



## **TECHNICAL ASSISTANCE TO THE FORESTRY PROJECT, ALBANIA**

### **Draft Report on the Development of a National Forest Fire Management Strategy and Action Plan for Albania**

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## **Preface**

The FAO Technical Assistance to the Forestry Project, Albania, in July 2001 called for an international consultation to develop jointly with national forest fire experts a proposal for a *National Forest Fire Management Strategy and Action Plan for Albania*. A first draft proposal was prepared by the international consultants, Mr. Johann G. Goldammer (forest fire expert mission leader), Mr. Mattia (fire management expert, supported by Mr. Davide Pontani) and the local fire management experts, Mr. Mehmet Meta and Mr. Genci Hoxhaj. In preparation of the draft strategy a number of national and local agencies and experts have been consulted, including a field visit of the most fire-endangered areas in the North of Albania (Puka Region).

The draft strategy was then discussed at the *National Round Table Meeting on Forest Fire Management in Albania*, Tirana, 2 October 2001. In this Round Table all national agencies concerned with fire, as well as research institutions participated.

The strategy presented in this paper is the result of inputs of all parties involved in the consultation.

## **1. Introduction**

Albania, despite its very small territory, is one of the European countries with rich vegetation, which originated during the Tertiary era. Today's vegetation of Albania is composed of endemic relic vegetation and of species that have invaded from neighbouring regions through migration, having phylogenetic similarities with floristic elements of neighbouring countries.

Albania is a mountainous country with high topographic and climatic variety: 52% of its surface is on elevation between 600 and 700 above sea level with prevailing steep slopes (ca.30%). Thus, ca.90% of its surface is subject to severe erosion and difficult to access.

About 57% of Albania's population is living in rural area, and mainly depend on extensive agricultural and stockbreeding activities. The northern, north-eastern, south-eastern and central areas are characterized by hilly-mountainous terrain; whereas the north-southern/coastal area along the Adriatic and Ionian coast is lowland.

Climate extremes range from extreme cold winters in the northern, north-eastern and south-eastern areas to very hot and dry summer along the coast. Rainfall regimes vary from north to south and from coast to inland. There are fewer rainy days in the south than in the north, but months

without rainfall can occur at any time of the year, as it is typical for the Mediterranean climate. Local precipitation differences lead to diverse vegetation patterns.

Forests occupy 1.045 million ha standing volume of about 82 m<sup>3</sup> and an average annual growth of 1.4 m<sup>3</sup> per ha. This is very low as compared with many countries of central Europe. Most of the forested land consists of degraded forests with low productivity, e.g. oak forests (31.8%) and shrub land (25.6%). The forest area is divided in two basic categories according to function: production forests (ca.900,000 ha = ca.86% of the area) and protection and recreation forest forests (ca.140,000 ha = ca.14%). The highland ecosystems are characterized by laurel, chestnut and alpine pastoral belts at various altitudes. In the south and near the Mediterranean coast, these belts grow at a higher altitude than in the northern inland areas. The major forest tree species are:

- Beech (*Fagus silvatica*), on 160,000 ha (= 17%)
- Pine (*Pinus* spp.), on 142,000 ha (= 15%)
- Fir (*Abies* spp.), on 130,000 ha (= 2 %)
- Oak (*Quercus* spp.), on 300,000 ha (= 32%)
- Other broadleaved species, on 510,000 ha (=34%)

Human misuse of fire (accompanied with deforestation during the past years) and grazing practices were no doubt largely responsible for most of the forest destruction. Unfortunately unrestricted grazing and uncontrolled fires caused accidentally and often due to agricultural burnings, as well as arson occur throughout the country.

The Forest Service under the supervision of the General Directorate of Forests and Pastures (DGFP) is in charge of operational forest fire management, serving as technical organ with planning, prevention, coordination, intervention, and inquiry responsibilities.

The legislative frame of forest fire controls incorporated into the law on *Forest and Forest Service Police* being accompanied by the by-law *On Forest Fire and Pest Control* and a special *Regulation Forest Fires*.

Forest Fires Statistics are collected by the Forest districts and evaluated by the General Directorate of Forests and Pastures. Most of the forest fires in Albania occur at the end of spring and in summer. The main causes of fires are human negligence, and to a lesser extent due to arson. Fire data for the period 1981-2000 are given in the Annex.

However, a well-organized fire prevention programme is not yet in place in Albania. A permanent observation-signalisation system/net (with several fire towers per district) is available in fire-endangered forests of the whole country and operated by the Forest Service during the fire season. The availability of fire suppression infrastructure and equipment, however, is still very insufficient.

The situation is worsened because of the release of the forest worker force formerly employed by the Forest Service and the transfer of forest management activities to the private sector has resulted in the absence of forestry personnel present in the forest during the fire season. As a consequence villagers and other people have to be hired. However, these are often not available due to insufficient payment. The involvement of inexperienced people also bears the risk of casualties during the fire suppression operations which can become rather dangerous for non-trained people, especially in mountain terrain.

## 2. Causes of increasing fire occurrence

The causes of an increase of fire occurrence have to be sought in the difficult economic and social circumstances that accompany the transition period to a democracy and a market-oriented economy. Whereas the causes of uncontrolled wildfires are rather easily determined – the majority of fires are caused by negligence or arson – emphasis should be given to analyse the reasons or the "underlying causes" for negligent attitudes or intentionally set fires. Understanding the underlying causes of wildfires will help to determine appropriate countermeasures or the fire management strategy.

The following general statements attempt to explain the increasing of fire occurrence and fire damage:

**Vacuum of ownership, power and responsibilities:** The termination of the old regime with its established rules and conditions of ownership, power and responsibilities has created a vacuum. The loss of control over the forest has resulted in the release of the forest working force. As a consequence formerly employed rural inhabitants are suffering unemployment or are leaving the rural space. People remaining in the communities do not feel obliged at all to assist the government in fire prevention and suppression. The "discipline" that had been enforced by the old political system has disappeared completely.

**Fires as a weapon against former decisions in land-use planning:** The rural population does not accept any longer the decisions and facts that have been created by the old regime. For instance, forest plantations established in former pasture lands in the South of the country are increasingly subjected to arson in order to forcefully reconvert the "artificial" forest to the traditional pasture domain.

**Land property disputes:** Under the old regime land has been afforested that formerly belonged to private owners. Other public land that has been afforested under the old regime is now becoming attractive for suburban or recreational development, including land speculation. Although the law clearly states that any conversion of forest to other uses is illegal or must be approved by the Forest Service, there is widespread development in forests that is either illegally or falsely approved by authorities without involving preliminarily a statement of opinion or approval by the DGFP.

**Consequences of market-oriented forestry operations:** The new system of forest management has resulted in the release of the traditionally employed forest worker's force. Concessions for timber harvest are given to those private enterprises that offer highest biddings. Those who did not win the concession sometimes set fire for revenge, attempting to damage both the concessionaire and the Forest Service.

**Lack of access:** In the most valuable mountain forest access for fire management personnel is very difficult. Fire set by negligent shepherds in remote upper mountain lands can be reached by long walking distances only which makes any rapid initial attack impossible and allows the wide spread of wildfires.

**Lack of funding to pay personnel for fire suppression:** In the case of wildfire occurrence the Forest Service depends on the recruitment of personnel for fire suppression. The amount of payment offered for fire fighting personnel is so low (about 500 Leke per day = 3.5 \$US) that villagers are not willing to take this hard job which is also considered to be dangerous – without doubt considering the absolute lack of appropriate fire fighting equipment and personal safety devices.

**Lack of technical means for fire management:** There is some modest technical equipment (hand tools) available in Albania for forest fire suppression. However, the amount and quality does not meet international standards and does not include personal safety equipment firefighter personnel.

**Climate change:** Finally the observed change of local climate, particularly in the North of the country, must be noted. The decrease of mountain water supply for the dams / hydroelectric power plants is a clearly visible signal and expression that the country is experiencing climate variability. The severe forest fire season of 2000 has been attributed to an extreme drought. These facts must be noted, especially for long-term forest fire management planning and provision of necessary equipment.

### **3. Recommendations for a National Forest Fire Management Strategy and Action Plan**

Based on the analysis of data provided by the DGFP and FAO-TA (local experts), the results of the field inspections done on 29-30 September 2001, and the Round Table on Forest Fire Management Strategy for Albania (2 October 2001) the following measures are recommended to improve the capabilities and efficiency of the Forest Service and other government agencies as well as the *komunas* in forest fire prevention and control. It should be noted that the recommended activities should be implemented in two phases. Phase I would include the establishment of basic capacities, including purchase of equipment and training of ground fire fighting crews. Proposals for systems that require higher investments and follow-up costs such as helicopters or automated fire detection systems should be considered for a Phase II.

#### **3.1 Establishment of a *National Forest Fire Management and Coordination Centre***

The occurrence of forest fires and other wildland fires in Albania reflect a complex interaction between natural conditions and the socio-economic and political development and have reached an unprecedented magnitude. Fire management measures that include fire prevention and fire suppression must address social, economic and ecological factors that determine the occurrence and impacts of fire. It is evident that the current organization and legislation means cannot cope with the situation. A new organization and planning tools should be developed on the basis of the existing structures in the forestry sector. This organization would include a new operational system in which the specific responsibilities would be defined at the different levels.

The culture of responding to fire emergencies must be overtaken by a culture of prevention and preparedness that involves the development of operational plans, influencing individual behaviour and the involvement of the public institutions, to allow a rational organization of the necessary measures.

As a priority measure the establishment of a *National Forest Fire Management and Coordination Centre* in the General Directorate of Forests and Pastures. The tasks of the Centre would include:

- a) Programme, promote and coordinate the actions of protection of forestry and agricultural resources from wildfires in the phases of early warning, prevention, suppression and rehabilitation of the altered environmental and ecological functions;
- b) Act as coordination and control unit for the annual forest fire management plans of the districts;
- c) Develop further Inter-Agency agreements, procedures and activities concerning the sharing of responsibilities and resources, e.g. on co-ordinated use of aircraft for fire suppression;
- d) Define gaps and prepare necessary proposals for new or improved legislation relevant to the protection of forest resources from fire;
- e) Establish and maintain a national database on forest fires;
- f) Promote studies and research on new technologies for forest fire prevention and control, particularly the elaboration of thematic maps on forest fire risk, burned forest areas and damage appraisal and assessment as well as information tools for decision support in fire suppression.
- g) Promote international collaboration to bring fire research and management knowledge to Albania that has been developed in other countries;
- h) Promote the cooperation with neighbour countries in fire management and bilateral or multilateral agreements for mutual assistance in fire emergencies.

Required investments:

- a) Establishment of a national fire management coordination cell, equipped with the necessary information and communication tools (computer hardware and software, radio communication facilities)
- b) Establishment of a special *Forest Fire Service Intranet* (as a subsystem of the Forest Service Intranet) and of an internet website;
- c) Establishment of a special Fire Report Hotline (a toll-free telephone number) for fire reporting by the public should be considered.

**3.2 Development of annual fire management plans**

With the assistance of the National Forest Fire Management and Coordination Centre the Regions should prepare annual fire management (fire prevention and control) plans. These annually updated plans should contain:

- a) Analysis of the causes of wildfires and factors that influence the spread of fire;
- b) Fire statistics of the last year;
- c) Forest fire risk areas and periods;
- d) Actions for the forecast and the prevention of forest fires;
- e) Entity and location of the means, equipments and human resources for the forest fire fighting;
- f) Entity and location of the ways of access to the forests;
- g) Technical fire prevention measures (fuel management, silvicultural and maintenance operations);
- h) Training and information activities;
- i) Finance plan.

An efficient activity against forest fires moves from an adequate forestry planning, from the correct management of the forest and also from the ecological awareness. A national fire plan and regional/district fire prevention and fighting plans should find place in the regional and national forest sector planning.

The national forestry plan should reflect the environmental needs of the country and should be in harmony with other federal laws, the sustainable management of natural resources and the conservation of biodiversity. It should also meet the standards of the European Union and international conventions regarding the protection and improvement of the environment and forests.

The configuration chosen at central level for the coordination activity, constituted by the National Forest Fire Management and Coordination Centre and supported by the Forest Service, should be closely associated with the regions and districts. Task Forces should be organized which include *Initial Attack Teams*, adequately trained and formed to be used in national forest emergencies.

These Task Forces should be composed of staff employed by the Forest Service, which would be responsible of the coordination of the terrestrial units and which would request aerial support if needed and available. The Task forces would also coordinate on site with other agencies, communities and NGO's.

Required investments:

- a) Establishment of fire management coordination cells in each district, equipped with the necessary information and communication tools (computer hardware and software, radio communication facilities, *Forest Fire Service Intranet*)
- b) Assign Forest Service personnel to take over the function of district forest fire management coordination and planning (all year round). This should be regulated by the new organizational structure of the DGFP which is currently defined.

### **3.3 Improvement of the fire danger forecast (early warning), fire detection and reporting system**

In order to ensure the functioning of real-time and near-real time information flow from the forest districts to the Central Coordination Cell an observation and communication network must be established for fire danger forecast, fire detection and reporting at various levels.

The fire danger forecast (early warning) component is described in detail further down under Research and Development.

Fire detection and reporting in Albania is based on *Forest Fire Guards* stationed in the field during the fire season. As of the moment the *Forest Fire Guards* are not yet completely equipped with radios and must rather walk long distances for reporting fires to the nearest forest office. Since the response time and efficiency of fire suppression personnel depends on quick communication flows it is necessary to provide the necessary hand-held radios to the *Forest Fire Guards* which will enable them to report fires to the Forest District Office without delay.

Required investments:

- a) Purchase and distribution of additional portable radios to the most fire-prone districts (to be handed out to all permanently employed *Forest Fire Guards*).
- b) Where necessary, provision of motorcycles to *Forest Fire Guards* responsible for large patrol areas.
- c) Planning of a forest fire lookout network with capabilities to precisely locate fires (smoke observation); this network could also include automated fire detection system, to be installed in a later stage).

Note: The investments of a tower-based fire detection network should be made in a "Phase II" of the *National Fire Management Action Plan*.

### **3.4 Establishment of a Forest Fire Service**

The proposed model of organization of a future Forest Fire Service is based on the needs to protect the total forest territory of the country which is of over 1.000.000 hectares and organized in 36 districts. According to the local conditions of fire hazard these districts must receive a proportional (appropriate) share of the employed people, means and equipments, a minimum set of information technology support, etc.

Considering the need to have available one operational *Forest Fire Brigade* (or Forest Fire Crew) for every 10 to 20,000 hectares of forest to be protected the Forest Fire Service would theoretically need 50 (to 100) operational brigades for the whole territory of Albania. However, some forested areas of the country do not require such intensive protection, especially in the forests dominated with deciduous species.

There are also other reasons why the complete coverage of the country by forest fire brigades should not be envisaged in the Phase I of the *National Fire Management Action Plan*: Limited funding and the need to collect experience before covering the whole forest area. Thus, only a limited number of Forest Fire Brigades should be established in the most fire-prone districts of the country. These brigades should be fully equipped with all necessary tools, including vehicles (small fire trucks or 4x4 all-terrain pick-ups with slip-on units, serving also as means for transport of the firefighters).

An operational Forest Fire Brigade will consist of:

- 6 trained and formed forest firefighters (including the team leader / crew boss);

- 2 portable radios (minimum: 1 hand-held radio for the crew leader; an additional portable radio would serve the needs of firefighter safety);
- 1 kit of manual tools (6 shovels, 2 axes, 1 chain saw, 2 fire swatters, 2 rakes, 2 picks/Pulaskis, 6 backpack pumps; 1 drip torch);
- 6 individual fire safety protections;
- 1 rescue / first aid kit.

In regions of high wildfire hazard and risk these crews will be supported by:

- 1 fire vehicle with a water tank (pick-up truck with slip-on unit; cf. below);
- 1 vehicle-mounted radio.

In a later stage (Phase II; see para 3.9) this organization could be supported in the high-risk forest areas by automated fire detection systems, and by helicopters equipped with a helibucket to be used for personnel transport in inaccessible terrain and aerial fire suppression.

Concluding from experience in other countries it is advisable to have trained forest fire management / suppression crews (or brigades) consisting of forest workers employed and stationed in the endangered zones. The Forest Fire Brigades should

- a) receive special fire management training
- b) receive appropriate hand tools and machinery (if applicable) including personal protection clothing for fire suppression
- c) work in fuel break / bufferzone construction during the fire season, during which they will
- d) be on standby to respond to a fire (initial attack or reinforcement in neighbour sections).

Required investments:

- a. Equipment (hand tools, personal safety equipment; see para 3.6 and 3.7)
- b. Formation of trainers
- c. Training by local trainers (see para 3.8)

### 3.5 Involvement of communities and the general public in fire prevention and suppression

Exempt a limited number of forest fire prevention slogans posted along some highways there are no further activities or programmes in place to increase awareness at local or national levels in which the forest fire problem are highlighted and / or a message conveyed that the general public should contribute to forest fire prevention.

Within the communities and villages there seem to be limited opportunities to encourage local residents to actively participate in fire suppression (see para 2). The influence of traditional leadership (village elders and mayors) with regard to encouraging local people to participate in fire prevention activities is limited to nil.

On-site discussions with community leaders and officials of the Forest Service during the consultation revealed that concepts of *Community-Based Fire Management* (CBFM) are hardly applicable in Albania.<sup>1</sup>

Thus, public-awareness raising or "public education" campaigns will remain a sole but important element to reduce the occurrence of forest fires.

Besides the traditional media (TV and radio spots, billboards, posters) the Forest Service is encouraged to cooperate with schools and other entities such as churches and Non-Government Organizations to promote forest protection (nature / environmental protection) awareness-raising programmes.

#### Required investments:

- a) Establishment of a Task Force for Public Relations and Awareness Raising to Promote Forest Fire Prevention. The Task Force should be part of the ongoing Public Awareness Programme of the Forestry Project and link with these activities. Terms of Reference (in detail to be determined): Creation of a PR programme including a logo / mascot for forest fire protection.
- b) Production and dissemination of PR materials.

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<sup>1</sup> CBFM concepts that have been put in place under different socio-economic conditions of some developing countries provide incentives (or bonuses) for the communities for active and successful participation in fire management.

### **3.6 Purchase of basic equipment for fire suppression and personal safety, primarily in high-risk areas**

In accordance paragraph 3.4 the equipment to be procured for the Forest Fire Brigades will include a number of sets of basic equipment (number of Fire Brigades t.b.d.) which include:

- 2 portable radios (minimum: 1 hand-held radio for the crew leader; an additional portable radio would serve the needs of firefighter safety);
- 1 kit of manual tools (6 shovels, 2 axes, 1 chain saw, 2 fire swatters, 2 rakes, 2 picks/Pulaskis, 6 backpack pumps; 1 drip torch);
- 6 individual fire safety protections;
- 1 rescue / first aid kit.

In regions of high wildfire hazard and risk these crews will be supported by:

- 1 fire vehicle with a water tank (pick-up truck with slip-on unit; cf. below);
- 1 vehicle-mounted radio.

These sets will be distributed i.a.w. with priorities listed in Annex I.

#### Required investments:

- a) see above: number of sets to be determined
- b) training (see para 3.8)

### **3.7 Forest fire management training**

In the future the implementation of the Strategy and the Action Plan it will be required to provide special forest fire management training to the Forest Fire Brigades and their supervising bodies.

This training is needed to familiarize the Forest Fire Brigades with the use of hand tools for fire fighting and exercising appropriate fire-fighting techniques. It is suggested that a number of selected future instructors will be trained in Italy. After training they will act as local trainers for initial and refresher training courses.

Required activities / investments:

- a) Explore cooperation with the Italian Forest Fire Service (*Corpo Forestale dello Stato*) to provide training for fire management trainers for ground and combined ground-aerial fire fighting.
- b) Explore cooperation with the Russian Forest Fire Service (*Avialesokhrana*) to provide training for Antonov-2 pilots in aerial forest fire combat.
- c) If helicopters will be purchased training must be provided for aerial transport of fire crews, including helirapelling, and aerial fire fighting with helicopter buckets.

### **3.8 Forest fire research and development**

#### **3.8.1 Development of a fire-danger information system for Albania**

The development of a national early warning system (or fire danger forecast / rating system) is necessary for improvement of the preparedness of the Forest Service. A research and development project is proposed which will be implemented by the Hydrometeorological Institute of the Academy of Sciences. The project will consist of three phases:

- a. Preparation of a daily or weekly fire danger information bulletin based on national weather data and the use of existing resources from outside the country, e.g. the products of the European Natural Hazards Project, Forest Fire Risk, or the Experimental Climate Prediction Center (ECPC), to be accessed through the Early Warning web page of the Global Fire Monitoring Center (implementation starting in 2001).
- b. In order to fine-tune the required meteorological information to the situation in Albania: Support the National Forest Fire Management and Coordination Centre to build a number of fire meteorological stations in the most fire-endangered districts of the country which will provide daily fire-weather readings to the Coordination Centre (by e-mail).

c. Conduct a study to investigate the use of most appropriate fire danger rating systems in use in the Mediterranean region or under Mediterranean climate / vegetation conditions elsewhere.

A draft forest fire weather analysis for Albania is provided in Annex

Required investments:

- a. Contracts for study team leader, project manager and field station personnel
- b. Library and manuals etc.
- c. PC, laptop, software, internet access
- d. Purchase of field weather stations (number to be determined)
- e. Domestic travel
- f. Organization of and participation at local/national/international training seminars, workshops and conferences

### **3.8.2 Establishment of a forest fire research nucleus**

A forest fire research nucleus should be established at the Forest and Pasture Research Institute and be supported by the Forestry Faculty of the Agricultural University of Tirana. The priority topics of research should include:

- a. Development of a forest fire and other wildland fire risk map of Albania. Such map would include a fuel assessment of forested
- b. Develop a selected / pilot study on forest damage appraisal / assessment.
- c. Study on rehabilitation (natural / artificial) of burned areas and environmental impact.

Required investments:

- a. Contracts for study leader
- b. Library, software, PC and internet access
- c. Participation in local/national/international training seminars, workshops and conferences
- d. Domestic travel

### **3.9 Purchase or lease of aerial fire suppression equipment and other major investments**

The majority of the national agencies supported an earlier proposal of the GDFP to purchase helicopters for aerial firefighting. Due to the high costs for leasing or buying and subsequently operating (maintenance) of helicopters a careful analysis of this proposal is required.

It was argued that helicopters equipped with helibuckets could be used for direct fire suppression, transportation of personnel and equipments in forest fire fighting. In addition the helicopter could be used for civil protection services, search and rescue (SAR), environmental monitoring and other aerial investigations, including illegal logging. Only then the investments would pay off, especially considering the fact that the helicopters would be available for other purposes outside of the forest fire season.

It should also be envisaged to lease helicopters instead of purchasing them.

It is suggested that the decision to lease or procure one or more helicopters should be postponed to Phase II of the Action Plan.

In the meantime it should be investigated if five Antonov-2 (AN-2) single-engine fixed-wing aircraft operated by the Albanian Air Force could be converted for firefighting. These AN-2 are equipped with an internal tank and agricultural spraying devices. Following the example of the Russian Aerial Forest Fire Service which is operating such converted AN-2 for forest fire fighting (see: <http://www.uni-freiburg.de/fireglobe/emergency/avialesookhrana.htm>) the conversion of the Albanian airplanes could be rather economic and cost efficient. The Global Fire Monitoring Center (GFMC) will follow up this option and provide the DGFP with more technical and cost details.

Phase II of the Forest Fire Management Action Plan should also investigate the establishment of an automated fire detection systems in high-risk forest areas. Such systems are successfully operating in Italy and have been tested in a number of countries (Germany, Portugal, Belarus, Russia).

Required activities:

a) Investigate costs for alternatively

(i) seasonal lease of helicopters from other agencies

(ii) lease of three helicopters

(iii) purchase of three new helicopters

(iv) purchase of three used helicopters

b) Investigate costs for purchase of helibuckets

c) Define responsibilities for coordination / sharing of helicopter use (if multi-agency) and a service (maintenance) point.

**ANNEX I****Areas (districts) of highest wildfire hazard, risk and fire occurrence in Albania**

<b>Hotspot Areas</b>		
<b>Districts</b>	<b>Forest Area (ha)</b>	<b>Conifers (ha)</b>
Puka	82,000	30,000
Mirdite	6,280	13,710
Korça	54,920	14,150
Mati	44,100	5,160
Tirana	47,220	3,770
Berati	26,210	5,010
Dibra	34,410	8,160

Bulqize	33,620	3,530
Kukes	38,060	6,980
Elbasani	38,350	6,030
Librazhdi	49,620	3,430
Gramshi	34,980	7,150
Tropoja	43,000	6,361
Permeti	37,890	4,000
Vlora	32,470	4,720
Kruja	10,400	1,760
Gjirokastra	28,770	3,110
Shkodra	54,100	5,990
M.Madhe	38,760	3,530
Kolonje	3,433	3,110
Devoll	16,530	2,430
Durresi	6,700	1,270
Pogradec	28,020	1,084
Skrapar	24,490	1,387
Kurbin	10,250	989
Saranda	14,480	680
Lezha	18,080	527
Lushnje	3,320	251

## ANNEX IV

### Forest Fire Meteorology in Albania<sup>2</sup>

Taking into account the importance of damages caused from the fires in Albanian forests on the recent years and refereed on some agro-meteorological evaluations regarding the potential possibility for fires created by the climate and nature of Albania, some considerations are presented in the following with the intention to emphasise the importance of this problem and to underline the urgent necessity of implementation of a new strategy (scientifically based) for a better protection of forest areas, avoiding at the maximum the hazards events (fire disasters).

Albania as a Mediterranean country has in general the same climatic conditions like the others countries of region. Consequently it is expected that the same phenomena regarding forest fires are playing a role. However, specific orographic conditions of the relief and the distance from the sea have a considerable influence on forest fire occurrence behavior.

From this point of view, looking at the most relevant meteorological elements used in this field, taking into consideration also the experience from other countries, a detailed list of elaborated elements, which frequently are applied in forest fire protection, has served as basis for analysis. These include:

- Precipitation
- Air Humidity (at 14:00 h)
- Calculation about the daily evaporation
- Maximum temperature above the threshold 33-35°C
- Relative Humidity under the threshold 30 - 40%
- Wind speed > 6-8 m/sec and the respective directions
- Soil humidity / temperature (0-20 cm)
- Air pressure >1015 hPa

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<sup>2</sup> This contribution to the Forest Fire Management Strategy and Action Plan for Albania has been prepared by Prof. as. Dr. Petrit Zorba, Hydrometeorological Institute, Academy of Sciences, Tirana, Albania (15 October 2001). The paper has been edited by J.G. Goldammer.

- Daily water balance, etc.

A general overview of the forest fire meteorological is presented at the following:

*Temperature - as first important index for initiation of fires*

The air temperature of 30-33°C (maximum temperature) which is considered as threshold temperature is exceeded every year, particularly during the period June - September. The regime of temperature is considered as reference for all other parameters, which are estimated for the same period June - September.

*Air Humidity - in many Mediterranean countries the threshold considered as important and contributory for forest fires is < 40% or <30%*

Excluding the seaside area during the period June - September, all the other parts of Albania are characterised with Mean Air Humidity (at 14:00 hrs) around the risk values 30-40%. So, in this case has been judged as very important, to do some estimations about the number of days (within the period examined) with Air Relative Humidity under the threshold 30%. As is presented at the respective materials in Albania are observed each year about 15-20 days. This index (as can be noted) increases gradually during a replacement on the centre - east part of the country, arriving at value 35-50 days (in other terms about 1-2 months).

*Wind speed over 6-8 m/sec*

Very important factor in the propagation of fires in forest is considered also the wind (direction and speed). Particularly the others experience (from European countries), let us know that the index of wind speed over the threshold 6-8 m/sec has to be as an important impute on the fires forecast models. For that reason, we can give a look also to this index for Albania. As can be noted, we have 5-15% probability for wind speed, that pass the limit of 6-8 m/sec. In mean time, the average (mean wind speed) is calculated around the value 1.5-3.5 m/sec. Conclusion: considering also the importance of orography and the relief, the wind speed, in a lot of cases can be as a factor, that positively influences in the propagation of winds. We do not have to forget its role. The wind direction is related principally with the mountain orientations.

*Rainfall*

In some countries the precipitation are considered as important factor, that can help to reduce forest fire occurrence. Nevertheless, if they are under a certain quota the problem is totally different. During the period June - September, the rainfalls are observed in few days and the total quantity is around 20-60 mm per month. Differs only the month of September that normally has more precipitation. But, if we consider the fact, that the forest cover has the capability to hold precipitation of 3-5 mm, then the situation on the soil will be totally different and the quantity of precipitation will be reduced drastically. As will be mentioned in following at the water balance, the missing of precipitation and the limited number with them is a helpful factor for fires in forest also in the Albanian territory.

*Soil temperature*

Only the fact, that their observed values arrive up to 60-70°C, it is sufficient to underline the importance of this element and to characterise the high potential risk for fires possibilities.

### *Evaporation - ETP*

Evaporation estimated through the ETP-Penman formula give us high values (140-200 mm), that are very important to create difficult situations not only for the forest trees but for a general drought situation. Considering the quantities of precipitation that are of order of 20-60 mm per month, is very easy to understand and expect a negative water balance of 100-140 mm.

### *Pressure*

The pressure is another meteorological element used in the methodology for forecast of fires forest in Europe. The threshold  $>1015$  hPa as can be noted pass this important limit especially on the low part of the country during the period June - September. Conclusion regarding this element: not so important, considering the fact that the forest areas are concentrated in centre - east part of Albania. The information regarding the pressure may be taken in consideration only for the forest areas near the seaside and only in cases of anti-cyclonic synoptic situations.

We can conclude, that in our country the risk for fires from the natural conditions (climate) are present and verified each year.

For the above mentioned reasons and taking in consideration:

- The missing of meteorological station actually on the forest areas or near them,
- The missing of meteorological observations that are important for estimations of fire forecast models,
- The meteorological conclusions that the forest areas in Albania are characterised with high risk possibility for fires,

We propose and suggest that the implementation of new strategy for the protection of forest from fires including a system of monitoring for meteorological elements will be very helpful to have at the end a effective protective policy regarding the forest in Albania.

## Appendix V

### **"Conference on Forest Fires in the Eastern Mediterranean, Balkans and adjoining Regions of the Near East and Central Asia" Turkey, 2003**

#### **Conference Outline**

##### **1. Rationale**

The Eastern Mediterranean Region, including the Balkan countries, the ECE member states of the Near East and Central Asia, and other neighbouring countries of Central Asia, e.g. Mongolia and China, have recently suffered major forest and other wildland fire problems.

The causes of an increasing occurrence of wildfires in forests and other wildlands, including the underlying reasons for increasing human-caused fires, vary within the region and are due to:

- \* transition from centrally planned to market economies
- \* national to regional conflicts, creation of new nations, involving political tensions and war
- \* increasing population growth and land-use pressure
- \* regional climate change towards increase of extreme droughts

It has been recognized that no regional activity is underway to establish cooperation in wildland fire management, including wildland fire science.

At the last regional ECE fire conference, the Baltic Exercise on Fire Information and Resources Exchange 2000 (BALTEX FIRE 2000), the FAO/ECE/ILO Team of Specialists on Forest Fire recommended to call for a fire conference covering the region delineated above.

In December 2000 the Government of Turkey through the General Directorate of Forestry expressed its interest to host the meeting in Turkey in early 2003.

The conference would be the next in a series of seminars and conferences which have been organized between 1981 and 2000:

- \* Fire Suppression Technologies (Poland 1981)
- \* Fire Prevention (Spain 1986)
- \* The Socio-Economic Environment of Fire (Greece 1991)
- \* Forest, Fire, and Global Change (Russian Federation 1996)
- \* The First Baltic Conference on Forest Fires (Poland 1998)
- \* The Baltic Exercise on Fire Information and Resources Exchange - BALTEX FIRE 2000 (Finland 2000)

Several reasons support the idea for calling for a regional conference. First, the Balkan countries, some of them being in a post-war situation and under reconstruction, as well as the South Eastern European countries which are still in economic and political transition, have not participated in recent activities of the ECE/FAO Fire Team and other international wildland fire research and development projects. Second, the neighbouring countries of Turkey, such as the Caucasus states, Iran, Turkmenistan, Uzbekistan, and Kazakhstan, have been quite isolated from recent scientific and technological developments in fire management. Third, the fire problems in Mongolia and northern China, and to a limited extent in Afghanistan, call for cooperation with the ECE region.

From the point of view of the Fire Team and the Global Fire Monitoring Center (GFMC) which coordinates the work of the team the ECE region and keeps close contacts with non-ECE countries, the countries listed above deserve full attention and support to bring them into the family of international community of forest fire scientists, managers and policy makers.

Turkey is situated in a strategically important place in the region and very suitable for bringing together the fire science and management community of the region. This is why the ECE/FAO/ILO Team Specialists on Forest Fire welcomes the generous hospitality of Turkey of host the conference in 2003.

## **2. Objectives of the Conference**

The regional conference will be entitled:

"Conference on Forest Fires in the Eastern Mediterranean, Balkans and adjoining Regions of the Near East and Central Asia"

and conducted jointly with a regional exercise on forest fire management entitled:

"Eastern European, Near East and Central Asian States Exercise on Wildland Fire Information and Resources Exchange - EASTEX FIRE 2003"

The objectives of the conference is to

1. Provide (a) a forum in the Eastern Mediterranean, Balkan and adjoining Regions of the Near East and Central Asia, (b) prepare mechanisms for information and resources exchange in forest and other wildland fire management within the region, including the establishment of partnerships for joint activities in fire research, training and policy development, and (c) prepare proposals to governments and international organizations of the region to establish mechanisms for sharing resources in large fire emergencies in accordance with existing international procedures

In addition to the regional focus on the Eastern Mediterranean, Balkan and adjoining Regions of the Near East and Central Asia the conference will

2. Compile an ECE-wide database on fire management capabilities in order to support the overall objectives of the conference and to facilitate international cooperation in management of fire emergencies
3. Conduct EASTEX FIRE 2003 - a bi-lateral or multinational fire-fighting exercise in which cooperation of ground and aerial fire fighting forces of two or more countries (to be determined) of the Eastern Mediterranean, Balkan and adjoining Regions of the Near East and Central Asia, including participation of commercial wildland fire suppression operators, will be exercised.

The conference objectives are in line with the scope of work and recommendations of various international organizations including:

- \* the ECE/FAO/ILO Team of Specialists on Forest Fire;
- \* the Interagency Task Force for Disaster Reduction of the United Nations Strategy for Disaster Reduction (ISDR) and its Working Group on Wildland Fire (WG-4 under the ISDR Inter-Agency Task Force for Disaster Reduction);
- \* the FAO, in accordance with the recommendations of the fire expert consultations on "Public Policies affecting Forest Fires" (1998) and "International Cooperation in Fire Management" (2001);
- \* the United Nations Office for the Coordination of Humanitarian Affairs (UN-OCHA) and its joint UNEP Environment Unit;
- \* the United Nations International Search and Rescue Advisory Group (INSARAG);

- \* the European Commission in the frame of the Mediterranean Disaster Information Network (MEDIN) and the overall scope of the Global Disaster Information Network (GDIN) International;
- \* the European Council in the frame of the European Open Partial Agreement (EUR-OPA);
- \* the International Institute for Disaster Risk Management (DRM) and the World Bank Disaster Management Facility (DMF) with its ProVention Consortium on Technological and Natural Disasters; and
- \* the World Health Organization (WHO)

The ECE member states and other invited countries will be asked to present "Country Profiles" that will be discussed and processed during the meeting to build a database on site during the conference. The materials will be presented in written form (printed and on electronic files) following a questionnaire (draft questionnaire is presented under ANNEX I to this conference outline).

Oral contributions will be invited from each country to present in brief the Country Profiles. Dedicated papers will be invited by the Steering Committee.

## ANNEX VI

### Budget for the proposed National Action Plan

The draft budget is divided in Phases I and II. Phase I budget will provide investments for the establishment of basic infrastructures, purchase of ground equipment, conversion of existing agricultural airplanes for aerial fire suppression, and training of personnel. Phase II will build on successful implementation on Phase I and comprise helicopters and training for helitack crews and aerial fire suppression using helicopters.

#### Phase I Budget

##### 1. Establishment of 30 Forest Fire Crews

Each Forest Fire Crew (or Forest Fire Brigade) will consist of six trained persons to be equipped with personal safety equipment and tools for ground-based fire suppression with or without fire vehicle. Maintenance of tools including chain saw will be done by crew members.

- 1 kit of manual tools (6 shovels, 2 axes, 1 chain saw, 2 fire swatters, 2 rakes, 2 picks/Pulaskis, 6 backpack pumps; 1 drip torch);
- 6 individual fire safety protections (fire-proof clothes, boots, helmet, goggles, gloves, headlamp, harness, backpack, etc.);
- 1 rescue / first aid kit.

Each crew package will cost ca. \$US 5000

30 kits =

**\$US 150,000**

##### 2. Radio communication

All 30 fire crews will be equipped with hand-held radios. Two radios for each crew must be provided for safety reasons.

Each radio will cost ca. \$US 400

60 radios =

**\$US 24,000**

### **3. Fire vehicles**

In regions of high wildfire hazard and risk these crews will be supported by one fire vehicle each with a water tank (pick-up truck with slip-on unit) and one vehicle-mounted radio.

Each vehicle will costs ca. \$US 50,000

15 vehicles =

**\$US 750,000**

### **4. Establishment of the *National Forest Fire Management and Coordination Centre***

The *National Forest Fire Management and Coordination Centre* requires a coordination cell to be located in Tirana, equipped with the necessary information and communication tools (computer hardware and software, radio communication facilities).

Tentative costs

**\$US 20,000**

### **5. Conversion of agricultural airplanes (AN-2) for aerial fire suppression**

Costs for conversion of the AN-2 have been requested through the Russian Forest Service and the *Formos* Company. No cost frame has been provided. However, it is assumed that conversion costs including travel of Russian specialists would not exceed \$US 20,000 per aircraft.

Tentative costs (max.) for 5 aircraft =

**\$US 100,000**

## **6. Forest fire monitoring, meteorology and other fire research**

Research and development in forest fire meteorology and other forest fire research should be started in Phase I and be subject to review before continued in Phase II. The forest fire meteorology (fire danger rating / early warning) component is an important field of activity. The overall magnitude of a network of forest fire weather stations, however, needs to be reviewed during Phase I.

Total costs for Phase I =

**\$US 100,000**

## **7. Training, workshops conferences**

The training component of Phase I includes the following elements:

- a) Basic training of trainers by the Italian Forest Fire Service (*Corpo Forestale dello Stato*) in ground and combined ground-aerial fire fighting.
- b) Training for Antonov-2 pilots in aerial forest fire combat by Russian Forest Fire Service (*Avialesookhrana*)
- c) Fire Management Training Course in Albania for all agencies concerned with fire management (international fire management training consultant to be hired)

d) Participation of Albanian fire management and research specialists in international conferences, e.g., the "International Forest Fire Research Conference" (Coimbra, Portugal, November 2002) and the "Conference on Forest Fires in the Eastern Mediterranean, Balkans and adjoining Regions of the Near East and Central Asia" (Turkey, April/May 2003).

Estimated costs include for Phase I =

**\$US 50,000**

Total costs Phase I

**\$US 1,144,000**

## **Phase II Budget**

### **1. Purchase or lease of helicopters**

After the establishment of the national coordination centre and the ground-based fire management capabilities as well as the first aerial component (conversion of AN-2 for aerial fire fighting) the question of purchase or leasing of helicopters must be addressed with highest priority. The requires use of helicopters requires an inter-agency agreement for the use of the helicopters and coverage of follow-up costs (maintenance) outside the forest fire season.

The tentative budget for buying one helicopter (without follow-up costs) will be ca.

**\$US 750,000**

## **ANNEX VII**

### **Work plan 2001-2002**

#### **1. Procurement of materials**

December 2001 – January 2002:

- a) Order of equipment (Fire crew equipment, radio communication)
- b) Tender for fire vehicles

#### **2. Training**

- a) March-May 2002: Equipping fire crews and initial training
- b) March 2002 (i.a.w. with training capacities in Italy): Training of trainers

#### **3. Establishment of the *National Forest Fire Management and Coordination Centre***

December 2001 - March 2002

#### **4. Conversion of agricultural airplanes (AN-2) for aerial fire suppression**

December 2001 – March 2002

#### **5. Forest fire meteorology and other fire research**

January 2002: Fire research round table

### **7. National workshop**

Between April and June 2002: National workshop on fire management

### **8. International conferences**

a) Fire research: November 2002

b) International cooperation in fire management (April/May 2003)