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PARA LA AGRICULTURA Y LA ALIMENTACION

FAO'S PROGRAMME ON FOREST FIRE PROTECTION: A REVIEW OF ACTIVITIES

FOR THE PERIOD 1970-1989

by

J. Troensegaard  
Senior Forestry Officer  
(Plantations and Protection)  
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1. Introduction

FAO's activities concerned with forest protection and in particular with protection against wildfires are grouped under two major programmes: the Regular Programme and the Field Programme. While the Field Programme deals with technical assistance through national or regional field projects, the Regular Programme is based at FAO HQ in Rome and its activities are not focused exclusively on specific countries or field activities but rather on global or regional, technical issues. The period covered by this paper coincides with the period when the United Nations Development Programme became the predominant international funding agency for FAO technical assistance projects in the developing countries.

2. Regular Programme Activities

This programme provides technical support to FAO assisted projects; organizes meetings, workshops and seminars; co-sponsors regional training courses; issues special studies and reports; provides the secretariat for several international bodies dealing, among other things, with forest fires, and responds to enquiries from its member countries either directly or through its library services. The programme is financed either directly by FAO, Trust Funds, or through co-sponsoring arrangements. The responsibility for the part of the programme that deals with wildfires is with the Forestry Department of FAO in Rome where one officer handles the corresponding duties on a part-time basis. He collaborates closely with the secretaries of the European Forestry Commission and of Silva Mediterranea who both have programmes on forest fire protection.

2.1 Meetings, Seminars

During the period under review, 3 major seminars and technical consultations were held in collaboration with other international organizations where fire was the key subject, and several where fire was an important component. FAO and Unesco held a joint Technical Consultation on Forest Fires in the Mediterranean region in 1977 and ECE, FAO and ILO held seminars on Forest Fire Prevention and Control in Warsaw, Poland, 1981 and on Methods and Equipment for Prevention of Forest Fires in Valencia, Spain, in 1986. The ECE/FAO/ILO Joint Committee on Forest Working Techniques and Training of Forest Workers also held seminars, where forest fires was one of the main issues, in the Federal Republic of Germany, 1977; in Spain, 1980; in Norway, 1982 and in Turkey, 1984 (see also Annex I).

Apart from the personal contacts and professional experience that these seminars provided to their participants, they also produced specific recommendations to the countries concerned and to the international development agencies. Recommendations on how to deal with forest fires and the resulting damage are also regularly given during meetings of the six regional Forestry Commissions of FAO<sup>1)</sup>, the FAO Regional Conferences, and Silva Mediterranea, which normally meet every 2 years. At the international level, several of these recommendations have been followed up. For example, the ECE/FAO/ILO Seminar on Methods and Equipment for the Prevention of Forest Fires (Spain 1986) recommended that efforts should be made to increase the collaboration with North African and Near East countries in future training activities on forest fires taking place in the Mediterranean Region. This recommendation was followed by instituting the regular forest fire training courses in Spain, described in the next section.

The increased attention that forest protection and, in particular, forest fire prevention and control has received during recent meetings of the FAO statutory bodies has led FAO to assign more resources to this field. As of 1990, and if approved by the 1989 FAO Conference, a new regular post will be filled at FAO HQ that will deal exclusively with forest protection.

## 2.2 Training

Technical assistance to training in forest fire management is normally provided through the Field Programme. However, as mentioned above, training courses on forest fire protection will now take place in Spain at regular intervals. The courses are organized by ICONA (Instituto Nacional para la Conservación de la Naturaleza) of Spain in collaboration with FAO and CIHEAM (International Centre for Advanced Mediterranean Agronomic Studies) which is the main sponsor, at its facilities in Zaragoza. The courses will last 3 weeks and the practical training will be carried out in different parts of Spain. The theoretical part will cover ecological effects of forest fires; fire behaviour; prevention; detection; suppression; planification and legislation. The field exercises will deal with prescribed burning; use of communication equipment; use of ground tankers and use of air tankers. The courses will initially be open to professional foresters from the countries of Europe, the Near East and North Africa with preference given to participants from the developing countries of the subregion but may in the future be open to other countries as well. The first course was held in May/June 1989 in French and the next will take place in the same period in 1990 and will be open to English and Spanish-speaking professional foresters. The instructors will be recruited internationally and simultaneous interpretation will be available.

## 2.3 Publications, Studies

Most of the FAO reports on forest fires are country specific and produced under the Field Programme. Under the Regular Programme, FAO has not been a prolific publisher in this field. It has been considered that the many excellent handbooks published in the fire prone developed countries, notably Canada, USA, Spain and Australia, cover the market and

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<sup>1)</sup> Europe; North America; Latin America and the Caribbean; Asia and the Pacific; Africa; Near East.

could be adapted to suit the individual developing countries, and in fact this is what has happened, in particular in the field of Fire Danger Rating. Instead, FAO's few publications cover specific international issues.

The Wildland Fire Management Terminology (FAO Forestry Paper no. 70) of 1986 provides a basis for a more precise understanding of foreign fire management literature and discussion and thus for sharing concepts among countries with similar fire problems. The lead language is English, although there is no intention to standardize the fire management terms in this language and equivalent terms are provided in Spanish, Italian, German and French. Forest fire statistics covering the ECE region are also provided under this programme, but fire statistics from the rest of the world have not been compiled by FAO because of incompleteness of data.

In 1975 a proposal for a Global Programme was published. This report describes the adverse effects of forest fires on the human environment; it identifies three areas of the world which are highly susceptible to fires (Mediterranean, Central American, and African savanna regions); and recommends a long-term programme of work aimed at solving some of the most urgent problems. It discusses both the on-site and off-site damage caused by unwanted fires, and it emphasizes that, because of population pressure and other factors, the potential for fire-caused damage is greater than ever before.

The report proposes a global programme of integrated fire management and describes the specific activities which need to be accomplished in each of the three regions as well as the implementation requirements for the first five years. The proposals cover field operations in fire prevention, detection, suppression and fuel management (including careful application of prescribed fire) and describe how optimum benefits can be obtained through an integrated fire management system. It also covers training, research and extension, and emphasizes the importance of interdisciplinary and multi-functional coordination in alleviating the impacts of forest fires on the human environment.

Two regional forest fire studies have been carried out in 1986, one covering the Mediterranean countries (11 countries<sup>1</sup>) and the other dealing with the countries of Central America and the Caribbean<sup>2</sup>. The reports draw attention to the wildland fire situation within the two regions and describe the measures that are currently being adapted and those that could be adapted in the future to relieve the problems. The reports are useful for formulating regional technical assistance programmes (*vis-à-vis* the Forest Fire Training Courses for the Mediterranean Region).

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<sup>1</sup>) Portugal, Spain, France, Italy, Yugoslavia, Greece, Turkey, Cyprus, Syria, Lebanon, Israel, Jordan, Libya, Tunis, Algiers and Morocco.

<sup>2</sup>) El Salvador, Guatemala, Honduras, Nicaragua, Costa Rica, Belize, Jamaica, Trinidad and Tobago, Cuba, Haiti, Dominican Republic, Bahamas and other Caribbean countries.

#### 2.4 Technical support to FAO field projects

The Regular Programme staff employ approximately half their time in technical support of the field projects. This covers programming and planning, formulation of projects, their implementation and evaluation.

Apart from these activities, FAO receives regular requests for information on forest fires from all over the world. Many of these requests concern statistical information on fires at national, regional and global level. For the countries of the ECE, and a few other countries, we have reasonably satisfactory statistics but for the rest of the world we have unfortunately no adequate estimates on number of fires and area burned per year. For this reason, some preliminary studies have been carried out by FAO in West Africa and Brazil employing NOAA satellite imagery. They showed that NOAA can provide information on location and number of fires at a very reasonable cost but it is not the tool for estimating area burned, for which other types of remote sensing will have to be employed. The next step of the investigations will be to develop a cost efficient methodology for estimating numbers, location and areas of wildland fires per year at different levels of geographic resolution. Once this stage has been reached we will be in a position to provide the field projects with reasonable fast and reliable fire data and will be in a position to give fire statistics of country, regional and global level should we be asked to do so and provided with the necessary funding.

#### 2.5 FAO/ECE Joint Agriculture and Timber Division

A number of activities concerned with forest fires are being undertaken by this body which are primarily, but by no means exclusively, directed to the countries of Europe and North America. These include:

- (i) A series of seminars, held under the auspices of the FAO/ECE/ILO Joint Committee on Forest Working Techniques and Training of Forest Workers, already mentioned in section 2.1.
- (ii) The collection and publication at two-yearly intervals of Forest Fire Statistics, containing annual data for European and North American countries on the number and area of fires, causes, financial losses and costs. The latest (fourth) edition was issued in 1988 with data up to 1986. The fifth edition with data up to 1988 will be issued by the end of 1989.
- (iii) The issue, twice yearly, of a Forest Fire Newsletter. A trial Newsletter was prepared in 1988 to assess readership response, which was extremely positive. As a result, the Joint FAO/ECE/ILO Committee decided to take steps to have the Newsletter published on a regular basis. The first issue is scheduled to appear in Autumn 1989.

The above projects on forest fires are just one component of a wide range of activities in the forestry and forest industry sector carried out under the auspices of the FAO European Forestry Commission, the ECE Timber Committee and their joint subsidiary bodies, the Joint FAO/ECE/ILO Committee on Forest Technology, Management and Training and the Joint FAO/ECE/ILO Working Party on Forest Economics and Statistics.

## 2.6 Silva Mediterranea

In the framework of FAO's Committee on Mediterranean forestry questions, Silva Mediterranea, a network of forest fire management was initiated in 1986 with a view to catalyzing cooperative research activities on the subject with common objectives and methodological approaches.

This network concentrated its research activities around three themes, namely:

1. Development of knowledge on the specific inflammability of different tree species.
2. Development of adequate land clearing techniques for fire-lines and fuel-break.
3. Surveys and sociological research on causes and origin of fires.
4. The Forest Fire Research Group met in Avignon in 1988 together with the IUFRO Working Party on Forest Fire to define a common programme on fire research.

The results of the research activities are reported at each session of the Committee. The next session will be held in Athens, 1990.

## 3. Field Programme

During the period under review, the Field Programme gave direct assistance to 36 developing countries through 66 projects, 24 in Africa, 20 in Asia, 17 in Latin America and 5 in Europe and the Near East. The location of these projects reflects the major fire ecologies of the world. The savannas of Africa (Burkina Faso, Benin, Senegal, Côte d'Ivoire, Guinea, Nigeria, Zaire, Kenya, Tanzania, Zambia, Mozambique: 30% of the projects); the grasslands and dry open forests of Asia (India, Burma, Vietnam, Thailand, Philippines, Indonesia: 23%); Central America and the Caribbean (El Salvador, Guatemala, Honduras, Nicaragua, Dominican Republic, Trinidad & Tobago, Venezuela: 23%). The last 24% of the projects is equally distributed between the Himalayan conifer region (Pakistan, Bhutan, Afghanistan); temperate Asia (Mongolia, People's Republic of China, Republic of Korea) and South America (Argentina, Chile, Peru); and the Mediterranean/Near East Region (Turkey, Greece, Syria) (see also Table 1).

**Table 1: FAO TECHNICAL ASSISTANCE PROJECTS ON FOREST FIRE BY REGION: 1970-1989**  
**(No. of Projects)**

REGION	UNDP/SF	TCP	TRUST FUND	ALL
Africa	11	8	5	24
Asia	17	3	-	20
Latin America & Caribbean	10	5	2	17
Europe/M. East	2	3	-	5
TOTAL #	40	19	7	66
%	61	29	10	100

The request for technical assistance originates in the countries themselves and FAO provides the assistance needed according to this request and the funds available from the donor community. As can be seen from Tables 1 and 2, the largest donor has been UNDP with 61% of the projects and 87% of the total expenditure in the period, followed by the FAO Technical Cooperation Programme (TCP) with 29% of the projects and 10% of the total expenditure and Trust Funds, mostly from individual donor countries but also from international development banks, with 10% of the projects and 3% of expenditure. The total expenditure for the period was approximately US \$12 million of which 40% was spent on equipment and the rest on training and personnel (consultants).

**Table 2: FAO TECHNICAL ASSISTANCE PROJECTS ON FOREST FIRE PROTECTION: 1970-1989**

DONOR	TYPE	NO.	INPUT					OUTPUT			
			Total 1000 US \$	Equip. 1000 US \$	Training 1000 US \$	Experts m/m m/m per project		Fellowships m/m Fellows		Technical Documents	
UNDP	Exclusive Forest Fire projects (a)	7	7,117	3,876	473	219	31	45	40	24	
	Experts (b) ≥ 12 m/m	12	2,067	67	20	268	22	40	18	17	
	Consultants < 12 m/m (c)	21	750	249	18	68	3	6	6	34	
	All	40	10,072	4,192	511	555	-	91	49	75	
TCP	Consultancies (c)	19	1,192	446	75	54	3	2	2	25	
TRUST FUND	Consultancies (c)	7	313	23	-	29	4	-	-	7	
TOTAL		66	11,577	4,661	586	1,224	19	93	51	107	

<sup>1</sup>US \$385,000 to CPR/6762 (China) alone

It is useful to group the field projects according to the magnitude of the inputs in terms of total funding, the value of the equipment and training component and man-months of experts and consultants provided. In Table 2, an effort has been made to summarize this information. However, the reader should be warned that the inputs and outputs are underestimated since FAO's records on fellowships and equipment provided by older UNDP short-term projects are not always available and because of the difficulty in estimating the number of people involved in on-the-job training and in-country training courses.

Basically, the projects are either full-fledged projects in which forest fire is the central issue; or they are forestry development projects of one kind or the other to which a forest fire specialist has been attached for a longer period, i.e. more than 12 months; or they are basically short-term consultancies. Of the first type, marked (a) in Table 2, there have been 7 during the period, in the following countries: Kenya (1974): Forest Fire Management; Nigeria (1975): Forest Fire Protection; Pakistan (1978): Forest Fire Protection in Azad Kashmir; Mozambique (1980): Slash-and-Burn Prevention; India (1984 and ongoing): Modern Forest Fire Control; Vietnam (1986 and ongoing): Forest Fire and Pest Management; and Mongolia (1987 and ongoing): Long-Term Rehabilitation of Fire Stricken Areas. These projects account for 61% of the total expenditure of the period, providing an average of 31 m/m of expert advice per project and 40 fellowships. Of these projects, the Modern Forest Fire Control in India is by far the most ambitious project that FAO has ever carried out in the field of forest fire protection. It is now in a transition phase to an equally ambitious follow-up project that will start operations in 1990. This is a unique situation in which a five-year period dealing with demonstrations and pilot operations, collection of statistical data and determination of basic fire parameters and protection costs, is followed by technical assistance on forest fire management planning. More details on this project will be given by the national project director later today.

In the second group, marked (b) in Table 2, there have been 12 projects, all funded by UNDP, accounting for 19% of the total expenditure for the period, and giving a total of 18 fellowships of 46 m/m total duration. These projects have provided a total of 268 m/m of expertise or an average of 22 m/m per project. The fire specialist has been attached to many types of projects but the effect has been most positive when the first input was part of an integrated forest management project (Nicaragua 1968-72; Honduras 1972-1980) and of relative long duration. In the last group, marked (c) in Table 2, are the 47 short-term consultancies mostly provided as a one-time-only input to various types of forest development projects or as assistance in emergency situations. In this last category, falls the assistance given to the People's Republic of China in 1987, on account of the large fire in the northern part of this country. This project also provided an unusual amount of equipment (\$385,000) for a TCP project (see also Annex 3).

It is difficult to evaluate the impact of these projects since they all had different objectives and since national follow-up activities were often influenced by factors outside the control of the forestry sector (reorganization of the administration of natural resources management; change of governments; civil strife; etc.).

In Honduras, the 85 m/m of expert advice provided on a continuous basis between 1972 and 1980 to a relatively strong and dynamic institution have coincided with the creation of one of the most efficient Forest Fire Services in Latin America and the reduction of the forest area affected by wildfires in that country from 30% in 1974 to less than 3% in 1982. Sixty-nine man-months of expert support to an equally strong institution in Asia did, however, not provide the same positive results. But then, the population density and the pressure on the forests were not the same in the two cases. Reviewing our work during the last 18 years, there have been both successes and cases where consultancies repeated at regular intervals fail to show a positive development.



Practically all projects have produced one or several reports, some of them of lasting value. Of the 106 field documents produced in the period, the most important are listed per country in Annex 4 of this paper. They provide valuable information and guidance for national or international foresters and planners working in the countries concerned. The documents cover a wide field of subjects: workplans; prescribed burning; lecture and training material; legislation; planning; protection of industrial plantations; damage valuation; relationship between fires and resin production and insect damage; fire simulators; and fire protection in general. Several manuals have also been produced on prevention (Mozambique, Nigeria 1979); suppression (Nigeria 1979); prevention and control, and prescribed burning (El Salvador 1975). For more details, please see Annex 4.

The reasons why a forest fire project has, or has not, been successfully followed up by the Government or institution concerned, are not easily determined. But it is thought that the frequent failures to implement project recommendations may be principally linked to the fact that efficient forest fire control programmes including prevention, detection and suppression require substantial initial investments and are quite costly to run. Although the average per ha cost of US \$2.50 may not sound impressive, it amounts to a substantial sum when the whole forest estate of a Service is taken into account and a serious if not impossible burden to many underfinanced institutions. Furthermore, foresters have had difficulty in convincing government officials that the services provided by an efficient forest fire management programme will save more money than it spends. It would therefore seem advisable that future technical assistance in the field should, whenever possible, include damage evaluation and forest fire management planning, where priorities are set and future expenditures are balanced against the corresponding benefits, in the same units of measure.

FAO provides relatively few fellowships for graduate or post-graduate studies. This has to do with the relative short life of its field projects. However, advanced studies on forest fire management are only taught in few developed countries, and students from these countries may also shy away from such a specialized issue, since the chances of obtaining employment afterwards are generally very limited. The result is that there are rarely any professional level forest fire staff in the developing countries who would be fully capable or motivated to push for implementation of project recommendations. Technical assistance projects on forest fire control should therefore give higher priority than heretofore to this level of training.

A universal issue in any technical assistance project is the technological level of methodology recommended as related to the absorption capacity of a particular country; or, in other words, how to determine what is the appropriate technology in any given situation. This problem is particularly relevant to forest fire management where even minimum requirements will include sophisticated communication equipment and in more advanced cases, hi-tech aircraft operations. There is no universal answer to this problem except that it should always be seriously considered. In this respect, the experience gained in the Modern Forest Fire Control project in India is particularly relevant, as you will realise when its findings are presented to you later today. Modern technology has in fact been introduced, in some cases with success in others with discouraging results. However, an important lesson has been learned.

Lastly, it should be mentioned that practically none of the consultants and technical advisers recruited on forest fire come from the developing countries. This is a regrettable fact that may be changed if post graduate courses are offered through technical assistance programmes and if successful forest fire management were to be implemented on a wider scale in the developing countries than it is today.

#### 4. Conclusions

FAO has dealt with the problems of protection against forest fire through international meetings, publications and field projects under a wide range of socioeconomic and ecological conditions. The experience and knowledge that the Organization has acquired in the process is at the disposal of all countries and institutions who face the problems of forest fires.

INTERNATIONAL MEETINGS ON FOREST FIRE ORGANIZED AND/OR SPONSORED BY FAO

- 1986 Seminar on Methods and Equipment for the Prevention of Forest Fires. ECE/FAO/ILO. Valencia (Spain), 27 papers. Proceedings 1988.
- 1981 Seminar on Forest Fire Prevention and Control. Warsaw (Poland). ECE/FAO Proceedings 1982. 28 papers.
- 1980 (Spain)  
1982 (Norway)  
1984 (Turkey) Other FAO/ECE/ILO Joint Committee on Forest Working Techniques and Training of Forest Workers (fire not main theme but one issue).
- 1977 Seminar on Reforestation of Forests Destroyed by Storm and Fire. F.R. of Germany. FAO/ECE/ILO. Proceedings 1977.
- 1977 FAO/Unesco Technical Consultation on Forest Fires in the Mediterranean Region. France 1977. Proceedings 1977 (E,F,S).
- 1972 Seminar on Forestry Social Plantations (incl. fire prevention/protection). FAO/SIDA. Proceedings 1973.
- Every 2 years (normally) Meetings of the Forestry Commissions for Europe; Near East; North America; Latin America and the Caribbean; Asia and the Pacific; Africa.

FAO PUBLICATIONS AND REPORTS ON FOREST FIRES (REGULAR PROGRAMME)

GLOBAL - Handbook

FAO  
(1986) Wildland Fire Management Terminology. FAO Forestry  
Paper no. 70. 257 pages. (E,F,S,I,G).

GLOBAL - Policy

FAO/UNEP  
(1975) Detection and Control of Forest Fires for the Protection  
of the Environment. Proposals for a Global Programme.  
69 pages. (E).

ECE - Statistics

FAO/ECE  
(since 1982) Forest Fire Statistics. Bi-yearly Bulletin covering  
Europe, USSR and North America. (E,F).

CENTRAL AMERICA - Sector Analysis

Hancock, M.  
(1986) Forest Fire Management in Central America and the  
Caribbean. 41 p. (E,S).

MEDITERRANEAN - Sector Analysis

Velez, R.  
(1986) Forest Fire in Mediterranean Countries. 42 p. (E,F,S).

FAO FIELD PROJECTS ON FOREST FIRE FOR THE PERIOD 1970-1989

1. UNDP

Year	Code	Project Type	INPUT US\$				OUTPUT		
			Don.	Train. #	Equip.	Cons. m/m	m/m	# Fellows	Doc
89-91	BKF/87/011	Forest Management				3			
89-91	MON/87/004	Grassland/Forest Fire	300	40	134	17	19	12	6
89-92	VIE/86/028	Fire/Insect Protect.	1,015	138	350	26	ongoing		
87-91	BUR/81/003	Watershed Man.				2			1
85-88	BEN/85/006	Protection & For.Dev.				3			1
84-89	IND/84/003	Forest Fire Man.	4,771	241	2,940	99	20	15	3
1984	BEN/81/003	Forest Res. Dev.				4			4
1984	ARG/84/001	Forest Development				1			1
83-88	ROK/82/001	For. Training Inst.				12			1
1982	GRE/78/003	For. Dev. & Refor.				4			
81-86	THA/81/004	Div. For. Rehabilit.				10			1
80-85	PAK/78/139	For. Fire Prot.AzakK	105	18	86				1
80-82	MOZ/80/004	Slash Burn Prev.	409		137	29	2	2	8
1980	IND/78/023	Modern For.Fire Figh.				3½			1
1980	NIR/77/008	Dev.For.Man.Cap.				12			3
79-81	KEN/74/024	For. Fire Man.	366	16	150	28	4	2	4
79-81	HON/78/005	For. Man.			50	24	4	2	2
1979	GUA/78/005	Ord. Bos. Altiplan				2½			1
79-81	INS/78/054	Forest Develop.				1			1
1979	PHI/77/011	Multiple-Use For.Man.				3			3
78-81	THA/76/001	Water Man.C.May			20	20	16	3	6
1978	NIC/74/002	Recup. Nueva Seg.				12			
1978	NIR/75/056	For. Fire Prot.	151	20	79	20			3
1978	THA/74/017	Dev.Ref. NE Thailand				2			
1978	THA/72/008	Wat. Man. NE Thailand							
		1st phase THA/76/001				37			
77-82	MOZ/76/007	For. & For.Ind.Dev.				3			2
1977	CHI/76/003	Res.,Train.,For.Dev.				1			1
76-83	BHU/75/007	For.Dev.West Bhutan				5			2
1976	HON/75/004	Ord.Des.For.			50	12	4	2	1
1976	SEN/71/522	Inventory/Protection				12			1
1975	PAK/72/001					1			1
1974	AFG/74/018	Watershed Aff.+ For. Fire Protection				24			1
74-77	GUA/72/006	Fort.Serv.For.				2			2
1974	TUR/71/521	Indust. Plant.				2			1
72-77	HON/71/511	Plan. y Ad. Des. For			50	39	8	2	1
1972	ZAM 10					12			1
1972	ZAI/72/014					3			
71-73	ELS/71/506	For.Dev.Wat.Man.				3			1
1971	SF/DOM/8	Inventory/Planning				3			1
1970	SF/PHI/16					2			2
1970	SF/ZAM/5					2			1
69-73	NIC/68/509	Investig.Dev.NE Nic.			50	54	8	3	1

2. FAO TCP

Year	Code	Project Type	INPUT US\$				OUTPUT	
			Don.	Train. #	Equip.	Cons. m/m	m/m # Fellows	Doc
1988	VEN/6751	Plantation Man/Prot.	90		10	1.5		1
87-89	PHI/6653	Forest Fire Man/Res.	100	22	25	4	2	3
1987	CPR/6782	Reforest. after Fire	400		385	1.5		1
1987	IVC/4503		10			1		1
1987	CYP/6755	Aerial Fire Detection	5			0.5		
86-87	INS/4513	For. Fire Prev.& Cont	121	25	15	7+2		4
1986	VRT/4525	Fire Prot., Stump Rate	50			3		2
1986	SYR/4506					1		1
1986	GUI/4509					1		1
85-86	GUI/4509	Mechan.Refor.& Fire P	70	15		3		1
1985	NIC/4505	Watershed Man.	20			2		1
1984	VRT/2317		10			1		1
83-85	IVC/2304	Forest Fire Prot.	177		15	13		2
83-84	DOM/2305	Proteccion/Refor.	20			2		1
82-84	TRI/0102	Form. Forest Fire Protection Scheme	47	13		4		
1982	IVC/2202	For. Fire Prot.	32		10	2		2
82-83	TRI/0102	For. Fire Prot.	40			4		1
1982	VRT/0112		10			1		1
1978	6/GRE/01/T	For. Fire Prot.	10			1		1

3. TRUST FUND

Year	Code	Project Type	INPUT US\$		OUTPUT				
			Don.		Train. #	Equip.	Cons. m/m	m/m # Fellows	Doc
1986	PER/027/NET						1		1
85-86	GBS/003	Forest Fire Prot.	40			23	16		1
1985	IVC/021/IVC	Fire Protection			51		6		1
84-86	VRT/074/SWE	Village Affor.					1		1
84-86	NIC/010/NIC	Desarrollo Noroeste					1		1
1980	SEN/021/USA	Land Resources Man.	9				1		1

TECHNICAL REPORT FROM FAO FIELD PROJECTS ON FOREST FIRES  
FOR THE PERIOD 1970-1989

Argentina

- 1986 FAO                      Prevencion y lucha contra incendios forestales. 27 p.  
ARG/84/001 (S).

Benin

- 1984 Sirois, G.P.G. Protection contre les feux de brousse et les incendies  
forestiers. 120 p. BEN/81/003 (F).
- 1985 Delabraze, P. Application des systèmes d'évaluation des risques de feu  
et contrôle de feux de forêts. 77 p. BEN/81/003 (F).
- 1988 Schnitz                      Lutte contre les feux de brousse. 28 p. BEN/85/006 (F).

Bhutan

- 1982 FAO                      Report on Forest fire Control in Bhutan. 50 p.  
BHU/75/007 (E).
- 1979 Ploadpliew, A. Lecture notes on Basic Fire Suppression. 49 p.  
BHU/75/007 (E).

Burma

- 1986 Goldammar, J. Forest Fire Management (Burma). 59 p. BUR/81/001 (E).

Chile

- 1978 Bjornsen, R.L. La preparación de ejercicios para el simulador de  
incendios. 91 p. CHI/76/003 (S).

China

- 1988 Lähde, E.K.                      Emergency Assistance to Forest Fire Management and  
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