation ocally collected ata) Real-time utomated visual onitoring (video ameras on ication, satellite nages, etc) Real-time sensor etwork data cquisition and onitoring Fire Detection nd Alarm idication Fire detection ased on eostationary atellite Area monitoring n demand for fire etection Pan European bservation ystem capability	Development and management of thematic maps (geographic and other Information for the support of all fire prevention and confrontation actions) - Detailed land use mapping based on field visits - Cartographic base used for land management, planning and investment for fire prevention	- Development of GIS platform (combination of High Resolution satellite images and Digital Elevation Models) - Model-based creation (daily / weekly / annual) of fire analysis/risk prediction maps - Early warning system - Development of case specific fuel model based on locally collected material - Provision of Fire Spread simulation modeling tool - Optimization of fire-watch station placement - Training and educational aid	- Creation of operation Centre for incident management - Call center integration - Development of Web application for information diffusion with different levels of access - End-user collaboration tools for crisis management - GIS-based collaboration environment - Real-time mission planning (situation analysis, dispatcher, scenarios handling, etc.) - Evacuation risk assessment - Management, tracking and optimal distribution of fire fleet units & resources (vehicles and pedestrian units) -Calculation of optimal routes and access time - Emergency Routing	- Recording of Fire History - Production of Metadata & management, file extraction for post processing (EC Directive INSPIRE compatibility) - Assessment of Damages after fire incident (flora & fauna, inhabited areas, forest land, etc.) - Estimate of the burned biomass





GP Transfer Matrix



METHODOLOGICAL APPROACH and IMPLEMENTATION PROGRESS OF GP TRANSFER PROCESS (C3)

GP Transfer Matrix – importing country sheet

LITHUANIA Details on GPs & services to be transferred			
GP number - country of origin	Service No.	Service (name - short description)	Justification of specific GP service transfer
GP22 - UK1	III.4	Provision of Fire Spread simulation modeling tool	To create Fire spread simulation models for particularly valuable territories (national parks, regional parks etc.)
	III.6	Training and educational aid	To improve education and training by using serious games
GP10- IT2	I.4	Fire Detection and Alarm indication	To use GP for improving Fire detection system in Lithuania by reducing false alarm number
	III.2	Model-based creation (daily/weekly/annual) of fire analysis/risk prediction maps - Early warning system	To improve forest fire risk prediction by including more factors
	IV.1	Creation of operation Centre for incident management	Improvement of comunication between the fire Centres of 42 state forest enterprises

Methodology to be followed: Developing Regional Action Plans

Developing Regional Action Plans

- a strategic document that defines how the Good Practices will actually be implemented under the Operational Programme of each region participating in a Capitalisation Project
- should be signed by the respective Managing Authority of the Structural Funds mainstream programme in order to ensure its official and binding character
- should include detailed information on
  - selected Good Practices (e.g. methodologies, projects, processes, techniques)
  - names and roles of regional stakeholders involved in implementation
  - steps and actions to ensure successful implementation
  - indicators for implementation (including baseline and target values)
  - details of provisional funds allocated to implement the Action Plan


EFFMIS
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INTERREG IVC
22 -23 February 2012, EFFMIS Workshop, Spain

Pyrosudoe 2009-2011

Interreg IV C SUDOE Program

EUFOFINET Workshop, LEON, February 22 th 2012

Pyrosudoe 2009-2011 – Wildland Urban Interfaces (WUI) :
a partnership of 7 members

OCR Incendi :Basis of « Pyrosudoe »

Pyrosudoe 2009-2011 – Wildland Urban Interfaces (WUI) :
Improvment of WUI management policies

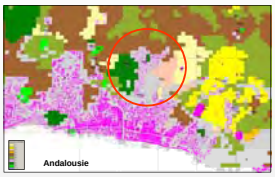
- **Common objectives of this project: :**
  - **Improvement of the WUI management policies for the prevention of fire hazard, ,**
    - **reduce threats to people and infrastructure**
    - **protect the forests and the natural environment**

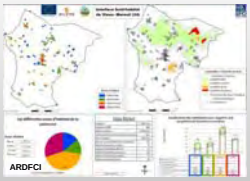
Pyrosudoe 2009-2011 – Wildland Urban Interfaces (WUI) : Improvment of WUI management policies

- **Organisation of the project in three thematics:**
  - **Mapping** WUI
  - **Feedback on the interfaces facing the fire**
  - **Development of risk culture**

WUI Mapping

- **Methodology, adapted from works carried out in the project FIREPARADOX**
  - Common mapping methodology, basis for comparison
  - Optional mapping, adapted to local context
- Tests on different territories of the partners (Mediterranean forest, schrubland, ..)





Feed back after fire in the WU

- Development of a common form of data collection after fire, as amended following the test on the large fires of 2010 and 2011
- Organization of the database in collaboration with Cemagref

- Supply of this database will be soon open to each partner from specific pages from the south defense prefecture website

Development of risk cultu

- Elaboration of a protocol for growing awareness of risk around the interface areas
- Test in each territory
- Adjustment for a final protocol in late 2011

Pyrosudoe 2012 and after …
Capitalisation actions, technical network

- **Capitalisation actions :**
  - **Local workshops in 2012 open to Spanish and French partners and other interested persons (translation Spanish/French supported by the Gard Council)**
  - **Internet data base for feed back after fire in the WUI hosted on the south defense prefecture in France (www.pyrosudoe.dpfm.fr)**
- **Technical network :**
  - **During 2012 and 2013, proposition of Gard council to support one or two thematic meetings each year**

Thank you for your attention

FOREST & LAND MANAGEMENT OPTIONS TO PREVENT UNWANTED FOREST FIRES

EUFOFINET WORKSHOP

Open Forum "A new European Regional Forest Fires Prevention Network"

León, Spain, 21-23 Feb. 2012

1-PROJECT RATIONALE
Fire Prevention

EASY TO UNDERSTAND, DIFFICULT TO IMPLEMENT…

- Broad spectrum of activities
- Diversity of aspects: technical AND scientific aspects BUT ALSO socio-economical, educational, cultural…
- Competencies shared among agencies, different territorial /admin. levels
- **In Europe:**
  - Knowledge is scattered AND
  - Lacks scientific background

1-PROJECT RATIONALE
Project Objectives

EUFIRELAB, FIREPARADOX, FIRE STAR, WARM…etc

- Compile: • Gather forest fire prevention theories & practices
- Analysis: • Identify gaps and obstacles hindering fire prevention efficiency
- Results: • Produce recommendations and practical guidelines
- Results: • Link stakeholders around the concept of FIRE PREVENTION and SUSTAINABLE FOREST MANAG.

2- CONSORTIUM

FP7 "COORDINATION AND SUPPORT ACTION"

Consortium: 5 countries, 8 institutions

TEAMS	CHARACTER
GMV *Coordinator*	Private sector
IRSTEA	Research Institution
AI	Private sector
CEPF	Civil association, European
EIMFOR	Private sector, SME
FORESTIS	Civil association,
INIA	Research Institution
JRC	Research Institution, European

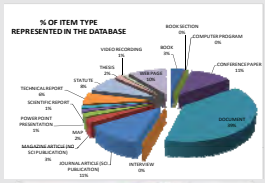
3-MATERIAL COMPILED
Sources of information

✓**FIRESMART WEB DATABASE:**
(624 Technical, 450 Scientific items)

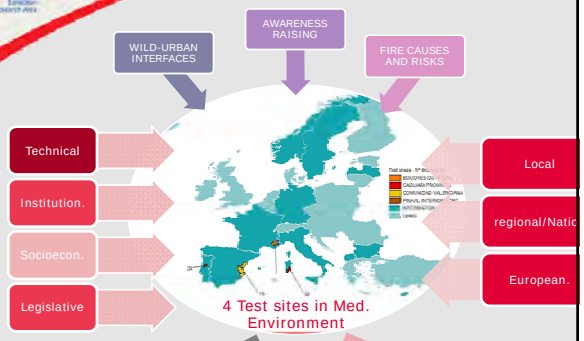
✓**FIRESMART QUESTIONNAIRE**
1850 experts!
Retrieve experts ' opinion on the efficiency and consequences of current practices, restrictions, legal issues, social and communication activities....

✓**FIRESMART INTERVIEWS**
32 experts interviewed

✓**WORKSHOPS AND LOCAL MEETINGS**
+1100 attendants (all together)



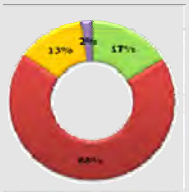
4-APPROACH



5- ANALYSES
SWOT

Institutional
Legislative
Socio-economic

- Strengths
- Weaknesses
- Opportunities
- Threats



- **QUANTIFY** the impact on fire prevention coming from every single S/W/O/T found.
- **TOPICS ADDRESSED:**

✓Agroforestry,
✓Awareness raising
✓Fire causes and risk
✓Preventive silviculture
✓Wildland-urban interfaces
✓Institutional
✓Legislative
✓Social
✓Economic

MAIN RESULTS

1) **Database** (Doc. Management System) with fire prevention material available on line
2) **Web page,** connecting point among stakeholders
3) **List of obstacles and recomendations**: derived through an exhaustive analysis and integrating opinions from all stakeholders
4) **Strategy roadmap** indicating the paths to follow in the future (on-going)
5) **Dissemination and Networking** (on-going)
6) **"Cheste Declaration"** on Wildland Urban Interface

MAIN RESULTS
Fire Prevention Database

MAIN RESULTS
Networking

http://www.firesmart-project.eu

- Over 2252 visits (one IP => one record) in 8 months
- 9 new persons a day
- Over 70 different countries

3- MAIN RESULTS
Networking (technical)

1. **Workshops and local meetings with fire prevention stakeholders:** Over 1100 persons connected directly

Madrid (April 2011); Madrid (Nov. 2011); Arganil (Portugal, April 2011); Brussels (Sept. 2011); Valencia (Spain, Jan. 2012), Italy (Sardinia April 2011), France (Aix en Provence, Mar.2012

3-MAIN RESULTS
Networking: Scientific

EUROPEAN NETWORK ON FF PREVENTION

1. NETWORKING HAS BEEN A MAIN GOAL OF FIRESMART, IN WHICH THE PROJECT HAS OBTAINED GREAT SUCCESS
2. YET THERE IS A CLEAR NEED TO REINFORCE LINKS AMONG STAKEHOLDERS
3. FIRESMART CONSORTIUM IS INTERESTED IN BEING PART OF THIS NET
4. WEB DB ON F. PREVENTION THEORIES AND PRACTICES AVAILABLE (DYNAMIC DB)
5. NON-EU MEDITERRANEAN COUNTRIES POSSIBLY INTERESTED (EG. ISRAEL)

OBJECTIVES AND RESULTS FROM TWO EUROPEAN PROJECTS

PROACTIVE HUMAN RESPONSE TO WILDFIRES OUTBREAK: MEASURE AND PREPARE FOR IT

EUROPEAN MEETING ON FOREST FIRES PREVENTION
Léon, 21st-24th February 2012

Fantina Tedim
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IMPACTS ON FOREST FIRES MANAGEMENT FROM TWO EUROPEAN PROJECTS

PROACTIVE HUMAN RESPONSE TO WILDFIRES OUTBREAK: MEASURE AND PREPARE FOR IT

Improve forest fire risk management

Improve emergency response and recovery

Enhance the participation of citizens and communities in forest fire prevention and response to forest fire outbreak

PROACTIVE HUMAN RESPONSE TO WILDFIRES OUTBREAK: MEASURE AND PREPARE FOR IT

Program	❑ **INTERREG IVC**
Duration	❑ October 2008-December 2011
Partners	❑ Lead partner: Region of Western Greece 10 institutions 5 countries (Spain, Bulgaria, Poland, Italy, Portugal) .

PROACTIVE HUMAN RESPONSE TO WILDFIRES OUTBREAK: MEASURE AND PREPARE FOR IT

Objective	**The improvement of the regional policies for confrontation of forest fires in European forestry areas** ❑ Improve response policies through operational readiness and effectiveness status of fire agencies and citizens ❑ Improve preparedness through : ▪ Enhance forest fire simulations and improve effectiveness ▪ Education for applying safety guidelines, the rights of individuals to stay and protect their properties

PROACTIVE HUMAN RESPONSE TO WILDFIRES OUTBREAK: MEASURE AND PREPARE FOR IT

Project outcomes

Deliverable 2/3

DEFINATION OF BEST CASES

Selection criteria:

- **Innovation** (of process, result, context)
- **Replicability** and **Transferability**
- Significant **contribution to** mainstreaming/system **development**
- **Sustainability**
- **Impact** (economic and environmental)
- **Consistency** between results and objectives of the project/practice

BENCHMARKING ANALYSIS ON BEST CASES

- **Benchmarking** Best Cases in terms of Readiness and Effectiveness Indicators.

PROACTIVE HUMAN RESPONSE TO WILDFIRES OUTBREAK: MEASURE AND PREPARE FOR IT

Project outcomes

COMPARATIVE ANALYSIS OF SIMULATION PROCEDURES

Deliverable 4

FOREST FIRE SIMULATION EXERCISES: lessons learned

RECOMMENDATIONS FOR PLANNING FUTURE SIMULATION EXERCISES

PROACTIVE HUMAN RESPONSE TO WILDFIRES OUTBREAK: MEASURE AND PREPARE FOR IT

Survival Guide D5

A booklet

A mobile smart phone application

it runs on the majority of all smart phones

A WILDFIRE SURVIVAL GUIDE FOR ALL

Objective:

Put in a short publication, easy to handle all reliable information in case of emergency or even before a wildfire occurs in order to help people to protect their life and property

The Survival Guide was produced in 8 European languages

METHODS FOR THE IMPROVEMENT OF VULNERABILITY ASSESSEMENT IN EUROPE

Program FP7 - Environment and climate change call

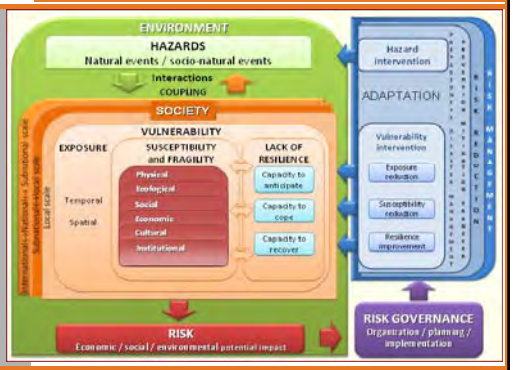
Duration October 2008 - December 2011

Partners **Coordinator**- University of Florence, Italy
13 Institutions
9 countries - Italy, Austria, Germany, United Kingdom, France, Spain, Hungary, Norway, Portugal

MOVE FRAMEWORK

Objective:

Improve vulnerability assessment in Europe



THE RELEVANCE OF VULNERABILITY FRAMEWORK

MOVE FRAMEWORK

- It introduces an up grade in the way vulnerability is conceptualized in forest fire risk

From the degree of loss

Multidimensional process characteristic of human systems and ecosystems

WILDFIRE VULNERABILITY PRODUCTS

Vulnerability map

At the municipal scale that could be aggregated with a **hazard map** in order to produce an **effective risk map** that could support wildfire prevention and suppression as well as landscape planning

Vulnerability profile

At different scales: households, communities, municipalities, country

Thank you for your attention!

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Forest Fires

Problem, causes and underlying factors

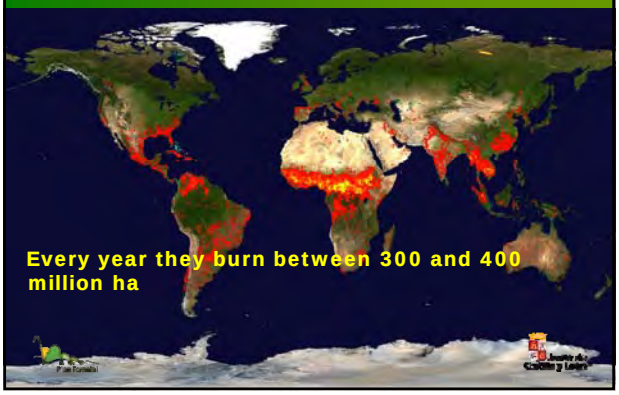
EUROPEAN FOREST FIRE PREVENTION NETWORK

EUFOFINET & EFFMIS meeting

CDF. Leon, SPAIN 2012

Mariano Torre

Forest fires are a worldwide problem



Every year they burn between 300 and 400 million ha

Size of the problem: Spain

IN AVERAGE per year

20.000 Wildfires

- 160.000 ha of wild land BURNED

- 35.000 ha of forest land
- 125.000 ha of bushes

Big fires are a huge problem

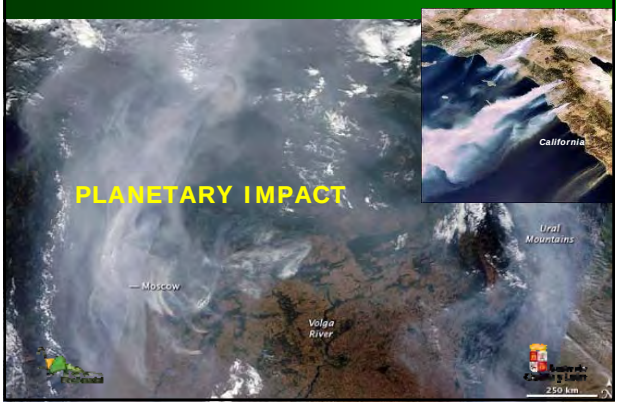
Lot of wildfires,
more dangerous time to time

- 20.000 wildfires per year in Spain
- 50% of damage is caused by just 0,1%
- Almost every year a catastrophic fire happens

Big fires are a huge problem

CHINA 1987
INDONESIA 1994
PORTUGAL 2003
CALIFORNIA 2003
AUSTRALIA 2003, 2005, 2006, 2007, 2009
BOTWANA 2008
GRECIA 2007, 2010
RUSIA 2011

Big fires are a huge problem



Big fires are a huge problem

Big fires are a huge problem

MEGA FIRE Factors:
DROUGTH, FIRE WEATHER, HIGH FUEL LOAD, CONTINOUS LANDSCAPE.

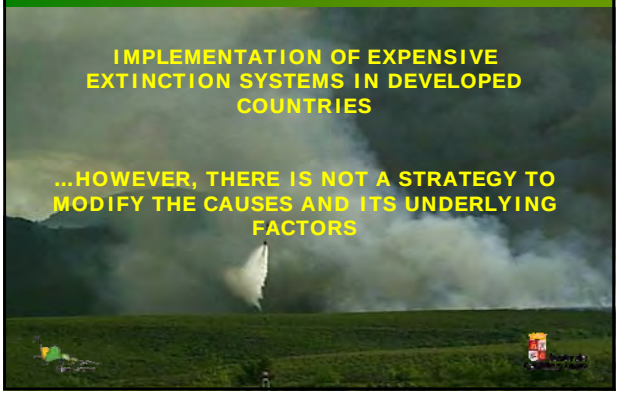
"Findings and implications from a coarse-scale global assessment or recent selected mega-fire. Williams et al", 2011.

The answer to this problem

We are trying to stop human wild fires. This is an important issue and the suppression budget in Spain rises above 1000 million Euros per year

The prevention budgets hardly reach to 15%

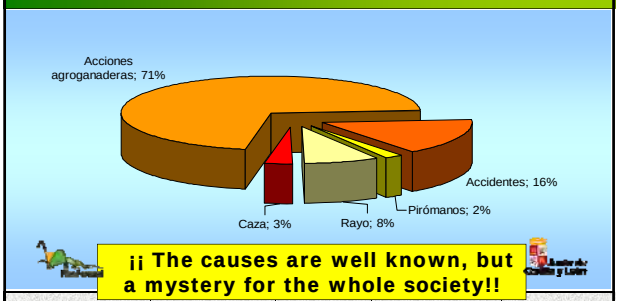
The answer to this problem



IMPLEMENTATION OF EXPENSIVE EXTINCTION SYSTEMS IN DEVELOPED COUNTRIES

...HOWEVER, THERE IS NOT A STRATEGY TO MODIFY THE CAUSES AND ITS UNDERLYING FACTORS

Wild fire causes in Castilla y León



¡¡ The causes are well known, but a mystery for the whole society!!

Farming	Accidents	Lighting	Pyromania	Hunting
75 %	13,2%	6,7%	3,4 %	1,7 %

Problem factors. The inherited tradition

BEFORE THE SEVENTIES

THE LANDSCAPE HAD KEPT OPEN BY FIRE AND GRAZZING FOR AGES

Vegetation structure. The old landscape

Vegetation structure. The current landscape

Problem factors. Vegetation structure

Problem factors. The vegetation structure

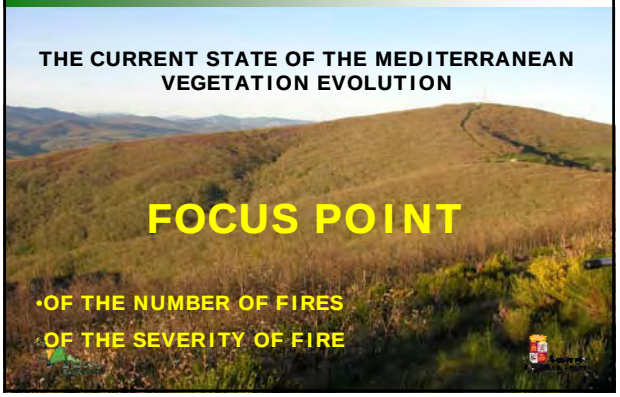
Problem factors. The vegetation structure

Problem factors. The inherited tradition

Problem factors. The inherited tradition

Problem factors. Vegetation structure

Problem factors. Vegetation structure and the inherited tradition



Underlying factors. Vegetation structure

What can we do?

Our proposal

Our proposal

We need
Fire Figthing Policies

based in
Fire Prevention . . .

locally adapted

Our proposal

Our proposal

It's essential to go beyond:

- Social awareness campaigns
- Fire detection systems
- Fire infraestructure improvements



Our proposal

The key to prevention is:

Landscape Management

- through the estructuring of vegetation
- and social & economic action

for a change in the **underlying factors** that feedback the problem

Our proposal

Our proposal

Proposed members of the Network would be:

- Public authorities responsible of land management
- Sectorial organisations
- Universities and research centres
- Other agents

Annex IV: European forest fires prevention network proposal

PREVENTION DES INCENDIES FORESTIERS
« Vers un Réseau Européen pour la Prévention »

Introduction

Il existe actuellement plusieurs entités localisées en Europe qui se rassemblent grâce à différents mécanismes: projets de financement européen, réunion de groupes forestiers, séminaires de débats…, sur l'importance d'établir des politiques intégrées de prévention des incendies forestiers afin de surmonter la situation actuelle en Europe mais aussi ailleurs, où les dispositifs d'extinction des feux sont déconnectés de la prévention, lui faisant jouer un rôle marginal.

L'usage du feu et ses effets comme outil de gestion du territoire est une pratique millénaire dans le monde entier, la prise en compte du risque d'incendies comme un problème social et écologique au niveau régional ou mondial est relativement récente. C'est pour cela que la classe sociale et politique lui donne plus d'attention.

Il faut offrir une réponse rapide au problème pour lutter contre les incendies. C'est alors souvent que sont mises en place des stratégies basées sur des dispositifs purs d'extinction, des modèles d'urgence, au lieu de programmes d'actions fondés sur les causes et facteurs des incendies en les coordonnant avec des moyens adéquats d'extinction.

Les modèles d'urgence sont très coûteux et ne sont pas efficaces dans le cas d'incendies forestiers catastrophiques, normalement liés à des circonstances météorologiques extrêmes associées aux combustibles présents. Dans ces cas, les facteurs comme la connaissance directe et détaillée du milieu ou la disponibilité immédiate de moyens sur le terrain peuvent être essentiels. Cela doit être mis en relation avec des moyens et ressources d'extinction nécessaires. Ces aspects semblent plus simples et économiques à atteindre, au moyen de modèles liés à la gestion du territoire depuis une perspective combinée de prévention/extinction, qui en plus collabore avec son propre travail de diminuer la probabilité d'occurrence d'incendies et la probabilité de que ceux-ci atteignent de grandes proportions.

Premier paradoxe : la mise en place de modèles basés sur l'extinction n'implique pas une réduction du problème des incendies, ni de mieux éteindre les grands incendies.

La disparition de l'usage du feu est peu probable, et nous devons apprendre à vivre avec les incendies futurs, particulièrement dans des zones géographiques déterminées. Nous devons agir sur les facteurs qui les maintiennent et qui ne sont pas facile de changer, la menace est jour après jour grandissante, les feux catastrophiques qui détruisent des milliers d'hectares de forêt et affectent les biens et la vie des personnes, ce risque croît et nous devons le contrôler.

Les facteurs clés d'un incendie catastrophique sont : la sècheresse, la météorologie du feu, l'accumulation de combustibles et un paysage homogène ou défavorable, ce qui peut actuellement être imputé en grande mesure, surtout dans notre contexte européen, à des omissions ou déficiences dans la gestion du territoire.

Comme nous ne pouvons pas modifier les facteurs d'origine climatique, il nous reste la possibilité de gérer le territoire de manière préventive, d'où l'importance de ce facteur. L'omission ou la déficience de la gestion du territoire a actuellement, et concrètement dans les pays les plus développés, plusieurs causes : transformations socioéconomiques (émigration, abandon, disparition de marchés traditionnels…), politiques de conservation, politiques de lutte contre les incendies concentrées sur la suppression et autres. Il faut alors travailler pour changer cette situation, et une des options les plus intéressantes semble celle de construire des politiques de prévention sur la base de la gestion du territoire à une échelle qui permette de réduire l'énorme risque actuel d'incendies catastrophiques.

Actuellement, les approches « technologiques » sont prépondérantes (moyens aériens très chers, vols nocturnes, développements informatiques presque miraculeux, unités militaires, professionnalisation synonyme de déconnection avec la prévention…), qui maintiennent le status quo, et en plus empêchent de manière indirecte l'évolution du système, en séquestrant le financement de la gestion du territoire et s'offrent comme unique solution politiquement utile chaque fois qu'il y a un feu catastrophique (décisions précipitées et de résultats apparemment rapides, mais pas efficaces à moyen et long terme).

Puisque l'option critique de la lutte contre les incendies catastrophiques est la gestion du combustible à l'échelle du paysage et que la croissance démesurée des opératifs d'urgence séquestrent le financement de cette gestion, et que la suppression du feu dans des territoires de faible utilisation mène à l'accumulation d'énormes quantités et continuité de combustible, ils contribuent implicitement à l'augmentation des risques de ces énormes incendies.

Second paradoxe : « plus d'extinction sans prévention, plus de risques d'incendies catastrophiques »

Notre réalité, en général, est que vu l'omniprésence de « l'approche technologique », la prévention est pratiquement inexistante : domination des efforts individuels, normalement à très petite échelle, avec peu de budget et peu d'extrapolation de la gestion du territoire. Mais surtout il manque une vision globale sur la prévention des incendies forestiers, qui liée à l'extinction offre une solution raisonnable au problème.

[1] *Findings and implications from a coarse-scale global assessment or recent selected mega-fire*. Williams et al. 2011

Le Réseau Européen de Prévention des Incendies Forestiers. Opportunités du moment.

A partir des prédictions du changement climatique, et des derniers épisodes critiques comme en Russie ou en Grèce, l'inquiétude monte en Europe sur les incendies forestiers, particulièrement sur les incendies catastrophiques.

Sachant que la majorité des décisions prises pour le moment par les gouvernements vont vers la croissance des dispositifs d'extinction, il existe un risque clair que cette préoccupation puisse finir par empirer la situation et, s'il y a une autre catastrophe, de refaire les mêmes erreurs comme en Espagne de créer une Unité Militaire d'Urgence peu effective et très coûteuse.

Le besoin de surmonter cette approche actuelle, en proposant de manière décidée la politique basée sur la prévention, commence à être partagé et mène à l'idée de créer un Réseau Européen de Prévention des Incendies Forestiers.

Objectif du Réseau

Le principal objectif du Réseau **est de donner de l'importance aux politiques de prévention basées sur les causes et les facteurs** d'incendies comme une stratégie qui doit surpasser la lutte contre les incendies forestiers.

Il s'agit de réunir dans le Réseau **les institutions qui réalisent des actions de prévention sur le terrain** ou en relation avec celui-ci. Précisément celles qui **ont une approche de la prévention dans la gestion des risques** dans un sens large.

Ces institutions opèrent occasionnellement au niveau des gouvernements régionaux, mais à différents niveaux ; de l'Etat aux municipalités, et dans beaucoup d'autres occasions ce ne sont pas des gouvernements mais d'autres institutions comme des associations de propriétaires, centres d'investigation, universités…

Il ne s'agit pas seulement d'échanger sur des techniques de sylviculture préventive sinon de réfléchir sur la situation actuelle de prévention où il y a beaucoup d'espace pour l'analyse et la discussion qui demandent la création du Réseau. La gestion préventive du paysage et de la population rurale est complexe puisqu'il faut intégrer différents aspects, culturels, techniques, technologiques, sociaux, budgétaires, d'organisation, économiques, de marché… et à différents niveaux de perception, de l'Europe au local, du paysage au bosquet, depuis tout un secteur économique à une petite entreprise, depuis des décisions d'un gouvernement national à l'expérience d'une petite communauté.

Cependant, malgré cette complexité, il existe des modèles à succès, de diverses portées et typologie, dont les facteurs clés connectés entre eux peuvent permettre de construire des approches conceptuelles adéquates pour confronter le problème.

Qui devrait participer?

-L'administration publique responsables de la gestion territoriale

-Organismes du secteur

-Les universités et centres de recherche

-Et d'autres agents qui considèrent la gestion territoire comme la clé de la prévention et la lutte contre les incendies forestiers

Pour commencer, nous pouvons donner quelques pistes pour réfléchir et échanger les expériences:

- Degré de mise en place d'approches préventives basées sur la gestion du territoire.
- L'état d'analyse des causes et facteurs des incendies.
- Degré de connexion entre les causes et facteurs des politiques contre les incendies.
- L'aspect social de la gestion du territoire.
- L'importance environnementale, économique et sociale de cette approche.
- L'adaptation de la prévention à la situation socioéconomique et culturelle de chaque territoire.
- L'analyse des modèles à succès.
- L'amplitude des politiques de prévention. Les échelles temporelles et spatiales.
- Les difficultés d'implémentation.
- L'état de la relation entre l'extinction, l'intégration ou déconnection, conséquences et effets.
- L'efficacité des différentes approches sur les incendies catastrophiques, tant sur le contrôle des risques comme de leur suppression.

Ces différents points ou ceux apportés par les membres du réseau peuvent être discutés.

Le résultat du travail que pourrait obtenir le réseau au moyen des idées proposées permettrait :

- D'établir un corps de doctrine commun sur la prévention grâce à l'expérience de bonnes pratiques qui se réalisent dans plusieurs endroits en Europe (et le reste du monde selon l'importance) et grâce à l'expérience des différentes entités du Réseau. Quelques entités ont une longue expérience pratique sur le territoire de différents mécanismes et actions de prévention dans différents contextes.
- D'unifier la voix amplement représentative qui permette de transmettre un message clair sur le problème des incendies forestiers dans les processus de discussion des politiques européennes, particulièrement sur celles liées à la gestion du territoire comme la Politique Agricole Commune.
- En conséquence : de contribuer à la discussion politique européenne et des Etats Membres pour promouvoir des politiques de gestion du territoire basées sur des approches préventives à grande échelle de perception. Plusieurs politiques, et spécialement les mesures agricoles peuvent être considérées comme des facteurs car elles n'intègrent pas une réflexion de son influence sur le maintien des incendies forestiers ou de ce qu'elles pourraient apporter comme solution.

Pour plus d'informations

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FOREST FIRE PREVENTION
«Towards a European Forest Fire Prevention Network»

Introduction

Currently several entities throughout Europe are gathering together through different mechanisms: European projects, forest-oriented focus groups, debates and others, focusing of establishing policies for forest fire prevention which overcome the prevailing situation not only in Europe but elsewhere, geared toward fire-fighting devices disconnected from prevention and relegating it to a marginal role.

The use of fire and its effects as a tool for land management has been present for millennia throughout the world, but it has only recently been perceived as a social and ecologic problem at regional or global levels. That is why the politic and social sectors are paying growing attention to it.

Therefore, and in need of providing a rapid response to the problem of forest fire, strategies based on the augmentation of the use of pure devices of extinction, emergency models, have been established, rather than implementing action programs that are based on the causes and the underlying factors and coordinating them with adequate fire-fighting resources.

Pure emergency models are very expensive and less effective in case of catastrophic forest fires, usually linked to extreme weather conditions associated with fuel continuity. In such cases, factors such as direct and detailed knowledge of the surroundings by operators or the immediate availability of equipment in the field may be essential. Of course, this should be coupled with the ever necessary existence of means and resources specializing in extinction, but these goals seem easier and cheaper to achieve by models linked to land management from a combination of prevention/fighting, which positively feedbacks its own work to decrease the probability of fire occurrence and the probability that it reaches large sizes.

***First paradox**: the implementation of models based on fire-fighting does not imply reducing the fire problem, or better extinguishing large fires.*

The fading of the use of fire is very unlikely and therefore we must assume that we will keep living with fire in the future, especially in some geographic areas. At least in the near future, the underlying factors that maintain the use of fire are not easy to change. But the greatest threat that we face is catastrophic fires. Each year its occurrence risk is growing and we must control it.

The key factors of a catastrophic fire are: drought, fire-prone weather, fuel accumulation and an homogeneous landscape. The unfavorable current landscape is due to a clear omission in land management, particularly in our European context.

Since we cannot change the climate-related factors, we only are left with our ability to proactively manage the territory. Failure in land management has different causes: socioeconomic transformations (emigration, abandonment, disappearance of traditional markets, etc.), conservation policies, policies of fire suppression and others. It is necessary to work to change this situation, and one of the most interesting options is to build prevention policies based on land management at a scale able to reduce the current tremendous risk of catastrophic fires.

Currently prevailing "technological" approaches (expensive air assets of ever-increasing capacity, night-flight capacity, IT developments, military units, professionalisation as a synonym for a disconnection from prevention) not only maintain the *statu quo*, but also prevent the evolution from it, hijacking the existing financial capacity from land management and presenting themselves as the only politically useful solution whenever there is a catastrophic fire (urgent decisions, apparently offering quick results, but of doubious medium- and long-term impacts).

Since the critical option for fighting catastrophic fires is fuel management at the landscape level, since emergency operations kidnap the funding of this effort, and since fire suppression in less-used territories gives way to an enormous accumulation of continuous combustible material, the current configuration is implicitly contributing to an increased risk of those large fires.

> ***Second Paradox**: The more extinction without prevention, the more risk of catastrophic fire*

Our reality is that, due to the omnipresence of the above-mentioned "technological" approach, prevention is scarce: frequently dominated by individual efforts, in general at a very small scale, with very little budget and few extrapolation to landscape management. But it is mostly missing a comprehensive vision of the prevention of forest fires, that links it to fire fighting and offers a reasonable solution to the problem.

[1] *Findings and implications from a coarse-scale global assessment or recent selected mega-fire*. Williams et al. 2011

The European Forest Fires Prevention Network. An opportunity now

Climate change predictions and recent critical events such as recent ones in Russia and Greece, a serious concern begins to appear in Europe on forest fire and in particular the catastrophic events.

Given that most of the decisions taken so far by governments are going in the direction of increasing suppression devices, there is a clear risk that this concern may end up worsening the situation, and if the catastrophe is repeated, the mistake will be repeated, such as the recent decision taken in Spain of creating a very expensive and scarcely effective Military Emergency Unit.

The need to overcome this approach, presenting a policy distinctly based on prevention, is beginning to be shared in many areas, so there is growing convergence on the idea of creating a European Forest Fire Prevention Network.

Objective of the Network

The main objective of the Network is to put prevention policies, based on the causes and underlying factors of fires, at the forefront of the strategies to fight against forest fire.

The point is to gather, together into a network, institutions that perform preventive actions on the ground or are connected with it. In particular, those that integrate prevention into land management in a broad sense.

These institutions operate at the level of regional governments in some cases, but in other cases they do so at different scales, from local to national, and often they are not public entities but other institutions like owners associations, research centers, universities...

The exchange between them should not only occur about preventive-silviculture techniques or active prevention policies, but also to reflect on the current status of prevention in which there are many fields of analysis and discussion that require the creation of the Network. Preventive landscape management is complex because it requires the integration of different aspects, cultural, technical, technological, social, budgetary, organizational, economic or commercial; at different scales of perception, from local to European, from landscape to stand, from a whole economic sector to a small business, from national government decisions to the experience of a small community.

However, despite this complexity, there are successful models from which to extract interconnected key factors that may allow the building of a proper conceptual approach to deal with the problem.

Who should participate?

- Public authorities responsible of land management

- Sectorial Organizations

- Universities and research centers

- Other agents considering land management as key to the prevention and combat of forest fires

Some subjects on which it may be convenient to discuss and exchange experiences can be advanced:

- The degree of implementation of preventive approaches based on land management.
- The state of the analysis of causes and underlying factors in forest fire.
- The degree of connection between underlying causes and policy.
- The social aspect in land management.
- The environmental, economic and social importance of this approach.
- The adaptation of prevention to the socioeconomic and cultural reality of each country.
- The analysis of successful models.
- The scope of prevention policies. Temporal and spatial scales.
- The difficulties faced in implementation.
- The relationship with fire fighting, integration or disconnection: implications and effects.
- The effectiveness of different approaches to catastrophic fires in both risk management and fire suppression.

The subjects on which to raise a reflection can be these or others the Network members agree.

The result of these networking efforts could include:

- To establish a common body of knowledge on prevention through the experience of good practices carried out in various parts of Europe (and elsewhere where relevant) and through the experience of the various entities that form part of the Network. Many agencies have a long history of application to the territory of different mechanisms and prevention activities in different contexts

- To unify a broadly representative voice that allows transmitting a clear message about the problem of forest fires in the discussion processes of European policies, especially those related to land management and within the Common Agricultural Policy in particular.

- And as a consequence: To make contributions to the European policy discussion and that of the Member States to promote land management policy based on preventive approaches to large scales of perception. Many policies and especially the land can be considered part of the underlying factors because they incorporate a reflection of his influence in the maintenance of forest fires or what might contribute to its solution.

For further information

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Prevención de Incendios Forestales
"Hacia una Red Europea de Prevención"

Introducción

En estos momentos varias entidades de diversos países europeos están confluyendo a través de diferentes mecanismos: proyectos de financiación europea, reuniones de grupos de trabajo, jornadas de debate,…, en la importancia de establecer políticas integradas de prevención de incendios forestales, para superar una situación predominante en Europa y países desarrollados, que está empleando cada vez más recursos a dispositivos puros de extinción desconectados de la prevención, lo que conduce a relegar a ésta a un papel marginal.

El uso del fuego y sus efectos como herramienta de manejo del territorio es milenaria y está distribuida por gran parte del globo, pero la percepción de los incendios forestales como un problema social y ecológico a nivel regional o global es relativamente reciente, y por ello es creciente la atención que le prestan el conjunto social y el estamento político.

Por ello, y con la necesidad de ofrecer una respuesta rápida al problema para luchar contra los incendios, frecuentemente se plantean estrategias basadas en incrementar los dispositivos puros de extinción, modelos de emergencias, más que en implementar programas de actuación que se fundamenten en las causas y en los factores subyacentes de los incendios coordinándolos con unos adecuados medios de extinción.

Los modelos puros de emergencias son muy onerosos y no resultan más eficaces en caso de incendios forestales catastróficos, normalmente vinculados a circunstancias meteorológicas extremas asociadas a continuidad de combustible. En esos casos, factores como el conocimiento directo y detallado del medio por parte de los operarios o la disponibilidad inmediata de medios vinculados al terreno, pueden resultar esenciales. Ello unido a la siempre necesaria existencia de unos medios y recursos especializados en extinción, Estos aspectos parecen más sencillos y económicos de lograr mediante modelos más ligados a la gestión del territorio desde una perspectiva combinada de prevención/extinción, que además colabora con su propio trabajo en disminuir la probabilidad de ocurrencia de incendios y la probabilidad de que los que sucedan alcancen grandes proporciones.

Primera paradoja: la implementación de modelos basados en la extinción no implica reducir el problema de los incendios, ni extinguir mejor los grandes incendios.

La desaparición de los incendios es muy improbable y por lo tanto sabemos que vamos a convivir con ellos en el futuro, especialmente en determinadas áreas geográficas. Pero debemos actuar sobre los factores subyacentes que los mantienen y no son fáciles de cambiar, pues cada día es mayor la amenaza a la que nos enfrentamos, los fuegos catastróficos que destruyan miles de hectáreas de bosque y afecten a los bienes y vida de las personas, este riesgo crece y debemos controlarlo.

Los factores clave de un fuego catastrófico son: sequía, meteorología de fuego, acumulación de combustible y paisaje homogéneo o desfavorable, algo que actualmente puede achacarse en gran medida, sobre todo en nuestro contexto europeo, a omisiones o deficiencias en la gestión del territorio[1].

Dado que no podemos modificar los factores de origen climático solo nos queda la posibilidad de gestionar el territorio de manera preventiva, de ahí la importancia de este factor. La omisión o deficiencia en la gestión del territorio tiene en la actualidad, y en concreto en los países más desarrollados, varios factores causales: trasformaciones socioeconómicas (emigración, abandono rural, desaparición de mercados tradicionales…), políticas de conservación, políticas de lucha contra incendios centradas en la supresión, etc. Es necesario trabajar para modificar esta situación, y una de las opciones más interesantes parece la de construir políticas de prevención sobre la base de la gestión del territorio a una escala que permita disminuir el tremendo riesgo actual de incendios catastróficos.

Actualmente son preponderantes los enfoques "tecnológicos" (carísimos medios aéreos de cada vez más capacidad, vuelo nocturno, desarrollos informáticos cuasi-milagrosos, unidades militares, profesionalización como sinónimo de desconexión con la prevención,…) que no sólo mantienen el actual "statu quo", sino que, de modo indirecto, pueden impedir la evolución del sistema al secuestrar la financiación necesaria para la gestión del territorio, y ofrecerse como única solución políticamente útil cada vez que se produce un fuego catastrófico (decisiones precipitadas y de resultados aparentes rápidos, pero no necesariamente eficaces a medio y largo plazo).

Dado que la opción crítica de lucha contra los incendios catastróficos es la gestión del combustible a escala de paisaje, que el incremento desmedido de los operativos de emergencias secuestra la financiación de esta gestión, y que la supresión del fuego en territorios con bajo grado de utilización conlleva la acumulación de enormes cantidades y continuidades de combustible, implícitamente está contribuyendo al aumento del riesgo de estos enormes incendios.

> ***Segunda paradoja:*** "Más extinción sin prevención, más riesgo de incendios catastróficos"

Nuestra realidad, en general, es que debido a la omnipresencia del "enfoque tecnológico" apenas se hace prevención: predominan los esfuerzos individuales, normalmente a muy pequeña escala, con poco presupuesto y con poca extrapolación a la gestión del territorio. Pero sobre todo se echa de menos una visión global sobre la prevención de incendios forestales, que enlazándola con la extinción ofrezca una solución razonable al problema.

[1] *Findings and implications from a coarse-scale global assessment or recent selected mega-fire*. Williams et al. 2011

La Red Europea de Prevención de Incendios Forestales. Oportunidad del momento.

A partir de las predicciones de cambio climático y de los últimos episodios críticos como los de Rusia o Grecia, comienza a haber una gran inquietud en Europa por los incendios forestales y en especial por los catastróficos.

Teniendo en cuenta que la mayoría de las decisiones tomadas hasta el momento por los gobiernos van en la dirección de incrementar los dispositivos de extinción, existe un claro riesgo de que dicha preocupación pueda acabar por empeorar la situación y de que, si se repite otra catástrofe, vuelva a caerse otra en el mismo error, como el reciente de España de crear una carísima y poco efectiva Unidad Militar de Emergencia.

La necesidad de superar este actual enfoque, planteando de una manera decidida una política basada en la prevención, está empezando a ser compartida desde muchos ámbitos por lo que se está confluyendo en la idea de crear una Red Europea de Prevención de Incendios Forestales.

Objetivo de la Red

El principal objetivo de la Red es **poner en relevancia las políticas de prevención basadas en las causas y en los factores subyacentes** de los incendios como estrategia que debe dominar la lucha contra los incendios forestales.

Se trata de unir en una Red a las **instituciones que realizan acciones de prevención sobre el terreno** o que estén relacionadas con esto. En especial a las que su **enfoque de la prevención integre la gestión del territorio** en un sentido amplio.

Estas instituciones operan al nivel de los gobiernos regionales en algunas ocasiones pero en otros casos lo hacen a escalas diferentes; desde estatal a municipal, y en muchas ocasiones no son gobiernos sino otras instituciones como asociaciones de propietarios, centros de investigación, universidades…

No sólo se trata de intercambiar técnicas de selvicultura preventiva o políticas de prevención activa, sino reflexionar sobre la situación actual de la prevención en la que hay muchos campos de análisis y discusión que requieren la creación de la Red. La gestión preventiva del paisaje y de la población rural que lo sustente, es compleja pues requiere integrar diferentes aspectos, culturales, técnicos, tecnológicos, sociales, presupuestarios, organizativos, económicos, de mercado… y a diferentes escalas de percepción, desde europea a local, desde paisaje a rodal, desde todo un sector económico a una pequeña empresa, desde decisiones de un gobierno nacional a la experiencia de una pequeña comunidad.

Sin embargo, a pesar de la complejidad expuesta, existen modelos de éxito, de diversos alcances y tipología, de los que extraer los factores clave, que conectados entre si, pueden permitir construir aproximaciones conceptuales adecuadas para enfrentarnos al problema.

¿Quién debería participar?

-Administraciones públicas competentes en gestión del territorio

-Organizaciones sectoriales

-Universidades y centros de investigación

-Y otros agentes que consideren la gestión del territorio como clave para la prevención y lucha contra los incendios forestales

Para empezar podemos avanzar unas cuantas materias sobre las que puede ser conveniente reflexionar e intercambiar experiencias:

- Grado de implementación de enfoques preventivos basados en la gestión del territorio.
- El estado del análisis de las causas y de los factores subyacentes en los incendios.
- Grado de conexión con causas y factores subyacentes de las políticas contra los incendios.
- El aspecto social en la gestión del territorio.
- La importancia ambiental, económica y social de este enfoque.
- La adaptación de la prevención a la situación socioeconómica y cultural de cada territorio.
- El análisis de los modelos de éxito.
- La amplitud de las políticas de prevención. Las escalas temporales y espaciales.
- Las dificultades de implementación.
- El estado de relación con la extinción; integración o desconexión: consecuencias y efectos.
- La eficacia de los diferentes enfoques sobre los incendios catastróficos, tanto en el control de riesgos como en su supresión.

Las materias sobre las que plantear una reflexión compartida pueden ser las anteriores o las que los miembros de la Red acuerden.

El resultado que el trabajo de la Red podría obtener mediante el desarrollo de las ideas anteriores incluiría:

- Establecer un cuerpo de doctrina común sobre la prevención a través de la experiencia de buenas prácticas que se realizan en diversos lugares de Europa (y del resto del mundo donde sea relevante) y a través de la experiencia de los diversas entidades que formen parte de la Red. Algunas entidades tienen una larga experiencia de aplicación al territorio de diferentes mecanismos y acciones de prevención en diferentes contextos
- Unificar una voz ampliamente representativa que permita trasmitir un mensaje claro sobre el problema los incendios forestales en los procesos de discusión de las políticas europeas, especialmente en las ligadas a gestión del territorio y dentro de ellas en la Politica Agraria Común en concreto.
- Como consecuencia: Realizar aportaciones a la discusión política europea y de los Estados miembros para promover políticas de gestión del territorio basadas en enfoques preventivos a amplias escalas de percepción. Muchas políticas y en especial las agrarias pueden considerarse parte de los factores subyacentes porque no incorporan una reflexión sobre su influencia en el mantenimiento de los incendios forestales o sobre qué podrían aportar a su solución.

Para más información

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Annex V: Field trip dossier

EUROPEAN MEETING ON FOREST FIRES PREVENTION
Workshop "Cartography of Risk"

FIELDTRIP

León - Spain
21st-22nd-23rd February 2012

Presentations
Teresa Mompín. Forest fires section head. Junta de Castilla y León. momalvte@jcyl.es
Jose Carlos García López. León environment defense department head. Junta de Castilla y León. garlopjo@jcyl.es

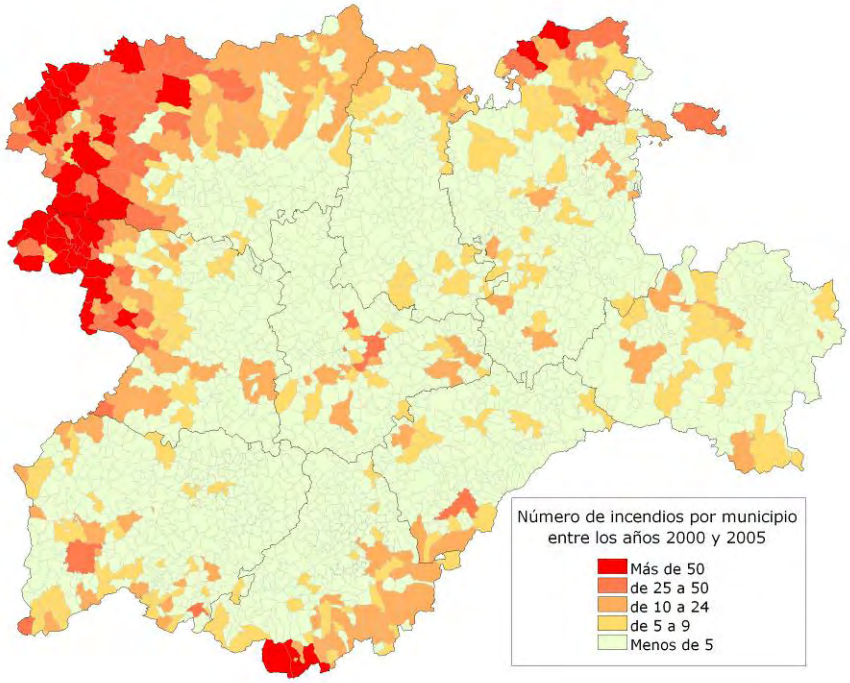
FOREST FIRES IN CASTILLA Y LEÓN

The autonomous community of Castilla y León and Leon occupies over 9,422,265 ha (94,223 Km^2) in the north west of Spain. The region's main central area is a plain, which is surrounded by mountain ranges. The central plain lies at between 700 and 1,100 m in altitude and is mainly agricultural, whereas the mountain areas circling it are mainly forest and cattle land where the peaks can reach up to 2,600 m.

With regard to usage, over half (52.0%) is forest, which is more than the area used for agriculture (44.0%). These percentages are similar to the national figures. Tree cover is 31.6% of the total area, although dense woodland or woods only cover 18.9% of the land.

There are some 2,500,000 inhabitants and the population density for the region is 26.6 inhabitants/km^2. The ratio of woodland to inhabitants comes to 1.19 ha of tree covered area per person. This feature clearly distinguishes Castille and Leon from the rest of Spain and the European Union, where the ratio is much lower (in both cases it is almost 0.27 ha per person). The amount of land used for crops has decreased appreciably over recent decades, which has meant a corresponding increase in the woodland areas. At the same time, as a consequence of rural depopulation, there has also been a reduction of pressure in the form of ploughing, cattle or timber extraction from the forest areas, which has allowed these areas to densify and the borders of the woodland areas to grow. This, together with the intense replanting that has been carried out, has allowed the forest area to increase by over 650,000 ha over the last fifty years. This increase has essentially taken place in the districts in the region's mountainous fringe.

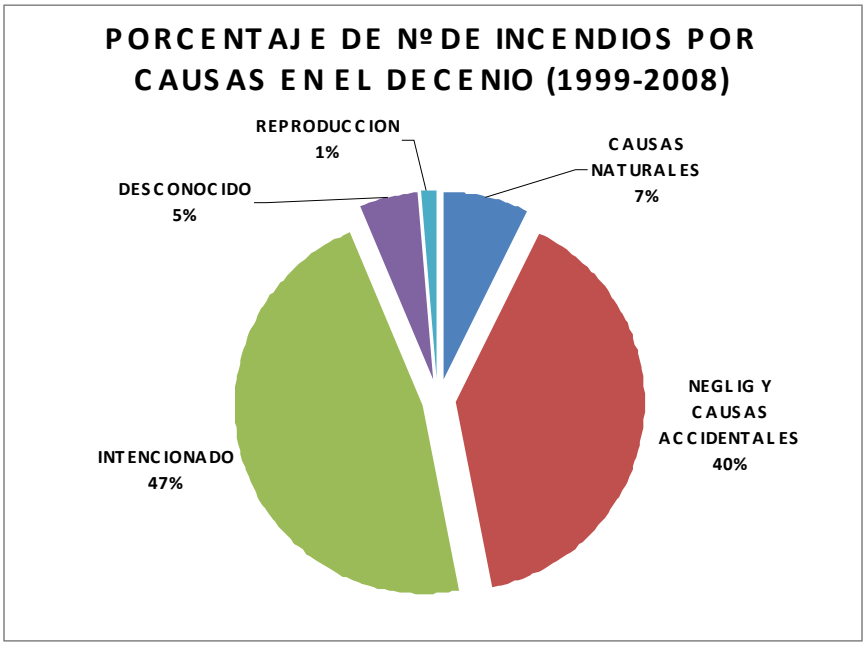
The region has an annual incidence of around 2000 fires, which 900 of them are small fire (*conatos*, which do not spread to more than 1 ha of surface area). These fires affect an average of 27,500 ha of woodland, of which a little over 5,000 belong to the forest area.



Forest fires thematic map by municipalities (2000-2005)

Most of the fires are concentrated in the mountainous areas around the region, where a large part of the woodland areas are to be found. Specifically, the north and the west of the region are where the greatest number of fires are concentrated, as they are linked in general to a greater use of fire as a tool for vegetation control in agricultural and livestock activities.

In fact, analysis of the causes of forest fires shows that 90% of the fires are started intentionally, or through negligence or by accident. Analysis of the motives of fire starters shows that 80% of intentional fires are linked to regeneration of pasture land, elimination of scrub-land, or elimination of agricultural residues.



CAUSES DURING THE DECADE (1999-2008) Reproduction; Natural Causes; Negligence and accidental causes; Intentional;Unknown

FIREFIGHTING STRATEGY AGAINST FOREST FIRES IN CASTILLA Y LEON

The Junta de Castilla y Leon, the regional government, proposes two essential principles as the basis for its policy for the prevention of forest fires:

- Make good use of forest resources, by seeking development of the forestry industry and economic participation of local populations in such use.
- Integrate both the prevention and the extinguishing of fires in such a way that the agents in charge of and involved in both tasks are one and the same and not only have a global awareness of the phenomenon, but also avoid an imbalance in investment towards the means of extinguishing.

Starting from these two principles, the prevention strategy for forest fires in the *Comunidad* will be undertaken along the following lines of action:

- Active prevention (avoid fires being produced)

– Research into the causes of all forest fires and determination of the motivation for the intentional ones, in order to achieve a greater degree of understanding of the problem and guide activities appropriately. This will also increase the number of legal actions taken out against those to blame, and so bring the impunity of such fire-starters to an end.

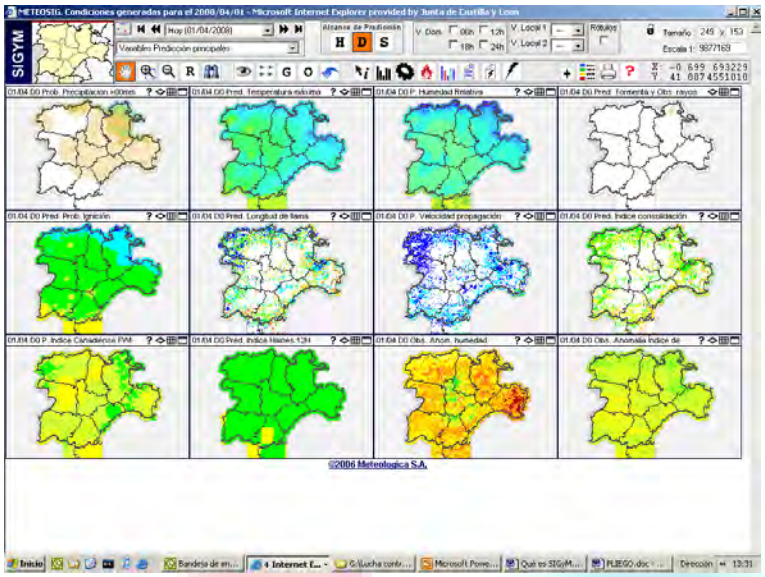
– Environmental education and measures for social intervention specifically aimed at the most affected areas, and the groups linked to the causes of fires in each area.

– Fostering of pasture planning by means of aid for mechanical scrub clearing and other activities on pasture land to avoid indiscriminate burning to increase such land.

- Increase in controlled burning that is either authorised or carried out by the Administration for regeneration of pasture land or the reduction of fire hazards in such a way that the need to provoke fires is reduced and vegetation structures are created that are more fire resistant.

- Indirect prevention (make it difficult for fires to start or to spread when they do)
  - Carry out preventive woodland treatments on a large part of the woodland area. The option here is for the personnel hired to put out the fires to carry out this work. Shrub clearance, clearing and pruning will be undertaken in strategic areas.
  - Maintenance and increase of support infrastructures for extinguishing (fire breaks and tracks, water points, bases for air response). These tasks will be carried out by the same personnel who make up the most specialised fire fighting teams during the High Risk Season (bulldozer reserves and heli-transport teams).

- Direct prevention (improve alert systems and reduce response time to give a faster and more suitable fire fighting response)
  - Characterisation and updating of the structural risks for forest fires in order to size and deploy fire fighting resources in the most appropriate way.
  - System for Geographic and Meteorological Data to carry out permanent tracking of the situation of both the atmosphere and vegetation with regards to fire hazards.



- Meteorological alert system with various degrees of adaptation for resources and for preventative and dissuasive measures according to the meteorological risk existing at any one time.
- Fleet management systems using GPS and GSM technologies to allow the location of equipment to be known at all times so that it can managed in a significantly better way.

Within the strategy of prevention, both direct or indirect, is commonly used the cartography of risks cartography and meteorological variables analysis for choosing locations of action.

FOREST FIRES IN THE PROVINCE OF LEON

The province of Leon is located at the most north-westerly edge of the region and has a surface area of 1,559,045 ha of which 1,020,836 correspond to forest land. In general, the province is very mountainous, and borders ranges that reach over 2,000 m in height except on its south-eastern edge. Just like the rest of the region, the intensity of land use has been decreasing gradually over the last 50 years.

The province's climate is clearly influenced by the Atlantic, with more frequent rainfall and summers that are cooler than the average for the region as a whole. This favours vegetation growth at a faster rate, which has led to an age-old regime of more frequent burn-offs to keep agricultural and cattle land in use. This traditional use of fire means that this is the province with the greatest forest fire problem when seen statistically.

An average of 650 fires and smaller *conatos* break out in Leon annually, which affect a total of 11,512 ha of which 1,490 are woodland areas. This is 22% of all fires (both large and small) and 42% of the region's burnt surface area. Both from a regional and a national point of view, the province of Leon records one of the highest fire incidence rates.

PROGRAMME FOR THE FIELD VISIT ON 22nd FEBRUARY

Throughout the day there will be explanations and a chance to see, on site, three activities that fall within the framework of the fire-fighting strategy in the Autonomous Community described above. They are located in an area to the north of the city of Leon (15 and 35 km away) in a mountainous area where moorland becomes the high peaks of the Cantabrian mountain range.

Demonstration no. 1. Planned burning in Adrados de Ordás

Weather conditions permitting, there will be a demonstration of a planned burning. The burning has been programmed for a plot of briar in order to protect the woodland masses, in this case a mature replanted pine wood. From the roadside the briar spreads upwards over a hillside towards the edge of the pine wood. The briar land covers some 20 ha and has become noticeably thicker in recent years. Its location makes it a threat to the pine wood in the event of fire, even more so if the relative frequency of fires in the area is considered. The fire-break strip that borders the lower part of the pine wood would not be very effective in the face of a fire going up the hillside over the scrub, and so the protection area is to be increased. By using a fire technique the aim is to eliminate the scrubland with established conditions for the burning in order to comply with the aim and minimise the impact on the soil.

Demonstration no. 2. Fire-break maintenance with machinery in Cuadros

A demonstration will be given of bulldozer work for maintenance of fire-break strips. The increase in fuel load in country areas makes it necessary to compartmentalise the territory so that the chance of success is greater when putting out fires. Bulldozers are a means that can be characterised by their versatility when fighting forest fires. Their extensive use in forestry work and in infrastructures for supporting fire extinguishing has lead to great skill being acquired in the use of these machines. This skill can be seen in the efficient use of bulldozers to put out fires by direct attack. They are also notable for their effectiveness in large scale fires when used for indirect attack together with the use of fire-breaks.

The demonstration machine is active in the reserve state when the fire hazard requires this, at a point that is easily accessible for fast deployment when mobilisation calls for it. When not in reserve, it is used for preventative works in the maintenance of tracks and fire-breaks, and can be mobilised from where it is working if necessary.

Demonstration no. 3. Forestry treatment in Santovenia del Monte

Several forestry interventions on woodland masses will be explained. The area to be visited is a wood in which there is a mix of *Quercus pyrenaica* and different species of pine. The main element of the ground cover and the areas of scrub in this setting is briar. The examples correspond to recent ground clearing, clearing cutting and pruning activities aimed at breaking up the continuity of the potentially combustible material. This will be contrasted with similar areas where intervention has not yet taken place. Analysis will be made of the planning and criteria for prioritising such work, and its efficiency in the face of fire.

Annex VI: Photos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2012


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INTERREG IVC
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INTERREG IVC
EUFOFINET
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21ST 23RD
FEBRUARY
2012
LEON, SPAIN


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project meeting
2012

EUFOFINET
project meeting


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FOREST FIRES PREVENTION
STRATEGY IN CASTILLA Y LEÓN
INTERREG IVC
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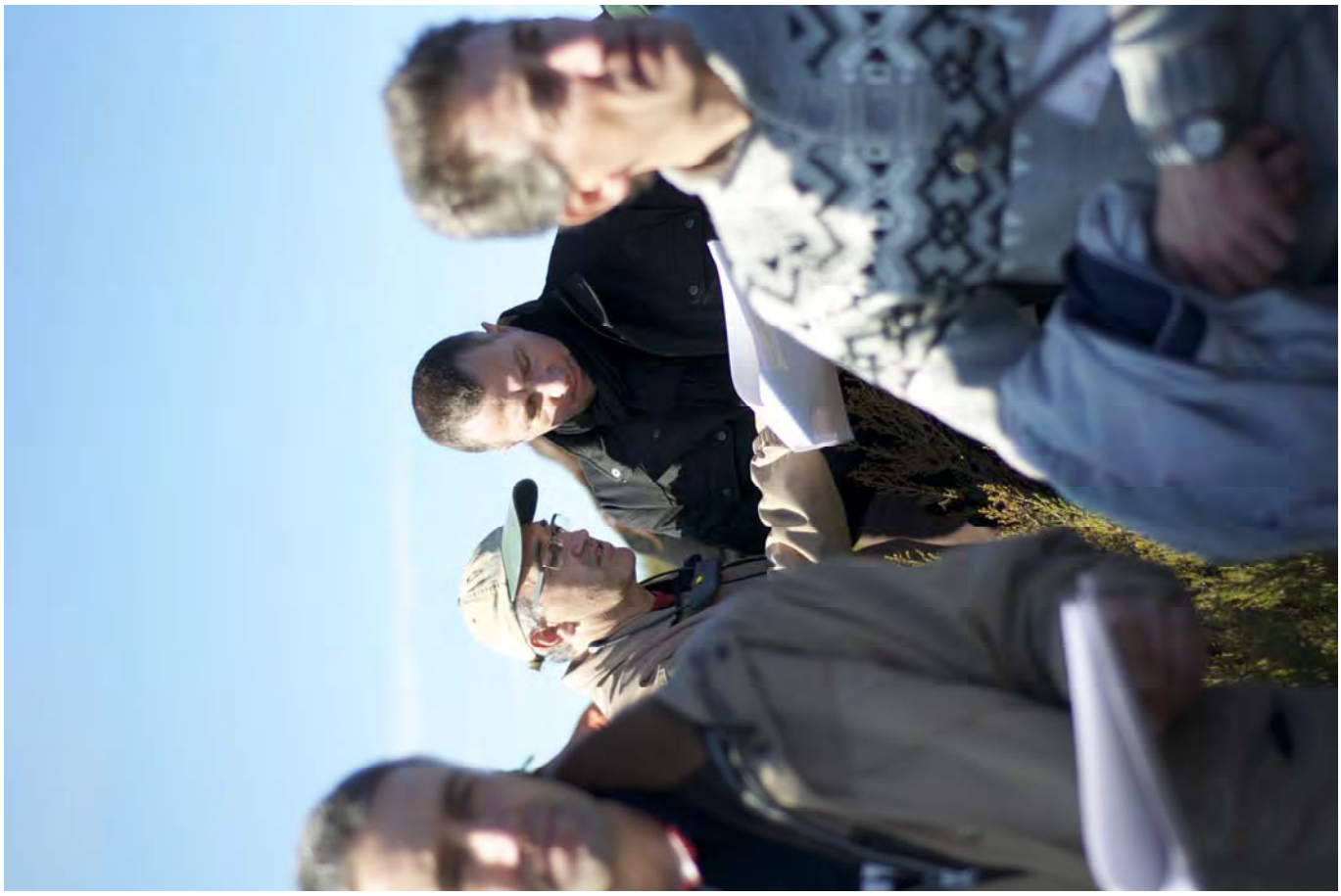


HEAVY-DUTY MACHINERY: A VERSATILE TOOL
THE OPERATIVE UNIT
DIRECT ATTACK
FINAL TASKS
INDIRECT ATTACK
EUFOFINET
project meeting
2012


EUFOFINET
ENRIQUE REY
Junta de Castilla y León
SPAIN


INTERREG IVC
EUFOFINET
project meeting
21ST 23RD
FEBRUARY

1. Added value regarding existing
2. Response to challenges in fine
3. Objectives ?
4. Members: countries, scientists
EUFOFINET

Jesús San Miguel
European Commission Joint Research Centre
Institute for Environme stainability
Ispra, Italy
EUFOFINET


EUFOFINET
INAZIO MARTÍNEZ
USSE
SPAIN


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USSE
SPAIN


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INTERREG IVC
EUFOFINET
project meeting
21ST-23RD
FEBRUARY


EFFMIS
EUROPEAN FOREST
FIRE MONITORING
using INFORMATION SYSTEMS
INTERREG IVC
Project Overview
Ass. Prof. Yiannis Bakouros
University of Western Macedonia
GREECE
23 February 2012, EFFMIS, Leon, Spain
EUFOFINET
EUFOFINET
project meeting
21st-23rd
February
2012


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1-PROJECT RATIONALE
Fire Prevention
EASY TO UNDERSTAND, DIFFICULT TO IMPLEMENT...
• Broad spectrum of activities
• Diversity of aspects: technical AND scientific aspects BUT ALSO socio-economical, educational, cultural...
• Competencies shared among agencies, different territorial /admin. levels
• In Europe:
• Knowledge is scattered AND
• Lacks scientific background
EUFOFINET
project meeting
21ST 23RD
FEBRUARY
LEON, SPAIN

EUFOFINET
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ENRIQUE REY
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SPAIN
project meeting


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