EUFOFINET (European Forest Fire Network)

North Aegean Region: action plan

This document constitutes the action plan of the North Aegean Region concerning the good practice provided by partners of the EUFOFINET project on the key themes of:

- Intervention – Strategies (GP1)
- Detection (GP3.1) and prevention (GP3.2)
- Restoration of burned areas (GP5)

1) The EUFOFINET Project context

The "European Forest Fire Networks" Project (EUFOFINET) is an INTERREG IVC Capitalization Project which is co-financed through the European Regional Development Fund (ERDF). INTERREG IVC brings Regions of Europe to work together and to share experience and "**good practice"** in the areas of innovation, the knowledge economy, and the environment and risk prevention.
A Capitalization Project is an interregional cooperation project which focuses on the transfer of good practices in a specific objective (such as a methodologies, processes, techniques), which were previously developed, identified and successfully tested by the partners and which have the potential to be transferred to another geographic area.
One of the innovative character of this kind of project and of its results is the fact some of the identified good practices, which were developed and worked among different regions and different countries with the contribution of many stakeholders will be transferred through "an action plan" as a suitable policy or strategy related with the management of forest fire risk to the other partners.

The EUFOFINET project focuses on good practice in wildfire prevention, restoration, suppression and intervention.
It has focused on five key themes related to wildfires & forest fires:

- detection and prevention of wildfires;
- wildfire suppression strategies;
- mapping risks and hazards;
- training and simulation strategies
- restoration of land burned by wildfire.

The project duration is 26 months starting from October 2010 until December 2012. The total project budget is 2.084.093 EUR and the fund allocated is 1.655.521 EUR (79%).

The project involves 13 partners from height European countries:

Four Greek partners, who represent regions where wildfires are a major problem, are participating to the project:

- The Regional Union of Attica Municipalities, PEDA, (project leader),
- The North Aegean Region
- The Epirus Region
- The Thessaly Region

The other partners involved are:

- The National Forests Office (Mediterranean Territory) (France).
- The Mediterranean Forest Alliance (France).
- The Tuscany region (Italy)
- The National Forests Centre (Slovakia)
- The Centre for servicing woods and forests of Castilla y Léon (Spain)
- The Galician Academy of Public Security (Spain)
- The Frederikssund-Halsnaes Fire and Rescue Service (Denmark)
- The Forest Research Institute (Poland)
- The Northumberland Fire and Rescue Service (England)

The aim of the project is to facilitate the cooperation among national, regional and local authorities and actors from different countries of the EU through the transfer of their experiences and through the development of action plans in order to improve the efficiency of the policies of regional development.
Some of the duties related to the project are the dissemination and transfer of the results and good practices developed and implemented in the frame of the previous project, integrating them into the regional policies and showing them to other European regions that try to improve their policies.

2) The North Aegean Region involvement to the project EUFOFINET

2.1 Elements for the North Aegean Region

The North Aegean Region is one of the thirteen regions of Greece. It includes the northeastern part of Greece, which is also the southeastern border of European Union. It comprises the islands of the north-eastern Aegean Sea, except for Samothrace, which belongs to the Region of East Macedonia and Thrace, and Imbros and Tenedos which belong to Turkey.
Administratively, the North Aegean region was established in the 1987 administrative reform. With the 2010 Kallikratis plan, its authority was redefined and extended. The capital of the region is situated in Mytilini in the island of Lesbos. Until the reform, the region consisted of the three prefectures of Samos, Chios and Lesbos. Since 2011 it is divided into five regional units, formed around major islands: Chios, Ikaria, Lemnos, Lesbos and Samos. The other populated islands are: Agios Efstratios, Inousses, Psara and Fournous.
The total surface of the Region is about 3.836 sq. km and total population of 204.108 citizens (2001 census).
The forested areas are mainly located on the largest inhabited islands of Lesbos, Samos, Chios, and Ikaria, which are the more populated areas. The fact that anthropogenic activities are concentrated in the more vegetated islands increases the risk and hazard of wildfires in the North Aegean Region. Moreover, the complex and sharp relief, the mosaic of ecosystems and habitats combining with the human infrastructures are the main key elements to have to taking into account to support forest fire prevention and management as well as post-fire restoration.

2.2 Implementation of the North Aegean Region to the EUFOFINET project

In the frame of the EUFOFINET project the North Aegean Region has share with the other partners of the project its acquired experience in specific fields as good practices and vice-versa has adopted good practices from other partners, which are considering that they could bring an add-value to practices applied in the region in the prevention, restoration, fighting and management of forest fires.

Another important issue for the North Aegean Region as the official managing authority involved in the EUFOFINET Project is to take care to transfer the knowledge obtained from the project to all the services and organizations involved in the forest fire prevention and fighting: Fire Brigade, Forest Services, Municipalities, Army and Volunteers (and scientific institutions).

The **main objectives** of the participation of the North Aegean Region to the project are:

- Facilitate the transfer of relevant good practice able to improve regional and national policies efficiency for forest fire risk prevention and management.
- Disseminate to other partners the relevant know-how of the Region acquired in previous projects, such as the OCR-INCENDI cartography – mapping of forest aiming to support forest fire prevention and management so well as post-fire restoration for the islands of Lesbos, Chios, Samos and Ikaria, and the traditional practice of resin collection - cultivation, as activity reducing fire risk.
- Identify and promote common intervention procedures in order to define a flexible model(s) that could be utilized by any entity with an interest in forest and wild fire prevention and management.
- Establish an international network of institutional contacts and operational links in the fields of wildfire prevention and wildfire suppression.
- Attempt to harmonize common frames of reference in the EU with regards to wildfire prevention and wildfire suppression.

2.3 Synergy with the regional operational programmes

The EUFOFINET project is closely related with many other projects that the North Aegean Region is involved:

- FOR CLIMADAPT: a European project that aims at encouraging initiatives and innovative experiments for an adapted management of the Mediterranean wooded ecosystems to the current and upcoming impacts of climate evolutions. As a result of climate change and other factors, forests are facing increased risk of fire, soil erosion, landslides, etc.
- ICHNOS PLUS (IVC): focus on the transfer and deployment of a model of Regional Centre of Competence for One-Stop Shops and its mainstreaming into the regional polices through the ERDF Operational Programme.
- BIOBUS: to strengthen the awareness of the regional community on the use of biodiversity and innovation and of the benefits developing North Aegean to a competent, dynamic knowledge based region.
- EX-INT: collection - documentation of the experience which has been accumulated from the INTERREG projects starting 1990 till today.
- MOONRISES (ARCHIMED): management, forestalling and attenuation of natural risks.

- WESTMUST: concerns the complete and viable management and protection of the cultural, natural sources and landscapes.
- CORI: identification and mapping of tsunami and other extreme sea level hazards for Eastern Mediterranean coasts.
- PACINTERREG (INTERACT): creation of a data base that includes all IIIC.

3) EUFOFINET Good Practices

3.1 Presentation

The five good practices had been chosen by the partnership for the relevance that these good practices have on the development and management of suitable policies and strategies on prevention, restoration and fight of forest fires.
In the EUFOFINET project, six technical workshops and seminars concerning each one a specific good practice (GP) were held. During the procedure, each partner, called **"donor partner"**, presented a description of its relevant experience and disseminated it by delivering specific documents.
The North Aegean Region, as already mentioned above, presented also its own experience in the good practices "Cartography" (GP4) and "Prevention" (GP3.2). Moreover, its external experts in forest fires, senior scientist researchers of the Forest Research Institute of Thessaloniki, presented an experiment in the frame of "Detection" (GP3.1)

The aim of these presentations was to bring the context and enough technical details, so well as financial information, to allow interested partners, called **"receiving or recipient partners"**, to integrate the entire or parts of this good practice in their own region via an action plan. A specific procedure allowed an exchange of information between donors and receiving partners in order to clarify the possibility of the transferability of the good practice.

3.2 Selection of good practices

The North Aegean Region decided the most appropriate good practices suitable for implementation and to be transferred as receiving partners are:

- **Intervention – Strategies (GP1)**
- **Detection (GP3.1) and prevention (GP3.2)**
- **Restoration of burned areas (GP5)**

The present document **"action plan"**, which is dealing with these three **good practices,** has been produced for the North Aegean Region entity by its external experts. The main concern of the action plan is to integrate the good practices of EUFOFINET project partners in the specific conditions of the region.

3.3 Description of the selected good practices

3.3.1 Intervention – Strategies (GP1)

The North Aegean Region selected from the good practices presented two interventions for fighting wildfires that are not used in Greece.

The **Centre for servicing woods and forests of Castilla y Léon (Spain)** presented two direct interventions that are widely used in fighting wildfires: the **backfire** as suppression technique, and **dozers** making both direct attack on the flames and indirect attack removing biomass fuel.
The **Northumberland Fire and Rescue Service (England)** presented also the backfire as suppression technique.

It appears, according the demonstrations of the techniques and the achievements from their use the results against wildfires, especially large or intense fires, are excellent, and are being quite more effective than other intervention techniques as aircrafts or water pumping.

Dozers

The practice of use dozers presented by Junta de Castilla y León consists of the disposal of one to three dozer teams per province, ready to leave 24 h per day on transport trucks, in the high risk season. The rest of the year the dozer is doing prevention works. There are also additional dozers making forestry works all over the year, and they can give support in great fires. Special complex fires are supported by convoys of resources from other provinces.

The means used are:

A) Dozer squad: 1 articulated lorry, 1 bulldozer with angle and tilt blade movements (recommended 170-200 HP), 1 warning car (compulsory for big-size lorries), fuel tank, lorry driver and dozer driver. Budget: around 900€/day. Second dozer: working in prevention tasks. The contract is made on the planned surface to do, and the quote depends on the production rate at each site.

B) Support convoys are formed by 2 land crews of 8 people with tools, cars and equipment, 1 or 2 tank trucks, 2 rangers and 1 or 2 technicians (officers). The convoy can be completed with 1 dozer squad with 1 additional ranger.

The main factor of efficiency of the method is the dozers availability. There is a contract to provide the machine ready to depart immediately during high fire risk season. However, sometimes it is complemented with a second machine working on field, which is also available to support in a great fire.

The experience and specialization of workers are a key factor for the efficiency. By the moment, dozers and backfires are still working better than other tactics and the use of support convoys is becoming more frequent.

According to the demonstrations that took place in the meeting of Leon and the relevant videos, bulldozers are working in two ways:

- Direct fighting: it concerns fires of low vegetation (grassland or shrubland). The dozer moves along the front and with his knife slightly turned towards the fire throws quantities of soil in flames. When there is a fire creeping under trees, they apply the parallel method. The dozer moves parallel to the forehead at a distance of a few meters. On the way the dozer clean the ground from the shrubs, while it cutting trees and swept along toward the unburned side.
- Indirect intervention: reduction of the fuel amount by opening firebreaks in order to avoid the expansion of the front of fires. The crews fight the fire by applying the appropriate method and mainly the backfire.

Backfire

The method consists to set a fire along the inner edge of a fire line to consume the fuel in the path of a wildfire or change the direction of force of the fire's convection column. This wildfire suppression technique is not sufficiently used in Europe. To master this technique, it is necessary to work in a co-coordinated manner using experience acquired by present-day operators, backed up by the necessary research.

Demonstrations of the technique have been done at the workshops in Leon and Northumberland.
The main parameters of the method are:
- Backfire has to be applied from the highest places and then extends lower.
- The number of emerging outbreaks should be less, than the crews can control.
- The outbreaks should converge before reaching the front of the fire.

The advantages of the method are: the high efficiency of the intervention, crews are working is a safer environment, the fire is under control.
The disadvantages are: destruction of a part of the natural environment if it appears the intervention was not done in the appropriate conditions, high needs for training to the technique, the front of the fire is far and the need for coordination is extremely important.

An advantage both of the two methods is they can be operated day and night, in contrast to aircraft that are operated only during the day.

Besides, it's difficult to quantify the results due to the variability of number and complexity of fires between different years. In Castilla y Léon, the last 10 years the great fires (more than 500 Ha) have been widely controlled by the use of dozers and backfire.

3.3.2 Detection and prevention of wildfires (GP3.1 and GP3.2)

GP3.1 Detection of wildfires
The development of automatic systems for detecting and monitoring forest fires is one of the innovative activities in the management of forest fires.
In the frame of the EUFOFINET project partners and participants in the workshop of Slovakia presented several systems of forest fire surveillance and detection.

The systems presented are based on network of *in-situ* cameras, optical or thermal, fully automated surveillance, with manual interference, and with or without automatic detection of fires (visually via smoke or heat, as well as optically).

Since 2006, **Castilla y Leon** developed a system for automatic detection of forest fires through thermal imaging camera. Nowadays, the system has 19 cameras covering over 380.000 hectares.
In **Slovakia** and the **Region of Epirus** in Greece, networks of optical CCD video cameras are monitoring large areas of forests.
The system of the Region of Epirus is based on the **SITHON system** that was a research operational experiment, presented by the external experts of the North Aegean Region at the specific workshop.
These three systems have similarities, networks of optical cameras consisting of monitoring towers, transmitters and innovative wireless transmission units, linked to an integrated GIS environment in order to facilitate the fire fighting management and support the decision making process during forest fires.

All the systems presented in the EUFOFINET have a GIS database that incorporates qualitative and quantitative information layers necessary for the estimation of fire risk. This includes information about the vegetation types, fuel load quantities, the road network for accessing active fires, the area's morphology, high risk locations (settlements, camps, folds,

archaeological sites, *etc.*), sensitive infrastructures (fuel stations, flammable materials, industrial areas, *etc*.), availability of natural or artificial water reservoirs and more.
Usually, they incorporate 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.

The systems of Castilla and Leon and Slovakia have automatic detection of fires. In contrary, in pure Mediterranean environment, because of specific abiotic and biotic conditions, it appears, there are still many problems with the number of false alarms leading to the decision to avoid them until the problem will be resolved.
According the presentation for the system in Castilla and Leon, the use of thermal cameras reduces or even eliminates the problem of false alarms.

GP3.2 Prevention of wildfires
From the good practices presented in the frame of prevention of wildfires, our interest is focused on those, at regional level, aiming to the assessment of present conditions and design of a structured planning of prevention actions.

The **National Forests Office of France** is elaborating a plan of interventions in two steps – phases:

Step 1: Plan Development:
A) Inventory: description of the problem, analysis of past events, analysis of actual structures, means of each services, issues analysis, and cause analysis.
B) Development of strategies (prevention, equipment, control ...),
C) Definition of objectives (in terms of number and surface fires, response time, control of the causes, protection of the issues ...) from these strategies.
D) Definition of equipment to create and actions to implement within these strategies, quantifying and prioritizing.
E) Definition of equipment to create and actions to implement within these strategies, quantifying and prioritizing.

Step 2: Implementation of the Plan:
A) Fundraising.
B) Land property mastering and technical precisions.
C) Partnership agreements.

At each step and sub-step, the work is done in close collaboration between different services responsible for prevention and control. Especially in developing strategies, it is important that the control services are involved in the selection of equipment they will use.

The **Forest Research Institute of Poland** presented the "Plan against forest fires", which is elaborated for each forest district and it's available on the Alarm-command Point (Forest Alarm Point) in form of documents and maps.
The first trimester of each year, the plan is actualized.
This includes a number of steps and actions, which can be summarized as following:

- Close collaboration with scientific institutions, media and stakeholders.
- Reminder of duties for forest employees in terms of fire prevention and fire fighting procedures.

- Inspection of training for the Forest Service Establishment workers in terms of forest fire management.
- Inspection of the fire equipment, water reservoirs, forest roads, fire breaks and their maintenance.
- Training of staff for patrol service, observation points, and Alarm-command Points.
- Inspection of Alarm-command Point equipment and communication facilities.
- Dissemination of information material.

Moreover, Poland Forest Districts use also any other actions in particular for people prevention and rescue actions. So, the Forest Districts are mainly obligated to:

- Setting an alarm-command network through establishing of observation points, and launching fire patrols.
- Control people staying in the forest area or close to ensure their activities are in compliance with fire regulation in the forest.
- Implementation of periodical restriction in entering the forest area due to high fire risk.
- Forest fires analysis.

3.3.3 Restoration of burned areas (GP5)

The good practice “restoration of burned areas” has been presented in a **synthesis document provided by the National Forests Office (Mediterranean Territory) of France (ONF)**.
The following section includes elements of this document in order to summarize the description of the good practice.

The definition selected for this topic when the project was launched is as follows:
"After the passage of fire, particularly in densely populated areas where public pressure is strong, the temptation is great to clear the traces of fire as quickly as possible, often requiring costly work. Here and there experience has shown that sometimes it may be wiser not to rush too much and to allow more time to think.
The good practice to be shared might be the use of a guide (on both policy and techniques) setting intervention priorities and practices to be implemented after the occurrence of fires."

This topic was the subject of a workshop in Valabre (France) from 16 to 20 May 2011. During the workshop, the five donor partners presented their practices in the meeting room, while a day of field visits in the Var and Alpes-de-Haute-Provence *départements* enabled the attendees to see how the measures were applied in different contexts and after varying periods of time.

Discussions between partners enabled them to compare the processes and measures that had been adapted to their specific contexts. This revealed many similarities which could be described in a general framework, identifying areas requiring consideration, priorities for action and a series of measures to be selected depending on the context.

The six cases presented by the different partners illustrate the responses applied to the various contexts (soils, vegetation, climate, fire regime) and primary objectives (production, protection, landscape). However they also highlight similar approaches from which a common general framework can be derived, which will be detailed in this synthesis.

ONF has attempted to define a comprehensive framework that addresses the majority of cases encountered, and which could be used as a toolbox from which solutions can be drawn depending on the local context.

This framework is based on four basic steps:

- Preliminary analysis
- Emergency measures
- Rehabilitation measures
- Monitoring and feedback

1- Preliminary analysis

This first step is crucial, to clearly identify the priorities and to use the resources in the right place at the right time. It should be conducted as soon as possible in order to define the emergency work to be carried out.

An optional preliminary analysis (a few days after the fire) can determine whether it is worthwhile pursuing this analysis, based on expert analysis of predefined maps using criteria.

This first approach can be systematised with the production of standard maps. It can be used as a decision support tool for policymakers and/or funding authorities to initiate more detailed studies. It can be improved by adding other criteria and by defining rules based on the quantification of these criteria.

It often makes sense to divide this study into two phases: emergency measures to be implemented very quickly and rehabilitation measures for which more time for consideration can be allowed.

The study should take into account the different roles of the forest.

The study should define the intervention priorities (spatial and temporal), specify appropriate measures, analyse any implementation difficulties (technical, land-ownership, legal, etc.) and estimate the cost of the actions.

2- Emergency measures

These should be implemented within the first few days or months after the fire (usually before the first heavy autumn rains, and at the latest before the rains of the following spring):

- public safety measures (such as reopening access, repairing damaged structures, felling dangerous trees),
- measures to control torrential flooding, and
- soil maintenance measures.

3- Rehabilitation measures

Some must be carried out fairly quickly (and can even be implemented concomitantly with some emergency measures), while others are more long term:

- treatment of burned timber,
- reforestation (natural regeneration is preferred, however in some cases it can be complemented or supplemented with a choice of appropriate species),
- support for recovered stands,
- preventive measures,
- environmental restoration measures, and
- revision of the management plan.

4- Monitoring and feedback

All the actions undertaken must be continuously monitored, and assessed in the short and medium term. In particular, once the emergency measures have been carried out, it is

important to evaluate the results before continuing with the rehabilitation measures. Finally, an assessment conducted after all the measures have been implemented provides overall feedback on the entire operation.

The study can include monitoring arrangements from the start and schedule important milestones for a review or a new debate.

This monitoring should be documented as thoroughly as possible, through tables, reports, maps and photographs. The record of all this data will be used for feedback, training and sharing experience, and communication.

After allowing enough time to pass (which may be several years for the rehabilitation measures), it is important to obtain feedback.

The success of the restoration operation will be facilitated by the establishment of technical and financial partnerships throughout the process, from preparation of the study to monitoring and assessment, and including the implementation of actions.

4) Action plan framework - Implementation of the good practices in the North Aegean Region

4.1 Description and analysis of the problems in the region

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, led to an increase number of forest incidents, as well as increased fire intensity and burned area. In Greece there are a relatively low number of fire events, but the proportion of burnt area to fire event number, per year, is the worse in Europe. This means that despite the great efforts being made, at central and regional level, there is a significant lack of efficiency in dealing with forest fires.

The region of North Aegean is by its topography and location a sensitive area in Greece. There is also a geographical isolation of the islands from the mainland and by consequence from a direct terrestrial intervention. Moreover, the vegetal formations, characterized by extreme high flammability, growing in these more arid Mediterranean climatic environments, are often subject of huge fire events. Major natural forests and mastic tree plantations of Chios Island were burned this summer. In previous years extended areas were burned in Samos and Ikaria.

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 forest cover of the large islands of Northern Aegean (with the main forest vegetation) is reduced because of the frequent fires. Moreover, other forested areas, which are still characterized as forests, are now degraded because of their fragmentation due to openings for roads or by overgrazing, illegal constructions, etc.

The burned areas are immediately typically declared reforested, but they are not always under a specific post-fire management treatment. Because, the Greek administration do not applied a central planning to post-fire management of burned areas.
So, in the North Aegean region, the design is based on the knowledge, resources and tools available to local Forestry Services.
Many times, in absence of a typical protocol of post-fire management, inadequate actions and practices applied may cause greater damages to the ecosystems than that caused by the fire itself.

Besides, forests are further degraded from a lack of management, which has as consequence an increase of fuel biomass. So, in Samos the end or reduction of the production of timber for ship building and large forest areas of unrecognized ownership, without management at all, combined with the laborious nature of the forest work activities, led to the abandonment of forests by the local population (even owners). The forest fires and diseases cease to be so sudden and rare events. They acquire ordinary and repetitive character. For Lesbos, the corresponding conditions of risk and forest degradation are mainly resulting from the abandonment of resin collection – cultivation and the limitation of the activity of collecting firewood. Moreover, the fragmentation of forest ownership discourages forest exploitation and the high cost of industrial timber transport outside the island reduces the interest of forest owners and loggers forest products.

By consequence, the large main islands of Northern Aegean are characterized on the one hand by overpopulated coastal settlements and areas favorable for tourism, and on the other hand, by abandoned from human presence settlements but also agricultural, agroforestal and forestal landscapes. Thus, both over-use and under-use of forest ecosystems lead to undesirable results.

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 depends of the available number, their level of knowledge of the terrain, their resistance, the location of the observatory etc.

4.2 Intervention – Strategies (GP1)

4.2.1 Objective of the transfer of the GP1

The North Aegean Region authority by adapting the good practice emerged from the EUFOFINET project on wildfire suppression strategies has as main objective the demonstration of the suitability of the techniques of backfire and dozers in the Greek context.

4.2.2 Strategy of implementation of the action plan

The North Aegean Region will apply the main elements of the good practices presented for:
- the use of dozers by the Centre for servicing woods and forests of Castilla y Léon (Spain), and
- the backfire by the Northumberland Fire and Rescue Service (England) and again Castilla y Léon.

Nowadays, in Greece, there is a requirement from the citizens and media to involve aerial means in alls the incidents of fires, because of the feeling of their "absolute" efficiency.

Another important issue is that backfire as intervention action is legally prohibited, while it used to be a traditional method of intervention in the past, when the Forest Service was in charge to fight forest fires.

The aim of an implementation of the two methods is to increase the efficiency of the fighting management by reintroducing the backfire technique and demonstrating the utility of the use of dozers.

4.2.3 Specific legal – regulatory framework

In Greece, until 1997 the Forest Service had the entire responsibility for the protection of forests from fires.
Since 1998, the Fire Brigade is in charge for the suppression of the fires in forest and vegetated areas in general (Law 2612/1998), with the assistance of the General Secretariat for Civil Protection. The jurisdiction of the prevention of forest fires is still remaining in the hands of the Forest Service.

Municipalities are also involved in the prevention of forest fires by undertaking the design and execution of "forest works" (e.g. cleaning of forest vegetation) in public forests and wooded lands in their area of authority after consultation with the Ministry of Agriculture.
Eventually, the Army, the Police and Organizations of Volunteers, which are operating under several laws and presidential decrees (1951/1991, P.D. 32/1992, 8281/1995), are also involved in the prevention and suppression of forest fires.

The Regional Secretariat of Civil Protection, which coordinates the services that fight forest fires, operates under the authority of the North Aegean Region.

4.2.4 Actions and schedule of implementation

In order to apply the strategy adopted for the action plan of wildfire suppression strategies, the North Aegean Region will demonstrate the efficiency of the intervention techniques of backfire and the use of dozers in the fighting of wildfires by organizing:

- training of staff of the Fire Brigade
- demonstration actions both of backfire and dozers and
- training sessions

For the implementation of the action plan the North Aegean Region will firstly send a crew of the Fire Brigade in order to training it to the two techniques.
Following, the North Aegean Region will organize demonstration and training sessions, where the crew will present the two techniques to the other fire fighters from the Fire Brigade and volunteers, so well as to dozers drivers.

Actions adopted:

1. Training abroad of the staff of the Fire Brigade

2. Demonstration actions
   2.1 Backfire technique
   2.2 Use of dozers against wildfires
3. Training sessions
   3.1 Backfire technique
   3.2 Use of dozers against wildfires

Completion period: 12 months, two (2) months for action 1, and 1 (1) month for each action (15 days by each sub-action) for the five main islands of the North Aegean Region (Lesbos, Samos, Ikaria, Chios and Limnos).

4.2.5 Operational implementation

The aim of the North Aegean Region is beyond its strict legal authority to bring efficient techniques useful in the fire fighting in Greece, by demonstrating them and training staff to their use.

The North Aegean Region already cooperates with Greek Forest and Fire Services in prevention works and with Fire Brigades and Volunteers in fighting forest fires. Moreover, the Regional Secretariat of Civil Protection, which coordinates services that fight forest fires, is under the authority of the North Aegean Region.

The North Aegean Region will organize both the actions of training and demonstration.

4.2.6 Evaluation indicators of the action plan

Time schedule

Action 1. Training abroad of the staff of the Fire Brigade: months 1-2.

Sub - action 2.1. Demonstration of the backfire technique: months 3 to 8, one month by island.

Sub - action 2.2. Demonstration of the use of dozers against wildfires: months 3 to 8, one month by island.

Sub - action 3.1. Training sessions in the backfire technique: months 9 to 10, one month by island.

Sub - action 3.1. Training sessions in the use of dozers against wildfires: 9 to 10, one month by island.

External expenditure

Action 1. Training abroad of the staff of the Fire Brigade: a crew of five fire fighters will be training in Spain and or N. England, estimated cost: 10.000 €.

Sub - action 2.1. Demonstration of the backfire technique: 20.000 € (cost of travel and subsistence, and material) (4.000 € / island).

Sub - action 2.2. Demonstration of the use of dozers against wildfires: 25.000 € (cost of travel and subsistence, and material) (5.000 € / island).

Sub - action 3.1. Training sessions in the backfire technique: 20.000 € (cost of travel and subsistence, and material) (4.000 € / island).

Sub - action 3.1. Training sessions in the use of dozers against wildfires: 25.000 € (cost of travel and subsistence, and material) (5.000 € / island).

Action plan funding

As an entity or in parts: public funds, European funds, sponsoring, integration in new projects, self-financed by the North Aegean Region or a combination of the previous.

Deliverables

Action 1. Training abroad of the staff of the Fire Brigade: number of staff, five (5).
Action 2. Demonstration actions: number, ten (10), two in each island (one by sub-action).
Action 3. Training sessions: number of staff, total 50-100, 10-20 by island.

4.3 Detection (GP3.1) and prevention (GP3.2)

4.3.1 Objective of the transfer of the GP3.1 and GP3.2

The North Aegean Region authority by adapting the good practice emerged from the EUFOFINET project on the detection and prevention of wildfires has as main objective the establishment of **a detection network of optical cameras on the main forested islands** of the region and to develop **a typical procedure for prevention actions** adapted to each island.

4.3.2 Strategy of implementation of the action plan

The North Aegean Region will apply the main elements of the good practices presented for:

- the detection by the National Forests Centre of Slovakia, the Epirus Region of Greece and our external experts, and
- the prevention of wildfires actions by the National Forests Office (Mediterranean Territory) of France (ONF) and the Forest Research Institute of Poland.

Detection

The problem of early intervention in the North Aegean Region is firstly due to the insufficient number of staff in patrolling the multitude of islands. Secondly, there is a lack of detailed information about the local conditions of the terrain in order to reduce the time of first intervention.

There is a major problem of coordination of all involved forces in fighting forest fires. The main cause of this situation is the available information has a lack of relevance to the needs fighting of wildfires. For example, 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.

Thus, the aim of an implementation of a detection system of a wireless network optical cameras linked to an integrated GIS environment is to facilitate the fire fighting management and support the decision making process during forest fires by reducing the problems mentioned above.

Last years, several prefectures in Greece, such Arta of the Region of Epirus, as mentioned above, are using wireless camera detection networks to get early detection - notification - monitoring of forest fires. The systems are operating via wireless broadband networks and they are supported by a mapping system of direct decision-making.

Prevention of wildfires

In Greece, and by consequence in the North Aegean Region, there is no central or regional directive regulating a planning to prevention management of forest against the risk of fires. So, practices applied are based only on the good will, the knowledge and resources mainly of the Forest Service. For example, there are no specifications for the density of firebreaks, forest tracks, and the density of water reservoirs. The majority of the islands have a low number of firebreaks and a variable density of roads. Some have a great number of water reservoirs others none.

The implementation of a combination of the systems of prevention selected in the frame of this action plan will allow using the analysis planning of ONF and the configuration in districts, such as islands in the frame of the North Aegean Region, of the polish plan against forest fires.

The first will bring a typical scientific frame of procedure step by step in the analysis of the needs of prevention of forest fires.

The second will focus on the particularities of each island, such as local intervention actions for design of safe escape ways around villages and reduction of the fuel amount in specific areas. Moreover, this will allow a better allocation of resources (human and material), encouraging the involvement not only of official services but also of scientific institutions, media and stakeholders in planning prevention actions and by consequence increasing their collaboration. The better coordination achieved will be very useful in a region like the North Aegean, where there are often forest fires in more than one islands the same days.

Other actions mentioned are the information and awareness of citizens on the problem of fire risks and how to avoid them by negligence.

4.3.3 Specific legal – regulatory framework

The Greek Government is the supreme authority in preventing and suppressing forest fires.

In Greece, until 1997 the Forest Service had the entire responsibility for the protection of forests from fires.

Since 1998, the Fire Brigade is in charge for the suppression of the fires in forest and vegetated areas in general (Law 2612/1998), with the assistance of the General Secretariat for Civil Protection. The jurisdiction of the prevention of forest fires is still remaining in the hands of the Forest Service.

So, the responsibility of prevention and restoration of burned areas is under the Ministry of Rural Development and Food (General Directorate of Forestry). The responsibility of the suppression of forest fires is under the Ministry of Citizen Protection (both Fire Brigade and Civil Protection). Eventually, local authorities are involved with all their means available (Regions and Municipalities).

But, some key elements of prevention, such as editing relevant fire regulations and rules, information and awareness on forest fire of the citizens, organization of patrols, the surveillance of the forest with terrestrial and aerial means, the distribution of fire fighting forces, the cooperation with other authorities and organizations, the post fire surveillance of burned areas for potential new fires, are now under the responsibility of the Fire Brigade.

Municipalities are also involved in the prevention of forest fires by undertaking the design and execution of “forest works” (e.g. cleaning of forest vegetation) in public forests

and wooded lands in their area of authority after consultation with the Ministry of Agriculture.
Eventually, the Army, the Police and Organizations of Volunteers, which are operating under several laws and presidential decrees (1951/1991, P.D. 32/1992, 8281/1995), are also involved in the prevention and suppression of forest fires.

The Regional Forest Service belongs to the Ministry of Interior and typically is administratively under the authority of the North Aegean Region. But, the policies regulating the frame of its interventions are decided at central state level by laws and decrees. Thus, the North Aegean Region does not have the jurisdiction to impose practices and regulations or to modify the policies implemented.
The Regional Secretariat of Civil Protection, which coordinates the services that fight forest fires, operates under the authority of the North Aegean Region.
There is still no law regulating in particular prevention actions of forest against the risk of fires. So, as already mentioned, practices applied are based only on the good will, the knowledge and resources of the services involved.

4.3.4 Actions and schedule of implementation

In order to apply the strategy adopted for the action plan detection and prevention of wildfires, it appears there is a necessity, in absence of law regulating prevention management, to adopt two main actions for the main islands of the region (Lesbos, Chios, Ikaria, and Samos):

- complete a study of the modalities for the installation of detection systems and
- elaborate a typical procedure of prevention actions and activities planning for each island separately.

The study for the detection system has to include the following:

- selection of the areas with a forest fire high risk,
- description of the architecture of the wireless networks of optical cameras,
- description of the linked GIS database, and
- cost analysis.

The typical procedure will formalize scientifically the prevention interventions to conduce in each island, including specific works, training sessions, equipment and infrastructure needs, information actions, coordination implementation, etc.

Actions adopted:

1. Completion of a study of the modalities for the installation of detection systems in the main islands.
2. Production of typical procedure manual of prevention actions specifically adapted for each main island.
3. Coordination meetings.
4. Seminars.

Completion period: 12 months, three (3) months for the completion of the study (action 1) and another six (6) months for the production of the typical procedure (actions 2), one (1) month for coordination meetings and three (3) months for dissemination actions.

4.3.5 Operational implementation

The aim of the North Aegean Region, in this action plan, is to produce useful scientific material that will be support the Services and groups of citizens involved in the forest fires prevention and fighting.
The second important goal is to coordinate these public services as typical head administrative authority.
In order to increase the succeed of the action is to bring together around a table all the services and organizations involved in the forest fire prevention and fighting: Fire Brigade, Forest Services, Municipalities, Army and Volunteers (and scientific institutions).
Finally, the North Aegean Region will use its experience and competence in dissemination actions organizing seminars for targets groups of citizens.

The North Aegean Region already cooperates with Greek Forest and Fire Services in prevention works and with Fire Brigades and Volunteers in fighting forest fires. Moreover, the Regional Secretariat of Civil Protection, which coordinates services that fight forest fires, is under the authority of the North Aegean Region.

The North Aegean Region will supervise the two actions, which will be produce by external experts and organize coordination meetings and information seminars.

4.3.6 Evaluation indicators of the action plan

Time schedule

Action 1. Conduction of the study: months 1 to 3, for the completion of the study.
Action 2. Production of the typical procedure: month 1 to 6, for the preparation of the manual.
Action 3. Coordination meetings: month ten, a total of four (4) in the main islands.
Action 4. Seminars: total of four (4), duration three (3) months, at the end of the above activities.

External expenditure

Action 1. Conduction of the study: 15.000 € (cost of expertise).
Action 2. Production of the manual: 60.000 € (15.000 € / island, cost of expertise).
Action 3. Coordination meetings: 12.000 € (3.000 € / island, cost of dissemination, expertise and travel and subsistence).
Action 4. Seminars: 12.000 € (cost of expertise and travel and subsistence).

Action plan funding

As an entity or in parts: public funds, European funds, sponsoring, integration in new projects, self-financed by the North Aegean Region or a combination of the previous.

Deliverables

Action 1. Detection system application study: date of delivery month three (3).
Action 2. Manual of typical procedure of prevention interventions: date of delivery month six (6).
Action 3. Coordination meetings: number, four (4).
Action 4. Seminars: number, four (4).

4.4 Restoration of burned areas (GP5)

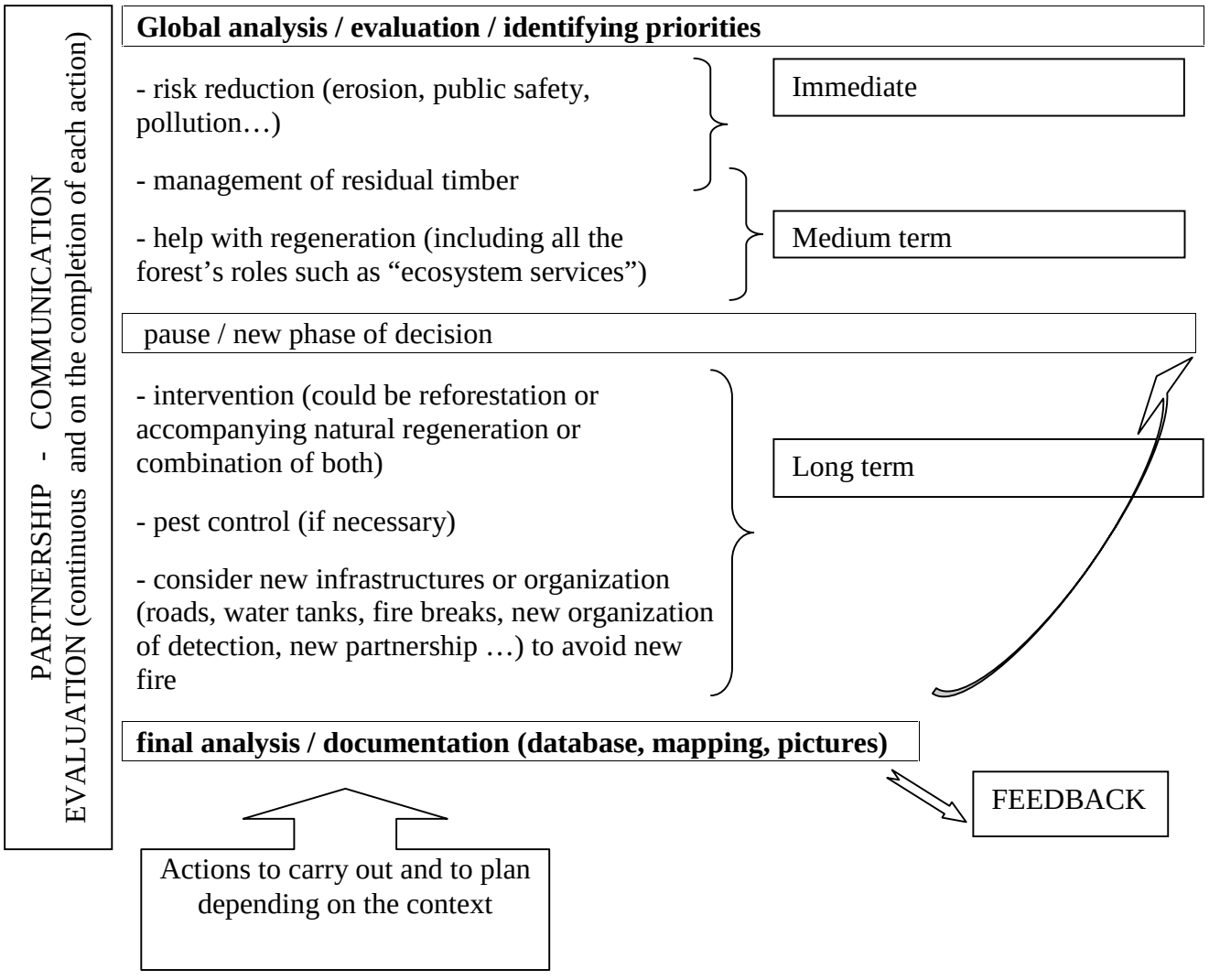
4.4.1 Objective of the transfer of the GP5

The North Aegean Region authority by adapting the good practice emerged from the EUFOFINET project on the restoration of burned areas has as main objective the establishment of a typical procedure for the restoration of burned and degraded land on the islands of the North Aegean.
This action plan also could be a model to be applied to the rest of country.

4.4.2 Strategy of implementation of the action plan

The North Aegean Region will apply the main elements of the synthesis of the good practices presented by ONF.

The procedure for restoration operations comprises phases /steps of actions and analysis that can be summarised in the following diagram:



The implementation varies according local environmental conditions and resources, so well as the intervention techniques, but the identified common key steps are applicable in any context.

The adoption of this procedure as protocol of post-fire management of burned areas allows avoiding wasting time and resources and increasing the efficiency of the actions applied.

4.4.3 Specific legal – regulatory framework

The Constitution of Greece itself, Article 24, is protecting the natural environment. A law states the protection of forests and wooded lands in general. It is forbidden to change the use of forest and wooded lands, unless, if it is imposed for public interest (Section 1), national economy as rural development or other use.
Thus as already mentioned, there is an obligation to immediate typically declare burned areas as reforested.
The Regional Forest Service has the authority to apply reforestations and post-fire management in general.
The Regional Forest Service belongs to the Ministry of Interior and typically is administratively under the authority of the North Aegean Region. But, the policies regulating the frame of its interventions are decided at central state level by laws and decrees. Thus, the North Aegean Region does not have the jurisdiction to impose practices and regulations or to modify the policies implemented.
Unfortunately, there is still no law regulating in particular post-fire interventions and management practices of burned areas. So, as already mentioned, practices applied are based only on the good will, the knowledge and resources of the Forest Service.

4.4.5 Actions and schedule of implementation

In order to apply the strategy adopted for the action plan restoration of burned areas, it appears there is a necessity, in absence of law regulating post-fire management, to have a **protocol or a guide** describing phases / steps for assessing the needs for restoration after a forest fire.
This methodological and technical guide will thus be prepared to formalise the approach resulting in the decision to restore (or not) fire-damaged terrain, and the schedule of studies and work to be implemented according to the main tree - shrub species present in the Greek Mediterranean areas.

Already in a non-formal meeting of the Greek partners it was a preliminary agreement to support the development of such a guide and to take it into account as priority in order to adopt this good practice.
If such a protocol or a guide is produced after the consensus of all the Greek partners of the EUFOFINET project, it would be easier for the Greek Central Forest Service, which is responsible for the reforestation – restoration of burned areas, to adopt it as a central planning.

The North Aegean Region will take care to **disseminate the guide** by distributing it to all the stakeholders involved, not only in the restoration of burned areas but also in prevention and fighting fires.

In collaboration with the Forest Service and volunteers, the North Aegean Region plans to organize training sessions in the use of the techniques of the guide and several seminars in the main islands in order to disseminate the content of the guide to target groups, such as public services and volunteers, NGO, etc.

In this way, the North Aegean Region already distributed to the local Forest Services of the islands a technical book for reforestations of burned areas (Konstantinidis P. and Gatzogiannis S., 2001. Selecting tree species for reforestation in areas affected by fire, by Forest Research Institute & TT (Post Bank of Greece). Thessaloniki. ISBN: 960-86160-9-3. 184 pp. *In Greek*) that has been prepared by our external experts before the project.

Actions adopted:

1. Production and edition of a guide describing phases / steps for assessing the needs for restoration after a forest fire.
2. Official distribution of the guide.
3. Training sessions.
4. Seminars.

Completion period: One year, six (6) months for the guide (action 1) and another six (6) for the dissemination actions (actions 2, 3, 4).

4.4.6 Operational implementation

The aim of the North Aegean Region is beyond its strict legal authority to bring together all the Services and target groups of citizens involved in the forest fires prevention and fighting (see above) and to provide and disseminate the results of the project in general and the present action plan in particularly.

Thus, the North Aegean Region already cooperates with Greek Forest and Fire Services on management and protection of forests and restoration of burned areas. Moreover, the Regional Secretariat of Civil Protection, which coordinates services that fight forest fires, is under the authority of the North Aegean Region.

The experience and competence of the North Aegean Region in forest fires are mainly in Dissemination Activities and Cartography – Mapping, which were done for the first time in the region and probably in Greece as well by a regional authority.

The North Aegean Region will supervise the production by its current external experts from the Forest Research Institute of Thessaloniki in the frame of EUFOFINET.

Following, the North Aegean Region will edited the guide and distributed it officially, in priority to the Forest Service, but also to all the public services and target groups of citizens concerned by the forest fires prevention and fighting.

Finally, the North Aegean region will organize training sessions in the use of the techniques of the guide and dissemination seminars.

4.4.7 Evaluation indicators of the action plan

Time schedule

Action 1. Production of the guide: six (6) months, preparation of the methodological and technical guide and layout editing and printing.

Action 2. Official distribution of the guide: month seven.

Action 3. Training sessions: a total of four-six (4-6), duration three (3) months, spread over years 2013-14.

Action 4. Seminars: total of four-six (4-6), duration three (3) months, spread over 2014-14.

External expenditure

Action 1. Production of the guide: 15.000 € for the preparation and edition (cost of expertise and printing).

Action 2. Official distribution of the guide: 1.000 €.

Action 3. Training sessions: 8-12.000 € (cost of expertise and travel and subsistence).

Action 4. Seminars: 12-15.000 € (cost of expertise and travel and subsistence).

Action plan funding

As an entity or in parts: sponsoring, integration in a new project, co-financed by the four partners involved in the EUFOFINED project, self-financed by the North Aegean Region or a combination of the previous.

Deliverables

Action 1. Production of the guide: date of printing at month six (6).

Action 2. Official distribution of the guide: date of completion of distribution month seven.

Action 3. Training sessions: number / year two-three (2-3).

Action 4. Seminars: number / year two-three (2-3).

5) Conclusion

The aim of the project EUFOFINET is to allow to “donor partners” to share their experience - “good practice” in wildfire prevention, restoration and fighting through the development of action plans to “receiving partners” in order to improve the efficiency of the policies of regional development.

The North Aegean Region has it-self transferred its relevant know-how acquired in previous projects in cartography of forest aiming to support forest fire prevention and management for the main islands, and the traditional practice of resin collection - cultivation, as activity reducing fire risk. Moreover, its external experts in forest fires presented a detection experiment.

The North Aegean Region is facing to a major problem in fighting strategies, prevention of forest fires and restoration of burned areas, because of objective facts of topography, such as isolation from the mainland, extreme high flammability of the vegetation, increase number of wild-fires, but also due to the lack of coordination of the services involved and the absence of official planning regulating pre-fire and post-fire interventions and management practices of forest and burned areas.

In order to take profit of the knowledge of the partners of the consortium, the North Aegean Region decides to be a “recipient donor” for the good practices “Intervention - Strategies (GP1)”, “Detection (GP3.1) and prevention of wildfires (GP3.2)” and “Restoration of burned areas (GP5)” and to apply a strategy how to implement it through an action plan, adapted to the four main islands (Chios, Lesbos, Ikaria, and Samos), which comprises the following for:

- GP1: training and demonstration of the suppression intervention techniques backfire and dozers.
- GP3.1 and GP3.2: a study of the modalities for the installation of detection systems, the elaboration of a typical procedure of prevention actions and activities planning for each island separately, and organizing coordination meetings of the services and organizations involved in the forest fire prevention and fighting and dissemination seminars for target groups of citizens.
- GP5: the production and edition of a protocol – technical guide, describing phases for assessing the needs for restoration after a forest fire, its dissemination to public services and target groups of citizens, and the organization of training sessions and seminars.

The North Aegean Region with its participation to the EUFOFINET project has been in contact with good practices and innovative techniques in the area of the prevention, restoration and fighting of forest fires.
However, most of all, the participants of the North Aegean Region to the project, had the opportunity to exchange constructive scientific views, but also to develop a frame of warm personal contacts with the other partners.

For further scientific information
Dr. P. Konstantinidis and Dr. G. Tsiourlis
Senior Research Scientists
Forest Research Institute
570 06 Thermi -Thessaloniki, Greece
E-mails: pavkon@fri.gr, gmtsiou@fri.gr

Legal responsible – Contact:
Athanasios Giakalis
Governor of North Aegean Region
77, Kountourioti street
81100 Mytilene
Greece

Represented by:
Regional Development Funds of North Aegean Region
3, Arg Eftalioti str
81100 Mytilene
Greece

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