UNITED NATIONS
ECONOMIC COMMISSION FOR EUROPE

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

INTERNATIONAL FOREST FIRE NEWS

No. 7 — August 1992

UNITED NATIONS
ECONOMIC COMMISSION FOR EUROPE

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

INTERNATIONAL FOREST FIRE NEWS

EDITORIAL

UNCED Earth Summit

The UNCED Earth Summit, which has been accompanied widely by scepticism and hope, is over. I have observed that many of those, who are engaged in the protection of the world's forest resources, have not been satisfied with the results of the meeting. They had hoped that UNCED would produce sufficient unanimity amongst the governments for decisive action that would result in concrete steps comparable with the international strategic arms reduction agreements and that could be materialized within a limited amount of time. Although the ***"authoritative statement of principles for a global consensus on the management, conservation and sustainable development for all types of forest"*** is legally non-binding, however, I feel that the Earth Summit has been one more milestone toward the development of a global forest protection policy. The governments from the industrialized nations and the developing world have demonstrated their willingness to cooperate and share the burden of this tremendous task. And they have already demonstrated that they feel committed to do so. For instance, only one week after the Earth Summit, the Government of Indonesia convened some industrialized nations and international organizations at the ***"International Workshop on Long-Term Integrated Forest Fire Management in Indonesia"***. The aim of the workshop, which was held at Bandung (Java) on 17-18 June 1992, was to coordinate national and international programmes that will contribute to build up a functioning fire management system for the whole country. The 10 countries and international organizations, that joined the round table at Bandung, declared their willingness to closely coordinate all activities in the fire management sector in Indonesia. A National Forest Fire Management Coordinating Committee, which was established briefly after the workshop, will serve as an instrument which will continue and lead this initiative into an operational system. The Indonesian approach is a remarkable pioneering initiative in the light of the uncontrolled escalation of fires in the tropical world. More details of this initiative will be published in the next issue of IFFN. I hope that I will be able to add information on similar initiatives recently taken in Brazil.

\+ + + + ***global fire telegram*** + + + +

Much public attention has been focussing on the forest protection problems of the tropics. The facet-richness of the global fire world, however, is reflected by fire reports from all over the world, some of which are being followed by IFFN. At the beginning of the northern fire season the first alarming signal came from the environments around the Chernobyl Nuclear Power Plant site. Fires occuring in early 1992 in the radioactively contaminated forests near the Chernobyl accident site seem to spread radionuclides to distant locations; more details are given in this newsletter.

During the early summer of 1992, as preparation of this newsletter was being completed, numerous fires were reported in Northern Europe. This was due to long-lasting high pressure and drought all over northern Europe. Sweden experienced one of its worst early summer droughts in its recent history. For the first time in 50 years severe wildfires swept over the island of Gotland. Massive response by all available fire-fighting forces was required to bring the fires under control. In early July wildfires continued to rage all over northern-central Europe. Germany for the first time for many years was struck by escaping forest fires. In the West of the Russian Federation, near Kaliningrad, more than 30 people were reportedly killed in forest fires. These fires also swept over to agricultural lands and caused extensive damage to wheat fields. In Latvia forest fires threatened ammunition depots of the Russian Army in the vicinity of Jurmala. Five fire fighting helicopters from Germany were dispatched to the Latvian fire scene, but were not eventually needed, because by 15 July all fires had been extinguished by rain.

All these events show again that the northern countries are far from having their forest fire problem under control. On the contrary, the fire events of 1992 and during the years before once again demonstrate the disastrous influence of extreme weather conditions. They highlight the potential impacts of globally changed climate patterns on wildfire occurrence. This needs to be born in mind by all those responsible for forest protection around the globe.

Freiburg, July 1992 Johann G. Goldammer

COUNTRY NOTES

AUSTRALIA

Large Forest Plantation Fire in Queensland

On Sunday 22 September 1991 the State of Queensland in Australia experienced its worst forest plantation fire. Over a period of about eight hours, the fire burned its way through more than 900 hectares of *Pinus elliottii* with an estimated value of around AUD 3,000,000. The affected trees were planted between 1961 and 1973.

The fire occurred in the 37,000 hectares Toolara plantation area, about 200 kilometers north of Brisbane, Queensland's capital city. The Toolara plantation area is the largest single component of the 175,000 hectares of plantation softwoods managed by the Queensland Forest Service.

The fire is thought to have been caused by sparks flying off the broken spring of a trailer towed by a passing motor vehicle. Under the influence of a strong dry wind, the roadside grass fire quickly spread into adjacent forest made tinder dry through many months of virtually no rainfall. High temperatures, strong winds and low humidity helped to quickly fan the blaze into a crown fire with a peak rate of spread of about 2000 metres an hour, with spotting distances up to 1000 metres.

By late afternoon wind and temperature had dropped and 120 firefighting personnel were able to suppress the fire. It was finally contained by 9 o'clock in the evening. Total suppression costs exceeded AUD 80,000.

From: K.R.Hamwood
Manager, Fire Protection Branch
Queensland Forest Service
Department of Primary Industries

Address: Head Office, Forestry House
160 Mary Street
GPO Box 944
AUS - Brisbane Q 4001

GREECE

The 1991 Fire Statistics Report

Heavy rainfall during the month of August was partly responsible for one of the best years in Greece's wildland fire history in terms of total area burned. During 1991, a total of 1,118 fires burned only 21,227 ha (4,730 ha forests, 11,598 ha brushlands, 4,900 ha pastures). The fire causes are distributed as follows: 16% negligence, 11% arson, 4% lightning, 69% unknown (most can be attributed to arson).

A novelty was that, for the first time in Greece, Soviet professional forest firefighters were employed by the Greek government in order to be prepared to support fire control. Also, during 1991 the budget allocation for forest fire suppression was U.S. $ 31,000,000, the highest amount ever.

Severe Forest Fires at Lesbos Island

Before the 1992 fire season was officially declared in Greece (1 June-30 October), a severe forest fire incident occurred on Lesbos island on 16 May 1992, forecasting a bad fire year. Lesbos island is located in the Northern Aegean Sea, a mile off the Turkish coast. It is the third largest Greek island covered by magnificent forests of Brute Pine (*Pinus brutia*). The fire burned over an area of 1,100 ha which consisted of forest regeneration and mature forest of Brute pine, located in the centre of the island. The same area was burned before in 1977.

The fire started at 05:00 hrs in a remote and inaccessible area. According to official sources the fire was started by arson. Unofficial rumors connect the fire incident with the formal visit of the President of the Republic of Cyprus on the island the same day. Extremely strong winds (9-10 Beaufort scale) during the fire rendered suppression efforts ineffective and the use of aircrafts impossible.

Short Course on Forest Fire Prevention at the Mediterranean Region

The Mediterranean Agronomic Institute of Chania, Greece (M.A.I.Ch.) is offering a short, intensive Course on Forest Fire Prevention in the Mediterranean region in November 1992. The official language will be English. Scholarships covering full or part of the cost are available to qualified applicants. The course covers principles of fire ecolgoy, fire prevention and fire mangement, including prescribed burning, as applied to Mediterranean forests. It is addressed to foresters, biologists, and other geotechnical scientists who work on forest fire suppression. For further information please contact:

Dr. George Lyrintzis
Mediterranean Agronomic Institute of Chania
P.O.Box 85
GR-73 100 Chania

Phone: +30-821-81153
Fax: +30-821-81154

From: Dr.Alexander Dimitrakopoulos

Address: University of the Aegean
Department of Environmental Studies
17 Karadoni Str.
GR-81 100 Mytilene

NEW ZEALAND

Forest and Rural Fire Research Resumed in New Zealand

New Zealand has been without any wildland fire research capability since the late 1970s. In recent years a number of factors have contributed to the need for rectifying this situation. As an initial first step in this process, in April 1992 a Canadian fire researcher from Edmonton, Alberta, Martin E. Alexander, began a one-year secondment at the Forest Research Institute (FRI) in Rotorua under the terms of an international assignment agreement between Canada and New Zealand. Mr. Alexander has worked as a fire research officer with Forestry Canada since 1976.

As a visiting scientist in fire research at FRI, the foreign expert will be involved in:

* Technology and information transfer activities pertaining to fire danger rating and fire behavior prediction

* Revision of the fire danger classification criteria currently used in New Zealand

* Demonstrations of the experimental fire technique designed to furnish fire behavior data in selected fuel types; and

* Problem analysis on fire research needs.

A position for a permanent fire researcher at FRI has recently been created. Mr. Alexander will be serving as a "mentor" to the appointee during his time in New Zealand. An advisory committee on forest and rural fire research has also been established.

The funding for the fire research programme at FRI is being provided by the National Rural Fire Authority, the Foundation for Research, Science and Technology, the New Zealand Forest Owner's Association, the Department of Conservation, and the Ministry of Forestry.

From: Mr. J.R. Tustin
Director, Forest Technology Division
Forest Research Institute

Address: Ministry of Forestry
Private Bag 3020
NZ - Rotorua

RUSSIAN FEDERATION

Forest Fires on the Areas Contaminated by Radionuclides from the Chernobyl Nuclear Power Plant Accident

After the Accident of the Chernobyl Nuclear Power Plant, which occured on 26 April 1986, large areas of the Ukraine, Belorussia and the Russian Federation were exposed to radioactive contamination. Currently the main contaminants of these areas are the long-living radionuclides caesium (^{137}Cs), strontium (^{90}Sr) and plutonium (^{239}Pu). Radionuclides of plutonium are found mainly within the 30-km zone around the Chernobyl Power Plant. Radionuclides of strontium have contaminated a number of districts in the Kiev Region (Belorussia) and in the Bryansk Region (Russian Federation). Radionuclides of caesium account for the largest contaminated areas in these states.

In the Russian Federation, the soil surface, in which caesium radionuclide contamination exceeds 37 GBq/km^2 (37 Gigabequerel = 3.7×10^{10} Bq), totals 4.9 million hectares within 15 Regions. The areas in which the radiocaesium contamination density is 555 GBq(= 0.555 TBq)-1,5 TBq/km^2 and higher, are mainly in the Bryansk Region (ca.250,000 ha). This Region was the most affected of the Russian Federation. Its forest cover is 1.2 million ha equalling more than 30% of its total land area.

In the most contaminated Regions of the Ukraine, Belarus and the Russian Federation (the Kiev, Zhitomir, Rovmo, Gomel, Mogilev and Bryansk Regions), the prevailing forests are young and middle-aged pine and pine-hardwood stands with high fire danger classes; there are also large areas of drained peatlands covered by forests. In future the degree of forest fire danger is expected to grow due to the accumulating debris, litter and standing dead trees because these forests are not going to be thinned.

During the pre-disaster years 1981-85 the annual number of forest fires in the Regions of these Republics varied from 809 to 3442, covering an area from 165 to 4456 ha. In the year of the disaster a total of 1775 fires burned 2336 ha of forests. In 1987, 803 fires burned on an area of 614 ha. In 1992 the first severe wildfires burned in May. On 1 to 4 May 1992, in the Gomel Region of Belarus, a fire destroyed several dozen hectares of forests and two evacuated villages. On 3 May 1992 the fire spread over to the territory of the Ukraine and penetrated into the 30-km zone of the Chernobyl Power Plant. According to the reports of 9 May 1992, the fire had affected 500 ha, thereof 270 ha of forests. Within the 30-km zone the level of radioactive caesium in aerosols increased 10 times. In the Bryansk Region, 135 forest fires on 93 ha of forest land was recorded by 12 May 1992.

Fires in radioactively contaminated forests turn into a very grave problem. The research required for forest fire prevention and control on areas contaminated by radionuclides, as well as the development of systems to monitor forest fires in these areas, are the responsibility of the All-Russian Research Institute of Chemistry in Forestry.

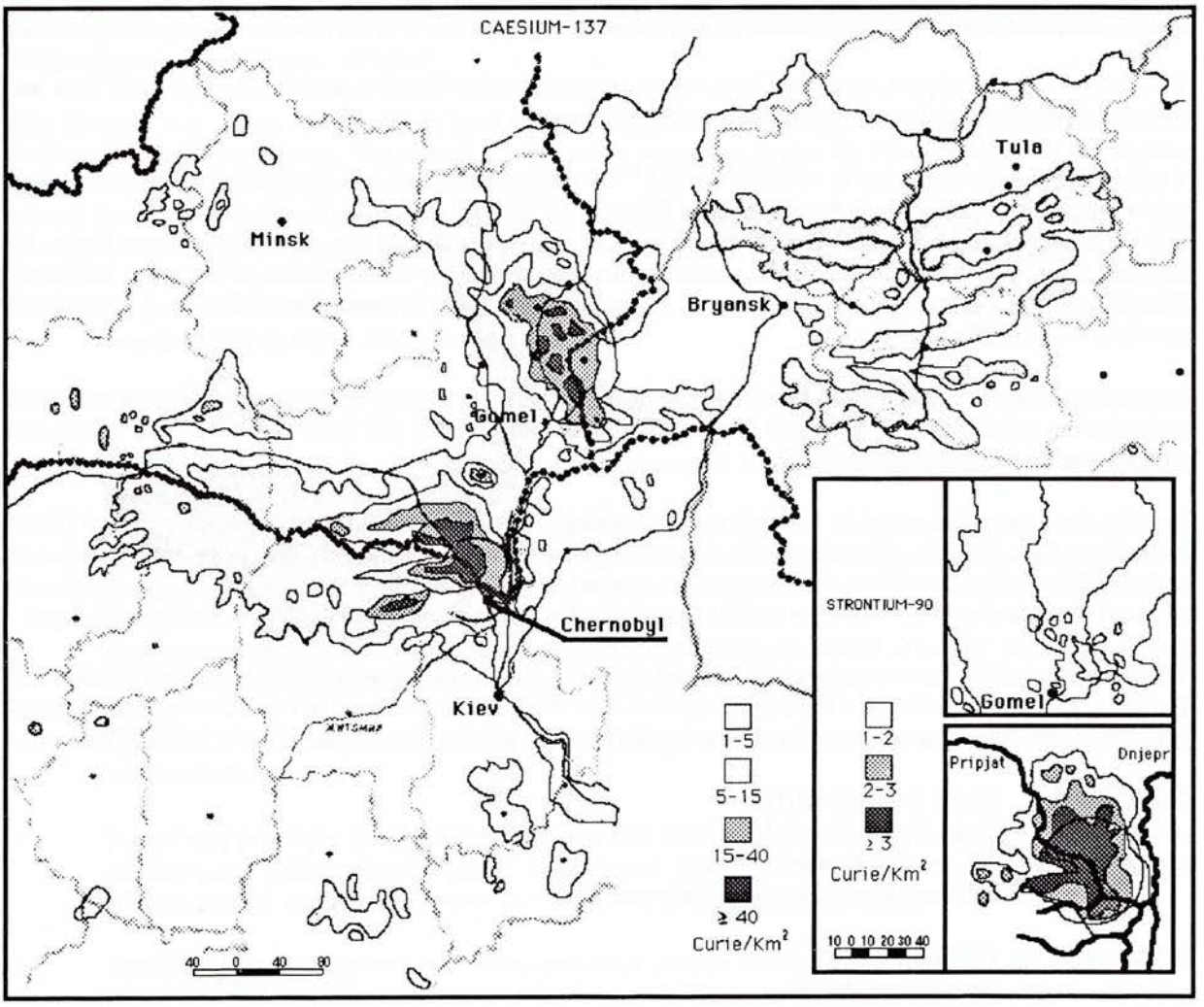


Fig.1. Contamination of the land area in the vicinity of the Chernobyl nuclear power plant by caesium and strontium radionuclides in 1990 (1 Curie = Bequerel).

This institute is subordinate to the Forest Committee of the R.F. Ministry of Ecology and Natural Resources. The institute studies the nature of forest fires and their consequences under radioactive contamination, focusing on the following factors:

* assessment of forest fuels in different parts of the biogeocenoses contaminated by radionuclides;
* specific and general radioactivity of the major forest fuel types under different degrees of soil contamination;
* specific radioactivity of the combustion products, i.e. ash, partly burned organic matter and aerosols;
* characterization of smoke emissions from different types of forest fires;
* radioactive characteristics of forest fire smoke plumes;

The institute also works on models of heat and mass transfer of radioactive particles during forest fires and defines characteristics of working conditions of fire fighters.

The research results show that in 1990 the bulk of ^{137}Cs radionuclides was concentrated in the forest litter and upper mineral layer of the soil. In the Bryansk Region, the litter of coniferous forests, that of mixed forests, tree cover and bush-grass cover accounted for 72, 43, 8 and 14 per cent of the radionuclides respectively. By the year 1992, vertical migration of radionuclides caused an increasing contamination of the upper soil layer. Therefore at present a serious danger is posed by surface fires (fires in contaminated litter and humus) and ground fires in contaminated peat.

Incomplete combustion causes additional open sources of ionizing radiation: in the zones where the density of radiocaesium contamination of the soil is 0.6-1.5 TBq/km^2 and higher, the specific radioactivity of ash and partly burned litter is 180-1086 kBk/kg).

Another great danger is posed by high-intensity (crowning) fires which develop convective activity and lifting of radionuclides into the atmosphere. To obtain correct quantitative characteristics of the redistribution of radionuclides during forest fires, it is necessary to conduct laboratory and field experiments. These experiments are needed to develop fire behaviour models, especially for heat and mass transfer in the near-ground layer.

The contaminated forest environment has not only affected the working conditions of forest fire fighters and the heavy contamination of fire fighting equipment. The studies of forest fires in radioactively contaminated lands are facing significant technical and financial difficulties, affecting both schedules and scales of research.

From: Sergei I. Dusha-Gudym
Head, Forest Fire Laboratory
All-Russian Research Institute
of Forest Chemistry (VNIIKhleskhoz)

Address: VNIIKhleskhoz
Zavodskaya Str.10
141250 Ivanteevka, Moscow Region
RUSSIAN FEDERATION

International Boreal Forest Research Association, Stand Replacement Fire Working Group

The ***International Boreal Forest Research Association*** established a new working group on stand replacement ecology with an emphasis on fire in ecosystems at an Association meeting in Krasnoyarsk Russia on 18-22 May 1992. The working group will foster cooperative research on stand replacement ecoloy with the goal of better understanding boreal ecosystems and assuring sustainable development and exploitation of resources in the taiga. The International Boreal Forest Research Association is composed of forestry research organizations in the United States, Canada, Russian Federation, Norway, Sweden and Finland.

Two documents were developed and signed at this meeting. The first, known as the Protocol, establishes the long term frame of reference for the working group and details eight hypotheses that will guide cooperative research among the participants. The eight hypotheses are related to quantitatively understanding boreal ecosystems, the role of fire in boreal ecosystems, and modeling and predicting boreal forest dynamics. The Protocol will be implemented through mutually agreed annual work plans. A work plan for 1992-1993 was developed and signed in Krasnoyarsk.

Two additional items were agreed upon outside the scope of the Protocol. A fire study tour of the United States and Canada for a small group of Russian scientists will be held during the period. The Stand Replacement Fire Working Group will also co-sponsor a conference entitled "Fire in Ecosystems of Northern Eurasia" to be held in Krasnoyarsk in the summer of 1993.[1]

The Protocol was signed by Dr. Brian Stocks for Canada, Dr. Eric Valendik for Russia, and Dr. Michael Fosberg for the United States. The annual workplan was signed by Stocks for Canada, Valendik for Russia, and Dr. Lewis Ohmann for the United States.

The eight hypotheses specified in the Protocol are:

1. Large forest fire behavior can be quantitatively related to weather conditions and forest fuel types in boreal forests of North America and Siberia.

2. Spatial and temporal cycles of large fires in boreal forests of Siberia and North America are similar.

3. The influence of stand replacement fires on structure and function of Siberian and North American boreal forests are similar.

4. Ecosystem processes, such as nutrient cycling, soil respiration, and carbon accretion quickly recover to pre-fire rates in fire cycled boreal forests.

5. Ecosystem responses (nutrient cycling, species composition, biological diversity, vegetative cover, etc.) following stand replacement fire is unchanged by salvage logging.

6. Many small fire events will substitute for single large fire events in terms of species and ecosystem response effects.

7. Predict and develop a strategy for an enlarged role for fire management in response to increased fire activity under global climate change, including an increased opportunity to use prescribed fire to advance natural ecosystem response to mitigate the effects of climate change.

8. Models for forest resources and forest protection can be constructed and applied for conditions in North America and Siberia.

The annual work plan for 1992-1993 contains 7 tasks. Five tasks were agreed upon for hypothesis 1. These include an exchange of data to evaluate seasonal patterns of fire danger and the behavior of large fires, an intercomparison of fire danger rating systems, and an experimental program of fire behavior.

Under hypothesis 3, it was agreed to conduct a field study of post fire recovery in the United States with both Russian and American scientists. Also, the United States and Canada will pursue obtaining a satellite downlink (NOAA AVHRR) image analysis system in Krasnoyarsk for monitoring and understanding forest fires from a global perspective. Resulting data will be shared and available to the scientific community.

---

[1] This conference will be organized jointly by the Max Planck Institute of Chemistry, Fire Ecology Research Group (Germany) and the Russian Academy of Sciences, Krasnoyarsk Forest Fire Laboratory.

The International Boreal Forest Research Association was first proposed at a meeting of the International Panalon Boreal Forests in Arkhangelsk, Russia. In June 1991, an organizational meeting was held in the Ukraine between the United States, Canada, and Russia. Member countries are represented by coordinators for priority research areas. Two priority areas were identified at this organizational meeting: Inventory and Monitoring, including classification; and Global Climate Change and Ecosystem Function. Dr. Eldon Ross of the U.S. Forest Service was named Association Coordinator, Dr. Anatoly Shvidenko of Russia was named Coordinator for inventory, monitoring and classification, and Dr. Glen MacDonald of McMaster University, Canada was named Coordinator for global change and ecosystem function. Each member country provides Deputy Country Coordinators to the 2 priority research areas. Recently, Norway, Sweden and Finland have joined the Association. A working party on forest inventory was established at the June 1991 meeting. The Stand Replacement Fire Working Group is the first Working Group established by the Association.

From: Michael Fosberg

Address: USDA Forest Service
Forest Fire and Atmospheric Sciences Research
P.O.Box 96090
USA-Washington, D.C. 20250

Fire Statistics from Krasnoyarsk Region - The Center of Future International Fire Research and Development in Boreal Eurasia

In addition to the general statistical information on forest fires in the Russian Federation, which was published in the last issue of International Forest Fire News, some more detailed data are given for the Krasnoyarsk Region. For the Russian fire managers and fire researchers Krasnoyarsk is one of the most important locations in Siberia. The presence of the Forest Fire Laboratory of the Russian Academy of Science, Siberian Branch, and the Institute for Forest Protection and Forestry Mechanization, is one of the reasons why next year's research activities will focus on that Region. The other reason why Krasnoyarsk was selected is the presence of the Aerial Fire Base of Kranoyarsk Region, which belongs to *Avialesookhrana*. All three institutions are located on one site in *Akademgorodok*, the Research Compound of the city.

The editor of IFFN several times met and interviewed Mr.Nikolaij Kovalev, the Chief of the Aerial Fire Base. Mr.Kovalev has expressed his willingness to support the international fire research and development activities which have been developing successively since 1991. He is strongly backed by Avialesookhrana headquarters in Pushkino (Moscow Region). Mr.Kovalev made available selected statistical data which reveal the importance and magnitude of wildfires in that region.

The Krasnoyarsk Region covers a total land area of 240 million km^2, with a population of 3.5 million. The Aerial Fire Base is responsible for protecting forest lands (National Forests, Forest Enterprises) and deer pastures, on ca. 85 million ha (Fig.1 and 2); the Fire Base is also responsible for fire protection on the territories of Tuva and Kha'kasia. On the average the Fire Base employs more than 80 airplanes (fixed-wing and helicopters) and 37 fire crews with more than 800 airborne fire fighters (smokejumpers and helirappellers; cf. last issue of IFFN). This means that each fire crew has to protect ca. 2 million ha.

Figure 3 shows that most fires are caused by humans. The share of lightning fires, however, is higher than in other regions of the world. The number of fires and the land area affected by fires are given in Figure 4. It must be remembered, however, that these numbers are refering to the land under fire protection only. This means that the fires burning in the unprotected *taiga* and *tundra* regions are statistically not represented. Figure 6 shows that the period of highest wildfire activity may vary from year to year. Finally some information on fire fighter accidents are given in Figure 7. These data reflect a high training standard of the Russian smokejumpers.

The upcoming fire research activities in Siberia are aiming, among other things, to improve operational systems of fire intelligence for the whole of the Siberian taiga and tundra. These systems will be based primarily on the use of NOAA AVHRR satellite information which will be added to the existing Russian *sputnik* sensors.

From: Johann G.Goldammer

Address: Fire Ecology Research Group
of the Max Planck Institute of Chemistry
Biogeochemistry Department
c/o University of Freiburg
Bertoldstr.17
D-W-7800 Freiburg

Fig.1 : Map of the Krasnoyarsk Region. Shaded areas are under fire protection.

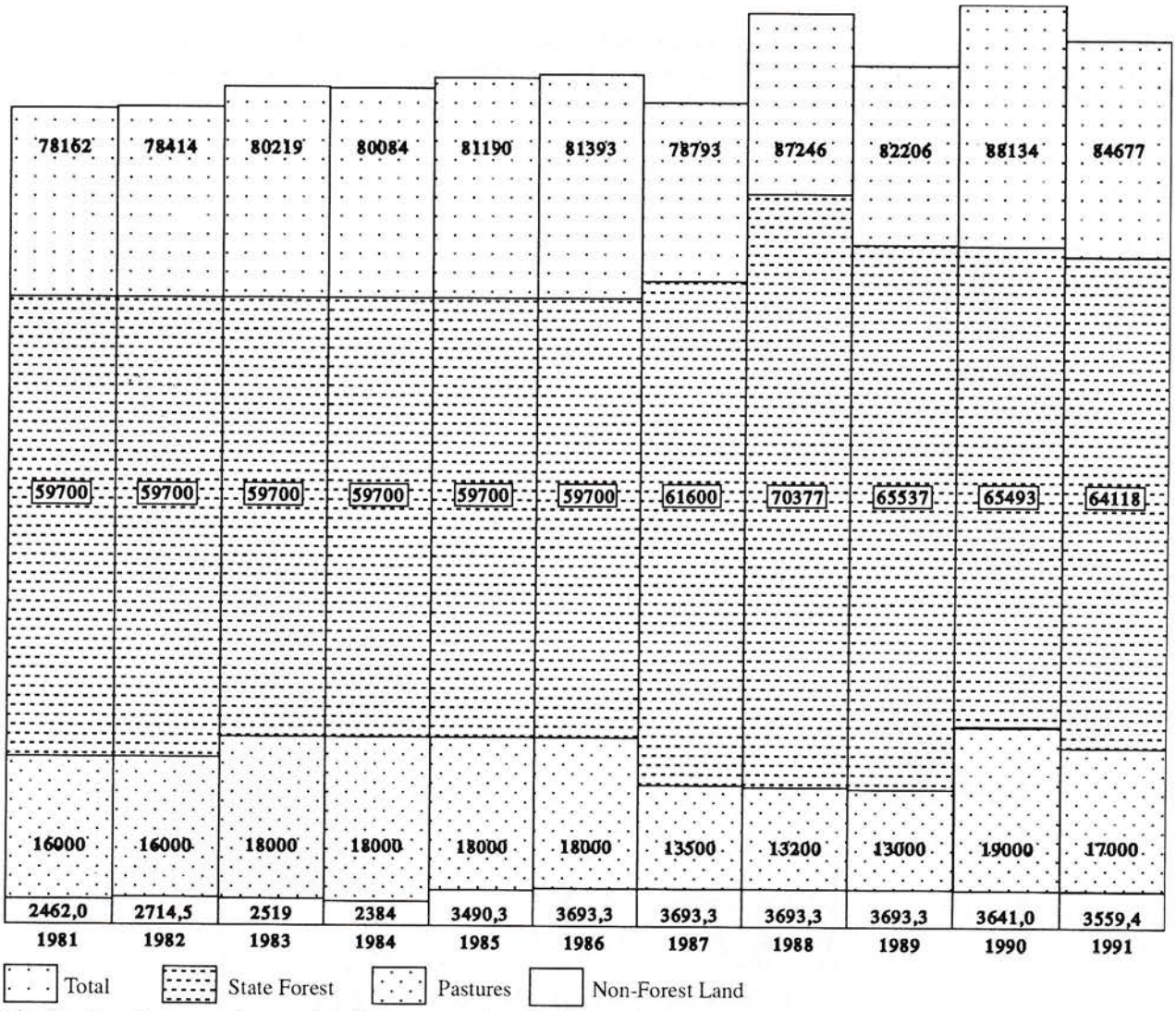


Fig.2 : Territory under aerial fire protection (millions ha)

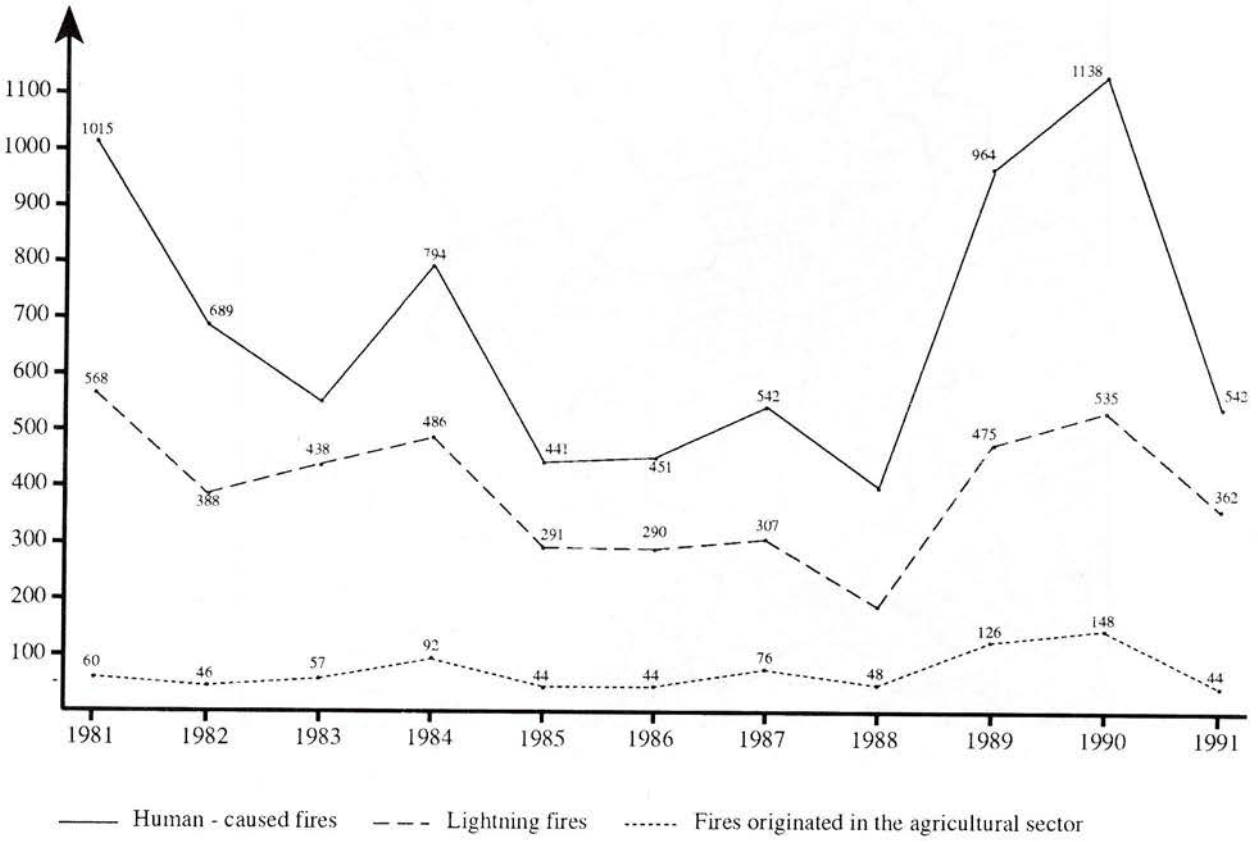


Fig.3 : Causes of forest fires in the Krasnoyarsk Region (1981-1991)

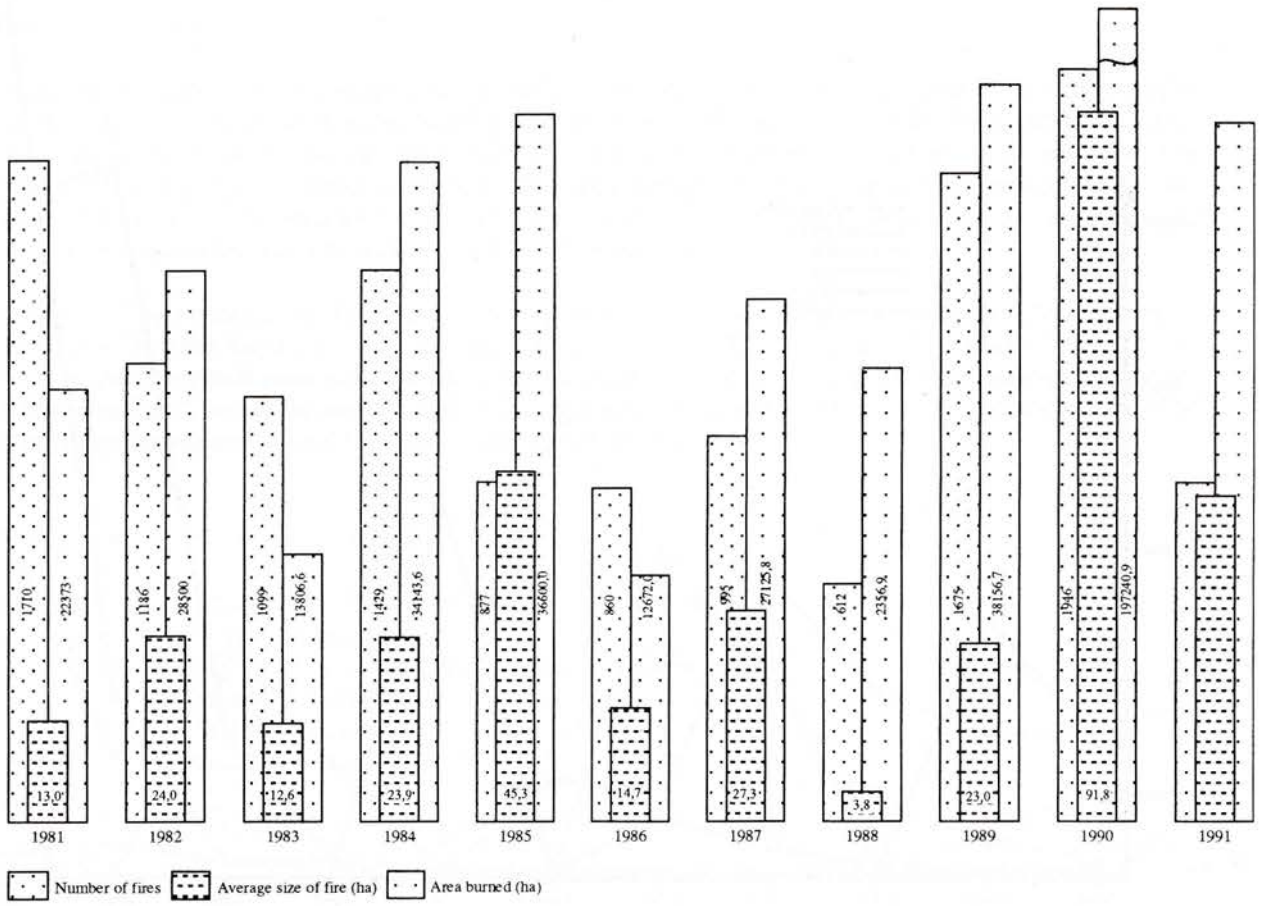


Fig.4 : Number of fires and area burned in the Krasnoyarsk Region (1981-1991)

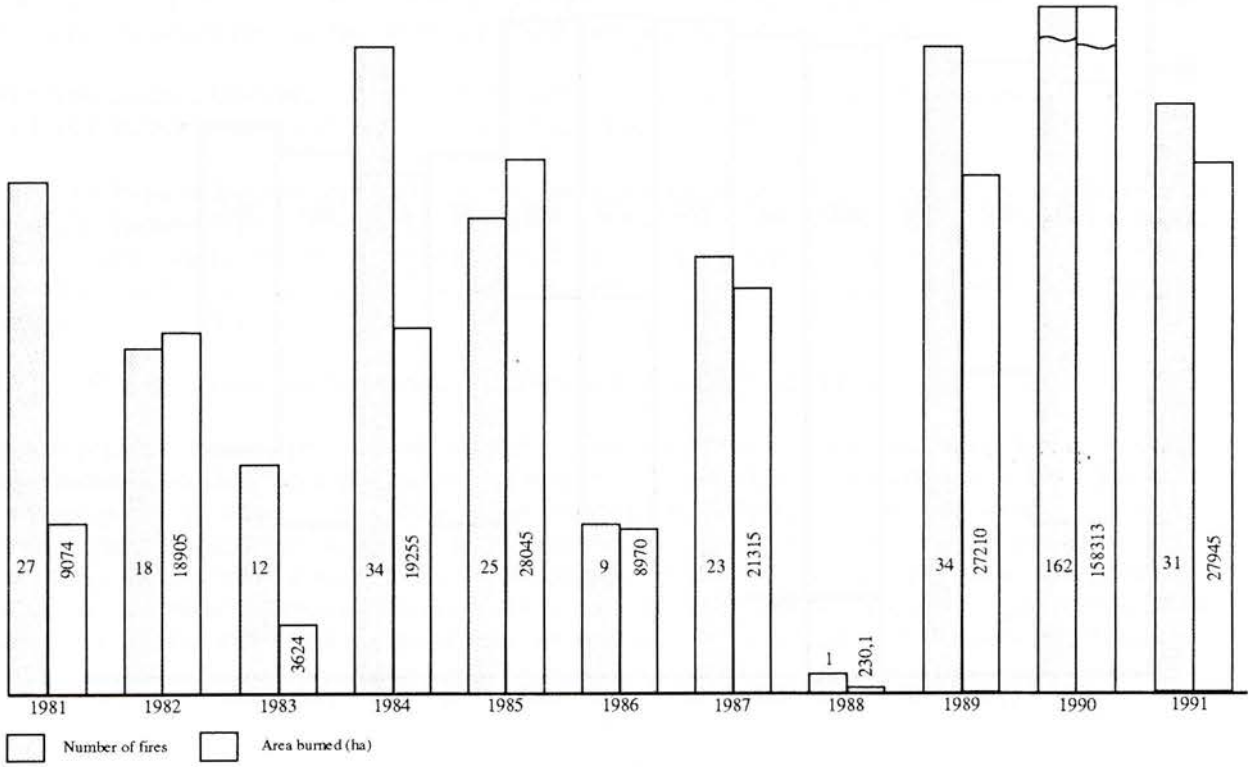


Fig.5 : Number and total size of large fires (= fires ≥ 200 ha)

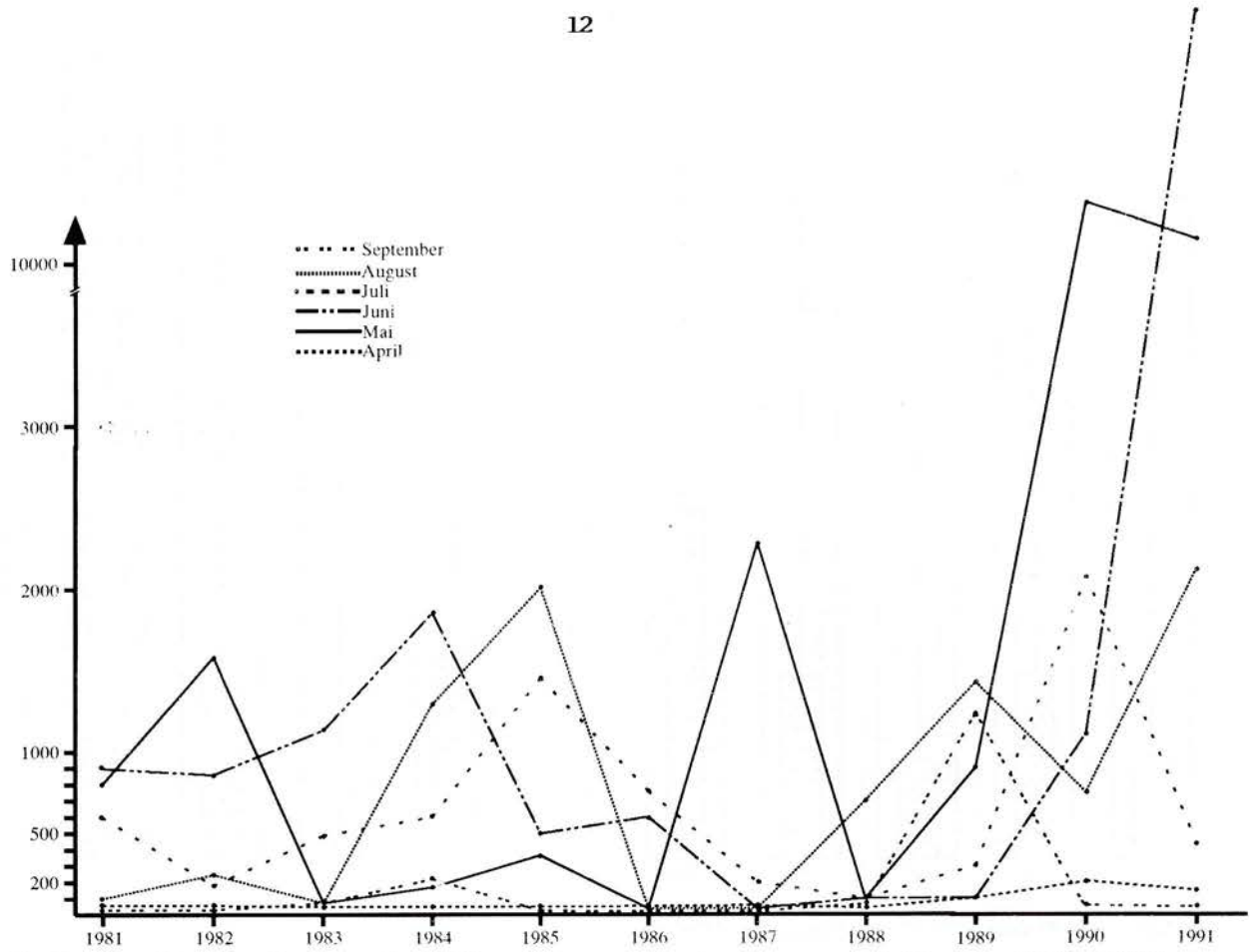


Fig.6 : Monthly distribution of wildfire occurrence in the Krasnoyarsk Region (1981-1991)

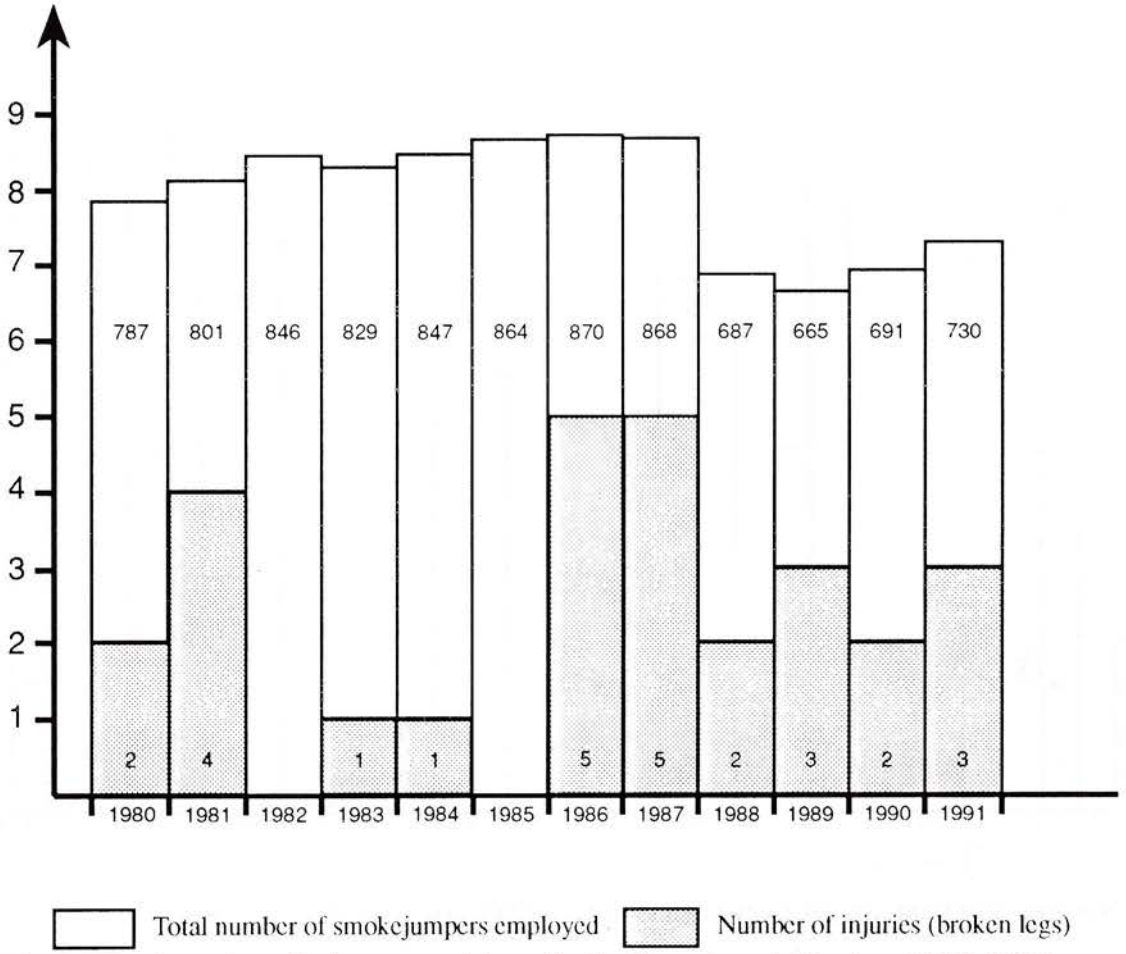


Fig.7 : Number of smokejumper accidents in the Krasnoyarsk Region (1981-1991)

Forest Ecology Research

In the last 20 years a stationary experimental study of the nature and ecological consequences of fires in pine forests (*Pinus silvestris*) of Western Siberia (southern part of the boreal zone) has been conducted at the Thelazia Station of the Institute of Forest, Ural Division of the USSR Academy of Sciences (as a part of the MAB UNESCO program, Project 2, No.653). The influence of wildfires and prescribed burning on the main factors of environment, structure of stands, reproduction, natural regeneration and dynamics of pine cenopopulations and ecosystems on the whole has been studied.

Results of these investigations have been published partly in the book by S.N. Sannikov and N.S. Sannikova "Ecology of Natural Regeneration of Pine under Forest Canopy" (Moscow, Nauka Publishers, 1985). In 1992 the same publisher will issue S.N. Sannikov's monograph "Ecology and Geography of Natural Regeneration of Common Pine", where the author develops the hypotheses of "a pulsed pyrogenic regeneration and stability" of pine populations and "impulsive" microevolution of all species.

From: Stanislav N. Sannikov

Address: Laboratory of Population Biology of Tree Plants
Institute of Forest
Ural Division of the USSR Academy of sciences
Bilimbaevskaya St. 32-a
620134 Ekaterinburg
RUSSIAN FEDERATION

VIET NAM

A Fire Problem Analysis

In February 1992 the author of this report evaluated the overall wildland fire situation in Viet Nam. He was accompanied by Dr.Ba Cuong Nguyen from the Centre des Faibles Radioactivités (Gif-sur-Yvette, France). The investigations were considered as a preparatory activity of the proposed international research campaign **SEAFIRE (South East Asia FIRe Experiment)**, which will be operational in the mid 1990's (for further organizational remarks: see "News from Fire Research"). The planned research campaign will focus on the emissions and atmospheric impacts of wildland fires and other plant biomass burning.

Viet Nam covers a total land area of ca. 33 million ha, of which ca. 9.3 million ha are classified as forested lands (8.6 million ha natural forests, ca. 700,000 ha forest plantations).

The main burning foci and fire problem areas were defined as follows: (1) regularly occurring fires in seasonally flammable deciduous forests, (2) wildfires in pine forest ecosystems, (3) wildfires in other natural and degraded vegetation, (4) the shifting agriculture and deforestation complex, and (5) use of fire in intensively treated agricultural lands. The peak of burning activities in Viet Nam is during the mid to late dry season (January to April).

1. Regularly occuring fires in the deciduous and semi-deciduous forests

Due to seasonal climate large tracts of Viet Nam's forests are characterized by deciduous or semi-deciduous tree species. Both the regular dry seasons and the seasonal availability of the shed leaves make these forests very fire prone. In many of the deciduous dipterocarp forests wildfires occur almost annually, e.g. in the Central Plateau areas near the border to Kampuchea. The dominating dipterocarps, e.g. *Dipterocarpus intricatus*, resprout after fires. Like in the neighbouring countries, e.g. in Kampuchea, Lao, Thailand, Myanmar, and India, the seasonal forests (or "monsoon" forests) are quite adapted to the regular occurence of fire. Fire exclusion would lead to a progressive development toward less fire-adapted broadleaved forests.

2. Wildfires in the pine forest lands

Indigenous pine forests are occurring in submontane and montane elevations throughout Viet Nam. The main species involved are *Pinus merkusii* and *Pinus massoniana* (in the lower elevations up to ca. 1000 m a.s.l) and *Pinus kesiya* (above 600 m a.s.l.). These forests are occuring on an area of ca. 135,000 ha and are highly endangered by overcutting due to including illegal logging, expanding shifting agriculture, grazing practices, and increasing demands for fuelwood and charcoal production. All these activities are closely linked with the use of fire and the threat of escaping wildfires.

One of the areas with the highest wildfire risk in in the Da Lat area (Lam Dong Province, northeast of Ho Chi Minh City). This mountain region is mainly populated by the Kinh, but also frequently visited by tourists from throughout the country because of the cool mountain climate and the beauty of the landscape. Both the local inhabitants and the tourists bring an increasing fire pressure to the ca. 42,000 ha of protected pine forest land. The FAO-supported project "Forest Fire and Insect Pest Management" (VIE/86/028) recently compiled the fire statistics of the period 1977-1989 (Tab.1).

Many of the pine forests are considered as fire climax communities, meaning that at certain stages of forest development (e.g. mature, open stands) the trees are not severely affected by the frequent surface fires. The understorey of pine regeneration as well as the hardwoods (dipterocarps) are killed by these fires, thus resulting in an overall loss of young age classes and species diversity. Too frequent burning in general has led to severe erosion and surface runoff.This problem has been observed throughout the pine belt of the mountain zone.

Tab.1. Fire statistics of a 42,000 ha pine forest district in Da Lat area, Lam Dong Province, Viet Nam (1977-1989)

Year	Total Number of Forest Fires	Area of Forest Land Burned (ha)	
		Planted Forests	Total Area
1977	185	178	1,181
1978	82	36	164
1979	56	68	296
1980	83	13	1,797
1981	102	34	2,809
1982	72	38	1,296
1983	193	38	1,093
1984	52	32	828
1985	51	31	1,001
1986	107	101	1,953
1987	59	68	452
1988	77	117	404
1989	47	60	277
Total	1,166	754	13,551

3. Wildfires in other natural and degraded vegetation

Much of the lowlands and the high plateau of Viet Nam formerly covered by seasonal or evergreen broadleaved forests is now degraded toward a shrub-tree-grass savanna. This vegetation is utilized extensively. Wildfires are occurring on a frequent base. The fires are not set for specific purposes. They are occurring largely as a result of carelessness or intentional setting without any land-treatment purpose.

The amount of former dipterocarp forest lands now degraded to a fire-climax savanna is not known exactly. It must be assumed, however, that several hundred thousands of hectares are to be classified in that category.

Other vegetation types frequently affected by fire are found in the Mekong Delta region. The economically very valuable *Melaleuca leucadendron* forests, which cover ca. 34,000 ha (of which 19,400 ha in Minh Hai Province), are very fire prone. Many of the wildfires are caused by honey collectors, other fires are intentionally set in order to get permission for salvage logging. During the extended pan-Pacific drought of 1982 wildfires affected more than 20,000 ha of Melaleuca forests in the Southwest of the country.

Other fire-prone vegetation types are the result of the second Indochina war. During the war approximately 12% of South Viet Nam's forest cover was sprayed and damaged by herbicides, other forest areas were damaged by explosives, mechanical land clearing and burning operations. Formerly closed evergreen inland forests degraded to grasslands dominated by extremely flammable grasses, e.g *Imperata cylindrica* and the exotic invader *Pennisetum polystachyon*. Fires are occuring almost annually and prevent the rehabilitation of these war-damaged forests.

4. Fire in shifting agriculture and deforestation

Fire is a traditional land clearing tool in shifting agriculture and permanent deforestation. At present the forest conversion rate is estimated to be ca. 15,000 ha per year (e.g., in 1982 the maximum forest conversion activities were 70,000 ha).

Fig.1. Forest fire prevention poster developed for public education in Viet Nam

5. Other agricultural burnings: rice straw fires

More than 5.5 million ha of rice fields are regularly treated by fire (rice straw burning). Most of the rice straw is burned by smoldering fires. Preliminary analyses of the smoke show high concentrations of carbonyl sulfide emitted by the smoldering rice straw fires. Smoke and "smog" created by these emissions significantly affect local and regional air quality.

The general conditions of fire occurrence and fire impacts in Viet Nam is quite similar to the neighbouring countries in continental and insular Southeast Asia. It is hoped that international cooperation in fire research and assistance in fire management will enable the country to cope with the manifold fire problems in rural Viet Nam.

From: Johann G. Goldammer (address on page 9)

ZIMBABWE

Fire Awareness in Zimbabwe

The main timber growing area of Zimbabwe is Manicaland, the moist easterly province of the country. Annual rainall between ca. 900 and 1800 mm allows the growth and management of softwoods on more than 100,000 ha. The rotation period is ca. 25 years. The mountainous area is of great landscape beauty and very attractive for recreation.

For the past eight years daily forecast of burning conditions during the dry season (from March/April to October/November) have been issued by the Meteorological Department and broadcasted by the Zimbabwe Broadcast Corporation.

Up to 1990 the fire danger estimates were issued only for the North and the South of Manicaland Province (eastern highlands). In 1991 this service was extended to cover the main centres of Zimbabwe, Harare, Bulawayo, Mutare and Gweru. This is the latest step to promote fire awareness all over Zimbabwe.

The Fire Danger Estimate (FDE) is an objective assessment of burning conditions based on the weather history and the expected weather conditions. It is therefore applied equally to forested lands, open savannas and grasslands, and the transition types between forest and savanna. The main local variables are particularities in fuel type and loads, topography and local weather conditions.

The fire danger estimates are based on three variables of weather, ambient temperature, relative humidity and windspeed. These components, plus a factor for the number of days since the last rainfall, are computed in a model which was developed in Chimanimani in 1964 on the base of other models. This system has been refined in recent years.

The fire danger index is expressed in "points" (also indicated in a colour code). Prescribed burning, for instance, may be undertaken under conditions up to 39 points (Green). Greater care must be given under conditions between 39 and 59 points (Orange), and burning is not permitted at all if the FDE is above 60 points (Red).

We find that by using this system we have a common understanding of what to expect and what is required for the state of readiness of fire fighting. It also gives us a final check when assessing conditions prior to a programmed (prescribed) burn. This is of special importance because our records show that more than 60% of all wildfires are started in the wake of prescribed fires in savannas and forests. We have also found that the FDE is useful for obtaining an increase of public fire awareness. It has contributed significantly to a reduction of the number of wildfires.

The writer would welcome comments from those individuals or countries who operate similar systems. In particular he would appreciate details of current methods of harnessing meteorological forecast data in the prevention and control of wildland fires.

From: Frank Elias
Chairman, Chimanimani Fire
Protection Committee

Address: P.O.Box 19
Chimanimani
ZIMBABWE

LONG-TERM FIRE STATISTICS UPDATE: CANADA AND GERMANY

Updated long-term fire statistics were received from Austria, Canada, Germany and the United States of America. The statistics from Austria and excerpts from the U.S. statistics will be published in the next volume of IFFN.

Canada

The 1991 forest fire report of Canada, issued by the Canadian Interagency Forest Fire Centre (CIFFC), shows that Canada experienced an average fire year with 10,343 fires on 1.6 million hectares (Tab.1). The 1991 statistics show once again that fires in the Observation Zone (definition: see Tab. 1) account for only 5% (506) of the total fire starts, yet account for 60% of the total burned area (958,899 ha). The fire statistics of Canada for the last ten years are compiled in Tables 2 and 3.

From: Tom Johnston
Operations Manager
Canadian Interagence Forest Fire Centre

Address: 210-301 Weston Street
CDN-Winnipeg, Manitoba R3E 3H4

Germany

This is the first time the German Federal Ministry of Food, Agriculture and Forestry has published forest fire statistics for the unified territory of Germany. Until the unification in 1990 the Federal Republic of Germany and the German Democratic Republic kept separate fire records (see IFFN No.2, December 1989). This explains the sudden increase in the total number of fires and forested area affected by fires by 84% and 91% respectively (Tab.4).

From: Federal Ministry of Food,
Agriculture and Forestry

Address: P.O.Box 14 02 70
D-W-5300 Bonn 1

Tab.1. The 1991 forest fire statistics of Canada

	Fire Action Zone [1]		Fire Observation Zone [2]		Total	
	no	ha	no	ha	no	ha
British Columbia	2,037	29,396	-	-	2,037	29,396
Yukon Territory	140	79,426	47	49,944	187	129,370
Alberta	921	6,130	-	-	192	6,130
Northwest Territories	240	3,580	91	221,744	331	225,324
Saskatchewan	672	57,308	90	182,064	762	239,372
Manitoba	611	21,698	64	121,280	675	142,978
Ontario	2,441	20,408	119	298,475	2,560	318,883
Quebec	1,150	379,861	61	58,438	1,211	438,299
Newfoundland	135	38,853	31	26,521	166	65,374
New Brunswick	656	3,335	-	-	656	3,335
Nova Scotia	733	1,775	-	-	733	1,775
Prince Edward Island	48	120	-	-	48	120
Parks Canada (Federal Parks)	53	791	3	433	56	1224
Total	9,837	642,681	506	958,899	10,343	1,601,580

[1] Areas in which fires are actively fought until out

[2] Areas in which fires may be allowed to burn unchecked but could be fought if they threaten areas of higher value

Tab.2. Total area affected by wildfires in Canada between 1981 and 1991. The ten-year average is for the 1981-1990 period. Source: Canadian Interagency Forest Fire Centre.

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	average	1991
British Columbia	106,568	348,695	67,363	19,908	234,647	17,261	36,177	11,462	22,386	72,504	93,697.1	29,396
Yukon Territory	35,158	254,891	43,006	19,895	15,131	90,568	88,326	6,310	328,910	169,601	105,179.6	129,370
Alberta	1,305,165	675,674	2,823	80,731	12,840	2,280	36,248	14,051	6,754	31,097	216,766.3	6,130
Northwest Territories	984,932	302,150	226,841	41,074	204,745	321,710	399,076	66,080	577,584	104,616	322,880.8	225,324
Saskatchewan	1,647,972	64,587	52,172	321,235	110,128	13,159	226,497	81,110	588,880	187,349	329,308.9	239,372
Manitoba	421,000	14,777	99,153	130,189	11,823	10,342	169,520	507,782	3,281,300	19,800	466,568.6	142,978
Ontario	177,389	3,847	443,655	120,424	1,007	145,561	75,582	390,796	402,264	183,694	194,421.9	318,883
Quebec	2,480	7,970	242,222	3,081	2,679	167,551	36,836	275,620	2,109,513	83,345	293,129.7	438,299
Newfoundland	13,087	4,392	16,792	7,743	159,744	108,831	17,128	1,780	68,156	47,317	44,497.0	65,374
New Brunswick	419	6,198	1,673	512	2,593	39,103	1,199	1,975	343	6,114	6,012.9	3,335
Nova Scotia	370	617	448	594	1,077	816	564	335	462	1,068	635.1	1,775
Prince Edward Island	146	131	321	202	181	512	113	17	216	102	194.1	120
Parks Canada (Federal Parks)	680,173	9,113	5,210	14,207	5,646	2,663	140	331	835	25,041	74,335.9	1,224
Total	5,374,859	1,693,042	1,201,679	759,795	762,241	920,357	1,087,406	1,357,649	7,387,603	931,648	2,147,627.9	1,601,580

Tab.3. Total number of wildfires (lightning and man-caused) in Canada between 1981 and 1991. The ten-year average is for the 1981-1990 period. Source: Canadian Interagency Forest Fire Centre.

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	average	1991
British Columbia	2,737	2,205	1,704	3,063	3,604	2,194	3,473	1,951	3,537	3,257	2,772.5	2,037
Yukon Territory	91	204	198	168	110	217	125	115	244	154	162.6	187
Alberta	1,556	1,272	755	1,370	934	581	1,236	865	795	1,296	1,066.0	921
Northwest Territories	311	357	337	311	150	206	374	190	613	236	308.5	331
Saskatchewan	965	596	437	895	520	493	970	1,064	1,020	897	785.7	762
Manitoba	663	425	535	692	346	217	523	982	1,229	568	618.0	675
Ontario	1,656	1,396	2,244	1,240	887	1,088	1,923	3,260	2,430	1,614	1,773.8	2,560
Quebec	1,114	1,202	1,652	683	880	830	992	1,331	1,167	852	1,070.3	1,211
Newfoundland	131	165	168	101	310	204	287	116	192	197	187.1	166
New Brunswick	275	279	252	393	851	588	653	437	392	377	449.7	656
Nova Scotia	449	491	332	451	583	508	590	328	425	496	465.3	733
Prince Edward Island	40	53	55	38	52	95	52	21	29	38	47.3	48
Parks Canada (Federal Parks)	148	104	93	161	128	90	93	73	131	128	114.9	56
Total	10,136	8,749	8,762	9,566	9,355	7,311	11,291	10,733	12,204	10,110	9,821.7	10,343

Tab.4 Forest fires in Germany from 1977 to 1991: Fire causes, number of fires, burned area and estimated damage. The fire statistics of the former German Democratic Republic are first included in 1991. Source: Bundesministerium für Ernährung, Landwirtschaft und Forsten 1992.

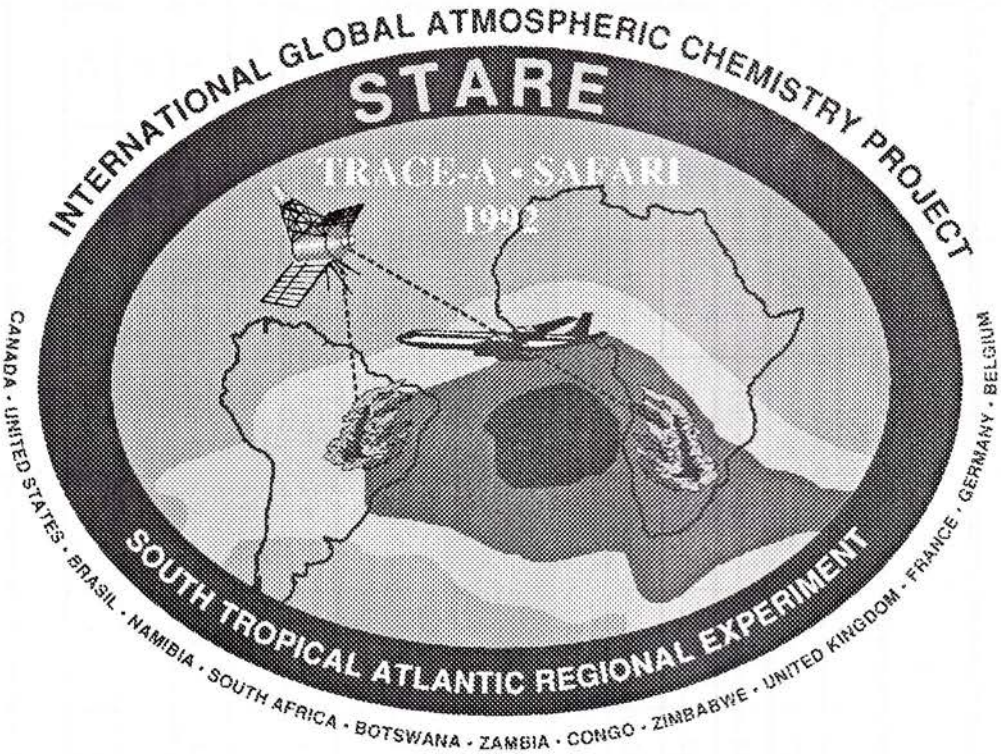
Year	Neglicence		Arson		Lightning		Other Causes		Unknown Causes		Total		Damage (estimated)	
	No.	ha	No.	ha	No.	ha	No.	ha	No.	ha	No.	ha	Mio. DM	DM/ha burned area
1977	384	151	172	80	2	0	248	215	294	167	1100	613	2.5	4078
1978	212	76	94	32	8	0	157	103	163	78	634	289	1.2	4152
1979	219	79	75	34	2	0	203	154	201	89	700	356	1.2	3371
1980	471	368	132	57	4	1	375	886	388	233	1370	1545	3.8	2450
1981	255	143	125	33	1	0	79	207	184	114	644	497	2.5	5030
1982	441	164	223	138	3	1	198	327	379	121	1244	751	3.7	4927
1983	296	150	197	92	22	1	227	256	367	293	1109	792	6.7	8460
1984	460	264	183	105	2	0	148	303	370	203	1163	875	5.1	5829
1985	163	67	146	47	2	0	72	86	139	42	522	242	1.3	5372
1986	151	48	146	36	5	1	121	152	195	56	618	293	1.4	4778
1987	168	136	99	41	2	0	105	96	110	46	484	319	1.6	5016
1988	164	48	143	21	6	0	104	86	142	127	559	282	1.4	4965
1989	192	39	237	64	12	1	135	117	230	60	806	281	1.8	6406
1990	311	131	225	86	28	6	152	146	285	113	1001	481	10.5	21830
1991	395	245	460	127	11	4	333	309	647	236	1846	920	3.3	3587
Changes from 1990 to 1991 (%):														
	+27	+87	+104	+48	-61	-33	+119	+112	+127	+109	+84	+91	-69	-84

NEWS FROM FIRE RESEARCH

Southern Tropical Atlantic Regional Experiment (STARE): First Intercontinental Fire Experiment Underway

The observation of highly elevated levels of tropospheric ozone (O_3) in some tropical regions, particularly over the southern tropical Atlantic Ocean between South America and Africa, led to the hypothesis that biomass burning emissions and subsequent photochemical processes may play an important role in atmospheric chemistry over a large region of the Earth. This was supported by spaceborne observations which showed the observed ozone enrichment to coincide geographically with regions of elevated carbon monoxide (CO) concentrations.

The **Southern Tropical Atlantic Regional Experiment (STARE)** was designed to investigate the chemical characteristics of the ozone-enriched airmasses over the southern tropical Atlantic and to study the sources of the trace gas emissions. Fires related to deforestation in South America, especially Brazil, and savanna fires in South America and Africa were identified as the most likely sources. Consequently, STARE is aimed at characterizing the emissions from plant biomass burning in the source regions on either side of the Atlantic, the transport of the air masses from these source regions to the atmosphere over the Atlantic, and the chemical transformations occurring in the air masses.



The development of STARE took place under the overall umbrella of the **International Geosphere-Biosphere Program (IGBP)** which was designed by the worldwide scientific community under the sponsorship of the **International Council of Scientific Unions (ICSU)**. One of the first IGBP core projects was the **International Global Atmospheric Chemistry (IGAC)** project, which defined several priority areas of research in atmospheric chemistry and its interaction with the biosphere. Tropical atmospheric chemistry and the role of wildland fires and other biomass burning was identified as one of these priority areas, and a steering committee was set up to guide the development of an international **Biomass Burning Experiment (BIBEX)**. This committee recognized the ongoing initiative to develop the STARE project, and adopted it as an activity formally accepted as part of IGBP-IGAC.

The scientific structure of the experiment is given in Figure 1. It shows that the activities of STARE in 1992 consist of two major components, **TRACE-A (Transport and Atmospheric Chemistry near the Equator - Atlantic**, a sub-project of the NASA **Global Troposheric Experiment**) and **SAFARI (Southern African Fire-Atmosphere Research Initiative**). TRACE-A addresses the source regions in Brazil and the long-range transport and large-scale distribution of pyrogenic pollutants over the southern tropical Atlantic (Fig.2); SAFARI investigates the emissions from savanna fires in southern Africa, their transport across the African continent, and the relationship between fires and savanna ecology. Both programmes contain remote sensing components which will determine the occurrence of fires in the two continents. In this first intercontinental fire experiment a total of 15 research institutions from 9 countries, supported by 4 additional countries, will commonly work on a single, but multi-facetted fire research project.

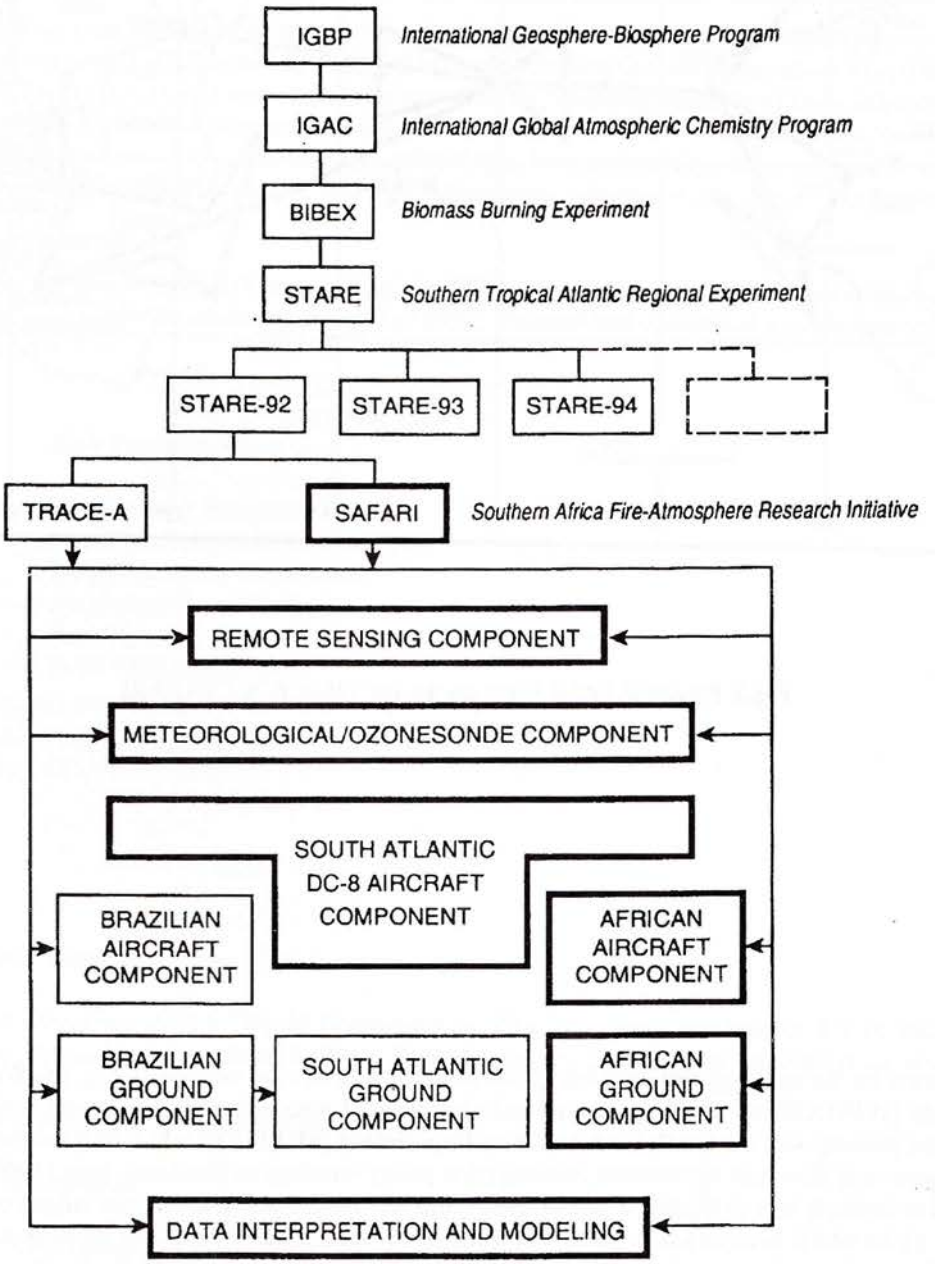


Fig.1. Scientific structure of the research programmes into which STARE and the sub-components TRACE-A and SAFARI fit. Boxes outlined with thicker lines are components contributing to SAFARI.

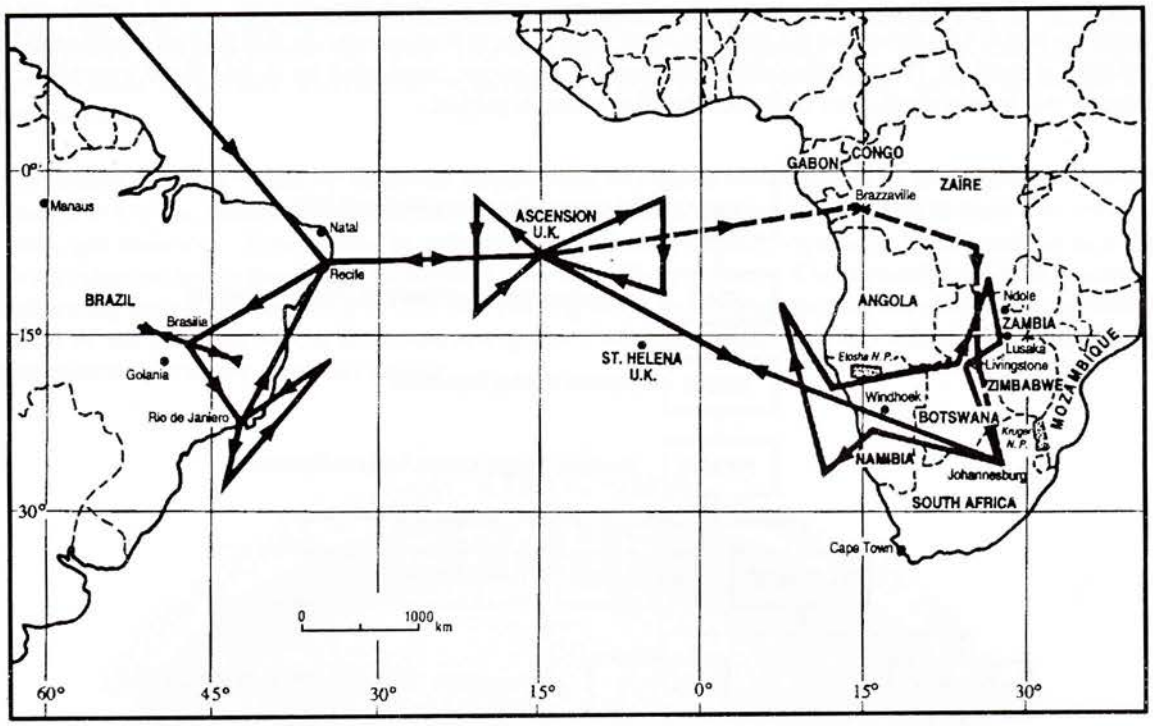


Fig.2 Proposed DC-8 flight tracks for TRACE-A / SAFARI

The preparation for the next regional research efforts in the mid-1990's are underway, e.g. the **Western Indian Ocean Study (WINDOS)** in which the fire-related phenomena between eastern Africa and the Indian Ocean (1994) will be investigated; the **South East Asia Fire Experiment (SEAFIRE)** which will focus on the impacts of forest conversion fires and agricultural burning (rice paddy burning) in Southeast Asia (1995-96); and the upcoming fire research foci in Eurasia's boreal zone (taiga and tundra ecosystems), the largest coherent forest zone of the globe which is expected to be mostly affected by vegetation changes and wildfire occurrence due to global climate change (see country notes *Russian Federation*, contribution by M.Fosberg).

From: Johann G. Goldammer (address on page 9)

MEETINGS HELD IN 1991-92

Dahlem Workshop "Fire in the Environment", Berlin, 15-20 March 1992

In March 1992 a Dahlem Workshop entitled "Fire in the Environment: The Ecological, Climatic, and Atmospheric Chemical Importance of Fire in Wildland and Rural Landscapes" was held in Berlin. The aim of the workshop was to re-evaluate the role of fire in the environment Earth, to define needs in further developing wildland fire science and fire policies.

The Dahlem Konferenz model provides a platform for interactive and multi- and interdisciplinary evaluation of science. The workshop was convened by Paul J.Crutzen and Johann G.Goldammer (both Max-Planck-Institute of Chemistry, Mainz, Germany) and extensively prepared by compiling the state of knowledge of the role and impacts of fire in the global environment. During the one-week workshop 48 scientists from various disciplines (e.g. fire ecology, paleoecology, climatology, palynology, biogeochemistry, atmospheric chemistry, remote sensing, anthropology, cultural history, and fire management elaborated on visions and definitions in fire science.

The Dahlem Workshop Report will be published by Wiley & Sons (in the Environmental Sciences Research Reports series) and will be available by the end of 1992. Detailed bibliographical information will be given in the next issue of IFFN.

From: Karl-Friedrich Weiss

Address: Fire Ecology Research Group
Max Planck Institute of Chemistry
Biogeochemistry Department
c/o University of Freiburg
Bertoldstr.17
D-W-7800 Freiburg

Aix-en-Provence Charter

From 12 to 14 December 1991 a "World Conference on Wildland Fires" was held in Aix-en-Provence. This conference was devoted to laws related to forest fires. The papers prepared for the conference dealt with

* Land occupation and construction in forest lands
* Fuel management
* Law enforcement and sanctions
* Legal base of fire fighting
* Rehabilitation of fire-damaged forests

Experts from thirteen countries, who participated at this conference (from Brazil, Spain, United States, France, Greece, India, Italy, Morocco, Portugal, People's Republic of China, Republic of Cameroon, U.S.S.R.) **agreed** on the following charter [2], stating that:

Whereas there is growing collective awareness of our generation's responsibility to future generations for the natural heritage of the world (Declaration of the tenth World Forest Congress held in Paris in September 1991);

whereas fires and uncontrolled bushfires are responsible for loss of life and destruction of property, affect today many countries whatever their level of economic development and whatever the extent of the national means of fire prevention and management deployed;

whereas wildland fires destroy the natural and forest environment, the resources of which are factors in socio-economic development, particularly rural development, and that these living formations assure at a local, regional and world level, certain irreplaceable ecological balances;

whereas the management of forest ecosystems and the policies of fire prevention and management must take account of new factors which multiply the risks of fires:

* in developing countries, by a growing demand for land which increases the importance of fire as a means fo forest clearance,

* in developed countries, where various economic and social factors converge to increase the risks of wildland fires (the abandonment of much farm land, the decline of migratory grazing and the crisis in certain woodland exploitations resulting in an accumulation of combustible materials, the expansion of building in woodlands, the increased human mobility in woodlands, etc.);

whereas national policies for wildland fire prevention and management are in most countries largely established through an often very elaborate reglementary and legislative arsenal, but noting that all these texts no matter how perfectly drafted, are only valid if followed up by effective enforcement and if they do not encounter major difficulties with regard to their implementation;

whereas in most countries, many fire prevention texts are not effectively applied, and whereas the public authorities in many countries do not have sufficient means to follow up the policies defined by these texts, this leads to a sentiment of resignation in face of the difficulties in executing national policies and public apathy to wildland fires;

whereas the absolute priority must be to eliminate the distortions between the legal texts and practical implemention;

and recommend:

1. Regarding Ground Occupancy and Construction Law in Forests:

a) to legally define in adequate manner the risks of forest fires in all documentation regulating urbanism and construction (land occupancy plans, planning permissions, forest clearing authorisations, swamping out obligations);

b) that impact analysis be strengthened to improve their reliability both for building operations and for land occupancy permits;

---

[2] Editor's note: Reproduced as received from the contributor.

c) to ensure a more effective protection in zones particularly sensitive to wildland fires, by the use of specific legal instruments, developed in collaboration with the various local partners and relation to the geoclimatic specificities of woodland areas;

d) to reinforce the coordination and cooperation between the various organisations from national to local administrative authorities;

2. Regarding Vegetation Management and Additional Preventive Measures:

a) that maps be plotted which define specific fire risk areas;

b) that the legislative and reglementary steps be taken to avoid uncontrolled outbreaks of fires and then to limit their spread in cases of accidents, by proceeding to selective brush management operations in concertation with local people's respresentatives or to the creation of planted fire-breaks:

- brush clearance around residential premises and constructions, on both sides of roads, such brush management being the responsibility of owners and local authorities,

- creation of organised fuelbreak systems cleared and managed on a regular basis by farmers, foresters and other users, or by the public authorities,

- installation of strategic facilities in agreement with the services responsible for fire prevention and management: fuelbreaks and firebreaks or planted firebreaks;

3. Regarding the Organization of Active Management

a) that people's participation to wildland fires management be developed;

b) that the techniques and knowledge of phenomena involved in meteorological forecasting, with particular attention to microclimate, be improved;

c) to minimize fire detection time;

d) that, as part of a global coordination, active management which integrates and optimizes all the fire fighting means be organized;

e) that, at the international level, bilateral and multilateral cooperation in research and development, and in the organisation of active management including the pooling of land and air fire fighting resources be systematically intensified;

4. Regarding Reafforestation:

a) that scientific knowledge be improved with regard to:

- the typology of forest sites index, and the potential of the different species and of the different reafforestation techniques, in relation to these sites,

- the dynamics of the natural environment after fires, especially regarding spontaneous, and occasionally assisted, forest recolonisation,

- the fire risk in relation to the characteristics of the environment and vegetation.

Such studies must be systematically undertaken on all candidate sites for reafforestion, in order to ensure:

- that the proper species and techniques are chosen,
- that the natural dynamics would not achieve comparable results at less cost,
- that the efforts will not be annihilated by poor maintenance or by a new fire;

b) that systematic reflection be organized into fires and woodland reconstitution. This reflection must be placed in the overall context of a sustainable development of the regions affected. Indeed, an effort must be made to reconcile the needs to protect the natural environment, to exploit woodland resources (firewood, timber, wood for trituration), to maintain multiple existing uses in woodland (grazing, leisure, landscape, etc.) and agricultural and urban development. In addition to these local imperatives, the concerns relating to global climatic changes and to preserving biodiversity must also be taken into account;

c) that, whenever possible, preventive forestry be undertaken to assure a structure which is favourable to the development of the forest environment and unfavourable to the propagation of fires.

The conference proceedings and the declaration are published (in French) by

Jaques Bourrinet (ed.) 1992. Le feu et la loi. Aspects juridiques des incendies de forêt dans le Monde. Editions L'Harmattan, Paris, 175 pp. (ISBN 2-7384-1500-8)

FIRE MANAGEMENT COURSE, NOVEMBER 1992

Short Course on Forest Fire Prevention in the Mediterranean Region

The Mediterranean Agronomic Institute of Chania, Greece (M.A.I.Ch.) offers a short, intensive Course on Forest Fire Prevention in the Mediterranean region in November 1992. The official language will be English. Scholarships covering all or part of the costs are available to qualified applicants. The course covers principles of fire ecolgoy, fire prevention and fire mangement, including prescribed burning, as applied to Mediterranean forests. It is addressed to foresters, biologists, and other geotechnical scientists who work on forest fire suppression. For further information please contact:

Dr. George Lyrintzis
Mediterranean Agronomic Institute of Chania
P.O.Box 85
GR-73 100 Chania

Phone: +30-821-81153
Fax: +30-821-81154

MEETINGS PLANNED FOR 1993

The editor of IFFN invites all organizers of upcoming or planned fire meetings (seminars, workshops, conferences) to announce details, e.g. call for papers, registration forms, etc., in the next issue of IFFN. The information should be on the desk of the editor by mid of November 1992. The next issue of IFFN will be published in January 1993.

RECENT PUBLICATIONS

Forest Fire Statistics, 1988-1990

The latest in the series of ECE/FAO publications of forest fire statistics was issued in May 1992. Information is given for all European countries, including for the first time the Russian Federation, as well as Canada and the United States. Long-term series (1979-1990) are presented on the number and area of forest and other wooded land burned. More detailed statistics are shown for the years 1988-1990 on area burned by type of land and ownership, causes, losses and expenditure on prevention and control.

> *UN-ECE/FAO 1992. Forest Fire Statistics 1988-1990, United Nations, New York, ECE/TIM/58, 23 p. Available free of charge from ECE/FAO Agriculture and Timber Division, Palais des Nations, CH-1211 Geneva 10 (Switzerland); fax no. +41-22-734 3345.*

"Burning Bush" - Now Available as Paperback

From the time Australia was formed tens of millions of years ago, this unusual continent has been dominated by fire. Fire shaped Australian geography, influenced Australian history, and penetrated the Australian consciousness. Indeed, when Charles Darwin arrived in Australia on the "Beagle" in 1895, he noted, "In the whole country I scarcely saw a place without the marks of fire".

Now **Stephen J. Pyne**, one of our foremost environmental historians, proposes a major reinterpretation of the Australian experience through fire in **Burning Bush: A Fire History of Australia**. Pyne asserts that fire has been a powerful environmental and cultural determinant in the shaping of Australia and uses it to examine Australia's remarkable geologic and biologic evolution as well as the interplay between man and this unique landscape.

Now Professor of American Studies at Arizona State University, Stephen Pyne first became interested in what was later to become an occupation when he took a summer job as a firefighter with the National Park Service on the North Rim of the Grand Canyon. This first summer led to nearly fifteen others, as well as seven books, including **Fire in America** and **Fire on the Rim**. Pyne continued his education and academic career during the rest of the year. Pyne's hands-on relationship with fire, combined with his unparalleled historical research, led Esquire to call him "the foremost authority in the world on a subject that is as old and as fundamental as creation itself."

In **Burning Bush**, Pyne traces fire's impact on Australia, from its initial influence on the evolving vegetation of the new continent, through its use by the Aborigines and the subsequent European sttlers, to the holocaust of 1983 known as Ash Wednesday. He explains the adaptation of Australia's unusual flora and fauna (the eucalyptus, for example) to an environment dominated by fire. He describes the Aborigines' use of fire to control the environment and to forge tools, cook food, drive game into open country during the hunt, clear paths trough the bush, and conduct the ceremonial rituals that were the backbone of their society. He chronicles the arrival of the British, their clashes with the Aborigines, their struggle to tame the Australian bush and to revise their uses of and attitudes toward fire in a strange new land. He examines Australia's post-World War II economic boom and the arrival of immigrants from all over the world, each with their own fire practices.

And always, Pyne reminds us of the omnipresent Australian bushfire and how each successive wave of people to colonize Australia dealt with this awesome phenomenon.

Burning Bush is a fascinating reexamination of the history of Australia, one which - literally illuminates this unique and vital continent. Perhaps the author himself best sums up the enormous importance of fire to Australia's past, present and future: "Fire is inextinguishably tied to (Australia's) life. Fire enhances, multiplies, stimulates, recycles and animates .... Always it is associated with life. Life made fire possible and fire, in return, dramatized Australia's life."

Stephen J.Pyne 1991. Burning Bush. A Fire History of Australia. Henry Holt and Company, New York, 520 p. ($ 15.95, ISBN 0-8050-1472-1)

New Forest Fire Publications by Giancarlo Cesti and Alberto Cerise

Giancarlo Cesti, a member of the Forest and Natural Resources Service of the Autonomous Region of Valle d'Aosta, Italy, has devoted his work to the problem of forest fires. After the publication of a comprehensive description of vegetation fires and a general and statistical analysis of fires in Valle d'Aosta

Cesti, G. 1983. Gli incendi della vegetazione in Valle d'Aosta. Breve analisi generale e statistica. Regione Autonoma Valle d'Aosta, Assessorato Agricoltura e Forest, Servizio Tutela dell'Ambiente Naturale e delle Foreste, Aosta, 125 p.

he has now published two more books on forest fires (all publications are in Italian).

"Il vento e gli incendi boschivi" is a comprehensive investigation on the influence of wind on fire behaviour. Special emphasis is given to the föhn wind which mainly affects the Valle d'Aosta Region between November and March.

Cesti, G. 1990. Il vento e gli incendi boschivi: indagine sulla ventosità invernale in Valle d'Aosta. Regione Autonoma Valle d'Aosta, Assessorato Agricoltura, Foreste e Ambiente Naturale, Servizion Selvicoltura, Difesa e Gestione del Patrimonio Forestale, Chatillon, 159 pp.

"Aspetti degli incendi boschivi" is a book jointly published with Alberto Cerise. In this monograph a complete description and analysis of forest fires in Valle d'Aosta is given, including the basics of fire behaviour. The volume is carefully prepared and provides drawings and photographs of excellent quality, thus making this scientific publication easy to read and understand:

Cesti, G. and A.Cerise 1992. Aspetti degli incendi boschivi. Musumeci Editore, Quart (AO), 295 pp. (ISBN 88-7032-388-9 [387])

ANNOUNCING: THE INTERNATIONAL ASSOCIATION OF WILDLAND FIRE

The Board of Editors of the International Journal of Wildland Fire, in cooperation with the U.S.Forest Service is pleased to announce the formation of a new international association for people concerned with issues in wildland fire.

The purpose of the International Association of Wildland Fire (IAWF) is to foster international communication among those interested in wildland fire issues, particularly through our scientific publication, the International Journal of Wildland Fire, our news publication, IAWF *HotSheet*, our bibliographic publications and library services and through the distribution of books and software.

The International Association of Wildland Fire

Members of the Association will have a voice in any positions taken on scientific, technical and political issues. Members will receive:

* Our *HotSheet* newsletter
* Special discounts on publications and software
* Free access to fire research literature, by modem
* Copies of literature for only a nominal service fee
* Free referral for networking with people with similar interests
* Voting rights for the affairs of the Association

The officers of the Association are:

Board of Directors: Same as Executive Board of Journal of Wildland Fire: A.M.Gill (Australia), J.G.Goldammer (Germany), A.L.Koonce, T.Parker and C.Rice (U.S.A.).

Chair: Andrea Koonce (U.S.A.)

Secretary: Armando Gonzales-Caban (U.S.A.)

Editor of the Journal of Wildland Fire: Michael Weber (Canada)

Executive Director: Jason Greenlee (U.S.A.)

In the Appendix to this newsletter you will find a membership application and order form (2 pages) which can be sent by mail or fax to

From: Jason M. Greenlee
Executive Director
International Association of Wildland Fire

Address: P.O.Box 328
USA-Fairfield, Washington 99012-0328
Phone: +1-509-283-2397
Fax: +1-509-283-2264

Join the Association Now !

Remarks from the Editor of International Forest Fire News:

Now all the business of the former *"Fire Research Institute (FRI)"* will be conducted under the name of the *International Association of Wildland Fire (IAWF)*. The former Director of FRI, Dr. Jason Greenlee, now appointed as the Executive Director of IAWF, has achieved a tremendous amount of pioneering work in setting up an internationally working institution that provides scientific software logistics to fire researchers and fire managers. The foundation of the Association is aimed at strengthening international cooperation by active participation of members from all over the world.

Congratulations not only to Jason Greenlee! There is one more key person who contributed to this success story. Dr.Ross W.Wein, Canadian Circumpolar Institute of the University of Alberta, Edmonton, served as the first Chief Editor of the International Journal of Wildland Fire and brought this journal to a highly recognized international standard. Congratulations! Recently Ross Wein retired from his position as Chief Editor (which doesnt't mean that he is retiring from his professorship). He was replaced by Michael Weber, Forestry Canada. Good luck, Mike, for getting continuous support from the wildland fire science community!

J.G.Goldammer

Briefly after completing the preparation of this volume the editor received the photograph showing (from left to right) Dr.Brian Stocks (Forestry Canada), Dr.Eric Valendik (Russian Academy of Sciences) and Dr.Michael Fosberg (U.S. Forest Service) signing the Protocols for the Stand Replacement Fire Working Group of the International Boreal Forest Research Association (see contribution on pages 6-8).

Order Form

		Non-Member Price	Association Price	Your Order
Membership in the Association of Wildland Fire, to include HotSheet newsletter (classifieds, member profiles, forum, news, conferences); Discounts on publications and software; A collective voice in international issues related to fire		n/a	$30.00	$_____
☐ **I wish to contribute to a fund for grants for free memberships**				$_____
☐ **I wish to apply for a grant for free membership (enclose explanation)**				free

Association Publications:

Subscription to the International Journal of Wildland Fire ☐ check here if this is a renewal subscription	Individual Rate	$95.00	$60.00	$_____
	Institutional Rate	$150.00		$_____
Back issues of International Journal of Wildland Fire Circle issue(s): 1(1) 1(2) 1(3) 1(4)		$20.00	$15.00	$_____
International Directory of Wildland Fire 30,000 names, addresses, telephone and FAX numbers	On disk* (research use)	$100.00	$55.00	$_____
	On disk* (commercial use)	$1200.00	$1100.00	$_____
	Paperback	$100.00	$55.00	$_____
International Bibliography of Wildland Fire 13 megabytes, 30,000 citations	On disk*	$225.00	$125.00	$_____
	Paperback	$225.00	$125.00	$_____
Subscription to the monthly Bibliographic Bulletin of Wildland Fire This monthly bulletin contains information on recent bibliographic citations	Paperback	$50.00	$25.00	$_____
	On Disk* **	$60.00	$25.00	$_____

Publications distributed by The Association:

Fire in the Tropical Biota, ed. by J.G. Goldammer, 1990, 497 pages	Hardbound	$148.00	$135.00	$_____
Natural and Prescribed Fire in Pacific Northwest Forests, ed. by J.D. Walstad, et al., 1990, 317 pages	Hardbound	$25.00	$23.00	$_____
Burning Bush, S.J. Pyne, 1991, 521 pages	Paperback	$15.95	$12.50	$_____
Forest Fires: An Introduction to Wildland Fire Behavior, Management, Firefighting and Prevention, M. Fuller, 1991	Paperback	$12.95	$11.95	$_____
The Burning Decision, Regional Perspectives on Slash, ed. by D.P. Hanley, et al.	Paperback	$20.00	$18.95	$_____
17th Tall Timbers Fire Ecology Conference Proceedings	Paperback	$15.00	$13.50	$_____
The Colorado Front Range: A Century of Ecological Change T.T. Veblen and D.C. Lorenz, 1991	Paperback	$19.95	$17.95	$_____
Critical Incident Stress In Wildland Firefighting, Gina Wilson-Miller, 1992	Paperback	$12.95	$9.95	$_____
The Fires of Autumn: The Cloquet-Moose Lake Disasterof 1918 Francis M. Carroll and Franklin R. Raiter, 1990	Cloth	$24.95	$22.95	$_____
	Paperback	$12.95	$10.95	$_____
Fire in North American Tallgrass Prairies edited by Scott L. Collins and Linda L. Wallace	Hardbound	$24.95	$22.95	$_____
	Paperback	$14.95	$12.95	$_____
Global Biomass Burning: Atmospheric, Climatic, and Biospheric Implications edited by Joel S. Levine	Hardbound	$75.00	$65.00	$_____

* Please indicate disk size: ___ 5 1/4 inch ___ 3 1/2 inch

**Only bibliographic data are on disk. Do you want ___ Procite format, or ___ ASCII format

SUBTOTAL $_____

PLEASE COMPLETE OTHER SIDE

Investigation of Vegetation Fires				
Richard T. Ford	Paperback	$12.00	$12.00	$_____
Development Strategies in the Wildland/Urban Interface				
Western Fire Chiefs Association, Inc	Paperback	$28.95	$23.95	$_____
Slash and Burn				
William J. Peters and Leon F. Neuenschwander	Hardbound	$29.95	$25.95	$_____
Wildland Firefighting				
Bill Clayton, David Day and Jim McFadden	Paperback	$22.75	$21.00	$_____
Yellowstone's Red Summer				
Alan and Sandy Carey	Paperback	$19.95	$16.95	$_____
Yellowstone on Fire				
Robert Ekey	Paperback	$12.95	$9.95	$_____
Red Skies of '88				
A. Richard Guth and Stan B. Cohen	Paperback	$12.95	$9.95	$_____
Prescribed Burning				
Harold H. Biswell	Hardbound	$32.50	$28.50	$_____
Playing God in Yellowstone				
Alston Chase	Paperback	$12.95	$9.95	$_____
Yellowstone and the Fires of Change				
George Wuerthner	Paperback	$5.95	$5.95	$_____
These books are slightly shop-worn, but are not defective				
Wall of Flames				
Lawrence H. Larson	Hardbound	$9.85	$8.00	$_____
From the Ashes				
Grace Stageberg Swenson	Paperback	$12.50	$10.00	$_____
Ecological Effects of Fire in South African Ecosystems				
edited by Peter de V. Booysen and Neil M. Tainton	Hardbound	$69.00	$59.00	$_____
Natural Hazard Risk Assessment and Public Policy				
William J. Petak and Arthur A. Atkisson	Hardbound	$108.00	$90.00	$_____
Special Issue Northwest Science 65(4)				
The George Fahnestock Memorial Fire Symposium	Journal - paperback	$7.50	$6.75	$_____
Fire in Forestry Volumes I and II				
Craig Chandler, Phillip Cheney, Philip Thomas, Louis Trabaud and Dave Williams	Hardbound	$110.00	$100.00	$_____
Fire Ecology				
Henry A. Wright and Arthur W. Bailey	Hardbound	$72.95	$69.95	$_____
Introduction to Wildland Fire				
Stephen J. Pyne	Hardbound	$64.95	$60.95	$_____
Fire Lookouts of Oregon and Washington				
Ray Kresek	Paperback	$12.95	$10.95	$_____
Le Feu sacré				
Mireille Durand	Paperback	$22.50	$20.00	$_____
Wood Combustion				
David A. Tillman, Amadeo J. Rossi and William D. Kitto	Hardbound	$47.00	$45.00	$_____
Fire and Ecosystems				
edited by T.T. Kozlowski and C.E. Ahlgrn	Hardbound	$121.00	$118.00	$_____
Applied Environmetrics Tables				
Meteorological Tables		$124.95	$124.95	$_____
Hydrological Tables		$124.95	$124.95	$_____
Oceanographic Tables		$124.95	$124.95	$_____
Set of Three		$249.90	$249.90	$_____
ProCite, Bibliographic Software by Personal Bibliographic	IBM	$395.00	$250.00	$_____
Software, Inc. **Specify full program w/o data or read-only w/ data**	MacIntosh	$395.00	$250.00	$_____

Make checks to and send or fax form to: International Association of Wildland Fire, PO Box 328, Fairfield, Washington, USA 99012
(509) 283-2397 Fax (509) 283-2264

SUBTOTAL FROM OTHER SIDE $_____
POSTAGE AND HANDLING
(U.S.:$1.50 PER ITEM, OTHER COUNTRIES: $2.50 PER ITEM) $_____
TOTAL MEMBERSHIP AND ADDITIONAL ORDERS $_____

☐ I wish to become a regional contact person for the Association.

Please note that some book discounts depend on meeting publisher quotas. If we do not meet the quota on the book you pay for, we will return your funds. Please contact us with any books or software on which we should attempt to get membership discounts.

Name: _____ Manager Vendor
Organization: _____ Research/Academic Other:_____
Street: _____
City, State/Province: _____
Country and Mail Code: _____ Telephone and Fax:_____
Payment by (Circle one): Cash Check P.O.#_____ Visa/Master No:_____ Exp. Date:_____

Printed at United Nations, Geneva
GE.92-45482–September 1992–900