FIRE MANAGEMENT NOTES

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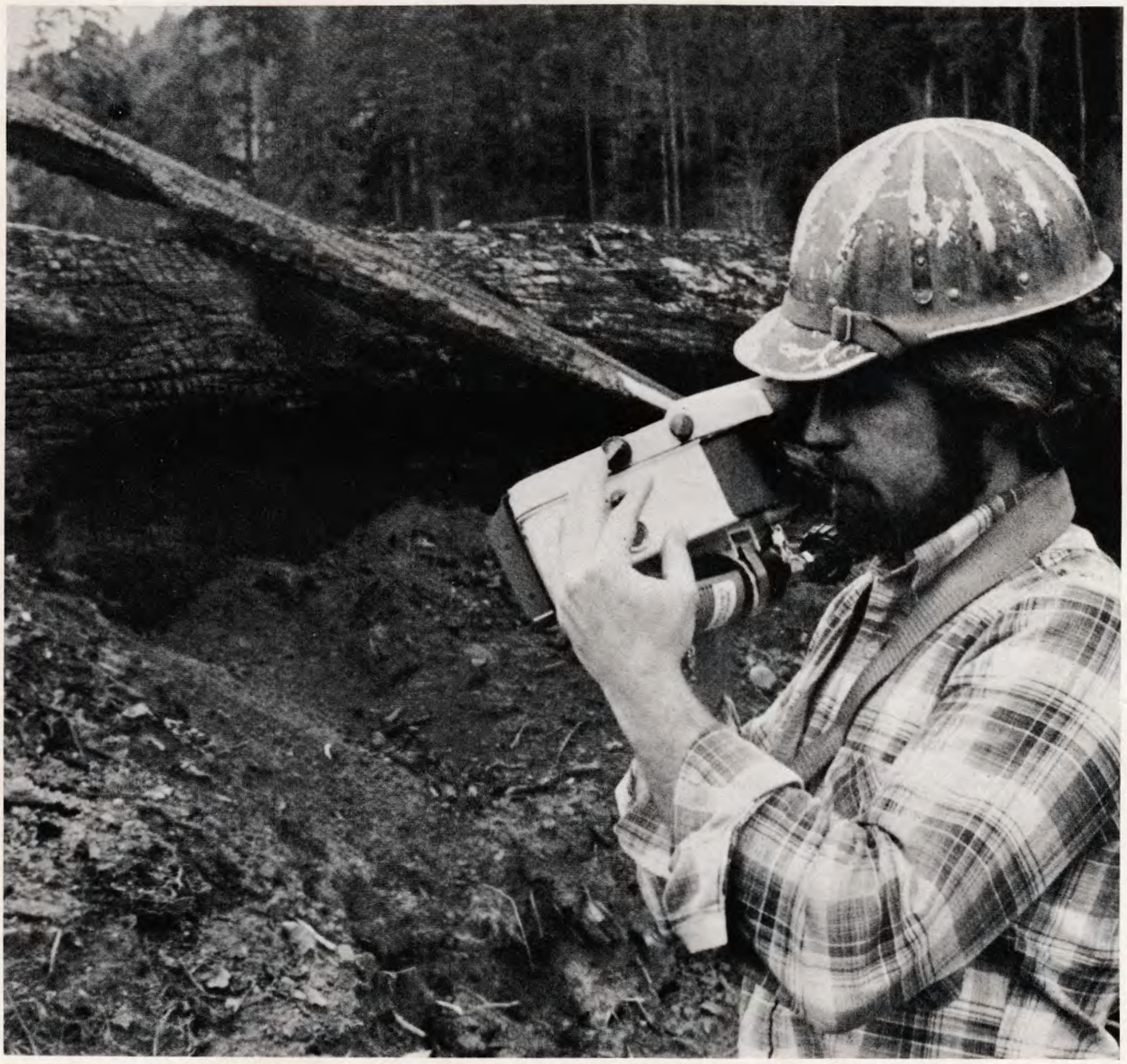

Forest Fire Problems in Germany

Johannes Georg Goldammer

In the Federal Republic of Germany, forests cover an area of about 7.22 million hectares, comprising nearly 29 percent of the country. Fifty-six percent of the forests are publicly owned, particularly by the states and the communities. The remaining 44 percent is privately owned. In German forestry, both organization and management policies are largely governed by state regulations. Multiple use and sustained yield have been emphasized for many years. Even today, the forests produce about 50 percent of the German timber needs.

Figure 1.—Selective precommercial thinnings lead to a fuel accumulation in many stands of Scots pine.

Forest Fires In Germany

The danger of forest fires in Central Europe is restricted to only a few forest types, depending mainly on the site conditions and tree species. The forest fire statistics show that stands of Scots pine *(Pinus silvestris)* are the most susceptible. Compared with other commercial timber species grown in Central Europe (Norway spruce, European beech, European larch, European white oak, Douglas-fir), the Scots pine has the lowest flashing point and the highest heating power (Missbach 1973).

Most endangered are forest stands on poor and dry soils, particularly those on pure and coarsely granulated podsolic sands without clay. Here, the waterholding capacity is very low. Since Scots pine is commonly planted on such sites, both lack of moisture and high combustibility of Scots pine present a combination of two unfavorable factors that lead to increased fire danger. Such conditions prevail within a broad belt in Central Europe, which reaches from the Netherlands to Poland. Forest fires are most frequent here.

A forest fire statistic for the period 1967–77 shows an average annual loss of forest stands on about 3,200 hectares (table 1).

1967	1,063 ha	1973	2,872 ha
1968	2,159 ha	1974	1,835 ha
1969	1,546 ha	1975	8,768 ha
1970	754 ha	1976	4,750 ha
1971	4,431 ha	1977	613 ha
1972	3,380 ha		

Table 1. - Total annual loss of forest area caused by fire 1967-1977

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Most forest fires are caused by accident, some by arson or other causes. Only 1 percent of the fires are due to lightning.

Change of Forest Structure

Socio-economic changes during the past years have also caused fundamental alterations of the forest structure. Heavy fuel accumulation occurs now in many forests, though forest practice does require a so-called "clean forestry practice." Two reasons are responsible for this situation:

- the extensive utilization of fuel accumulations as firewood has diminished because more convenient sources of energy are readily available;
- precommercial thinnings are no longer economical because of high labor costs.

Mechanical treatment or removal of forest residues is usually not possible in the commonly used systems of selective cutting and precommercial thinnings (by the future-tree-selection method); thus, forests appear as shown in figure 1.

Organization of Fire Protection

The responsibility for fighting forest fires has been delegated by some states to the local fire department or other civilian boards. Most state and private forests are not equipped with any heavy firefighting equipment. Therefore, the forest service has to depend on the cooperation of civilian and military staffs. Regulations provide joint exercises in forest fire suppression to be carried out every year (fig. 2).

In general, sufficient firefighting equipment is available because every small community has a fire department. The conditions for using fire trucks are favorable. The road system, the prerequisite for intensive forest management and forest protection, amounts presently to 25 meters per hectare (average for the entire country). This provides an access of 400-m-strips between two roads. Most of the state-owned forests have more than 35 meters per hectare, which seems to be optimum. The road systems provide practically all-weather access and are complemented by additional "machine roads" (suitable for skidding with tractors). Public roads, which are paved and found even in remote areas, allow fast concentration of firefighting forces. Therefore, no provisions are made for smokejumpers and helitack crews.

These circumstances had led the authorities to neglect the possibility of fire attack by air. The destructive forest fires of 1975, however, have forced a reconsideration of application of airborne firefighting systems.

Helicopter Operations

Two versions of water tanks were developed for use with a helicopter. The capacity of the buckets range between 1,350 up to 5,000 liters. The pilots may trigger a concentrated release or a release as drizzle. Spotfires may be extinguished easily. The buckets are filled at nearby dipping sites or by pumps. The helicopters may also be used in efforts to rescue crews trapped by the fire.

The Firefighting Aircraft TRANSALL

The C-160 TRANSALL is an aircraft that is widely used within the German armed forces. It has excellent slowflying qualities. Any TRANSALL can be easily converted into an effective firefighting aircraft at relatively low cost (figs. 3, 4, & 5). The firefighting kit is a 12,000-liter tank. It can be installed within 20 minutes. Aircrafts thus equipped may be concentrated for concerted action within a short time. The tanks are filled by hoses within 5 minutes. This system is similar to the MAFFS (Modular Airborne Firefighting System) in the Lockheed C-130 airplane.

Because the TRANSALL can oper-

Figure 2.—Joint forest fire suppression exercise with state forest service and fire department.

ate even from small airstrips, any forest fire might not be farther than 60 kilometers away from the nearest airstrip. The example in table 2 demonstrates the effectiveness of such operations.

Other Equipment

Fire retardants are not yet available in Germany because air tankers were not used in operations until recently.

Single Aircraft	
Time at ground (landing - fill up - take off)	10 min.
Flight time (airstrip - fire location - airstrip)	18 min.
On task (orientation and drop)	2 min.
Time required for one air attack	30 min.
Firefighting capacity of a 10-hour operation with 10 TRANSALL	
Total number of runs per hour	20
Sequence of runs (min)	3
Total number of runs	200
Total charge dropped (tons)	2,400

Table 2. - Example of aerial delivery potential based on 60 kilometers between airstrip and fire

Since 1975, wireless communication has intensified. A special communication line was established exclusively for forest management. The frequency band (69.95 MHz) with a code system is uniform for the entire Country.

Prescribed Burning

Prescribed burning for reducing fire hazard as an integrated part of fire management is presently not applied in Germany. Although ecosystems in Central Europe are not influenced and/or formed directly by natural fire, the use of controlled fire as a substitute measure seems possible (Goldammer 1978).

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Figure 3.—Installation of MBB-firefighting-kit in C-160 Transall.

Under discussion now is the use of fire in range management to keep certain landscapes open (Riess 1975). Also in pure pine stands, prescribed burning could reduce wildfire hazard. Pilot tests in Germany (Goldammer 1979) show pure stands of Scots pine (without hardwood understory) may be effectively treated with fire.

Conclusions and Perspectives

The forest fires of the past years in Germany have lead to new considerations in fire management. The development of forest firefighting systems by aircraft and helicopters has been adapted to the conditions of a densely settled country like Germany. Forest fire control responsibilities and cooperation have been regulated for more efficiency and radio communications have been improved.

Figure 5.—MBB-firefighting-kit in C-160 Transall in use.

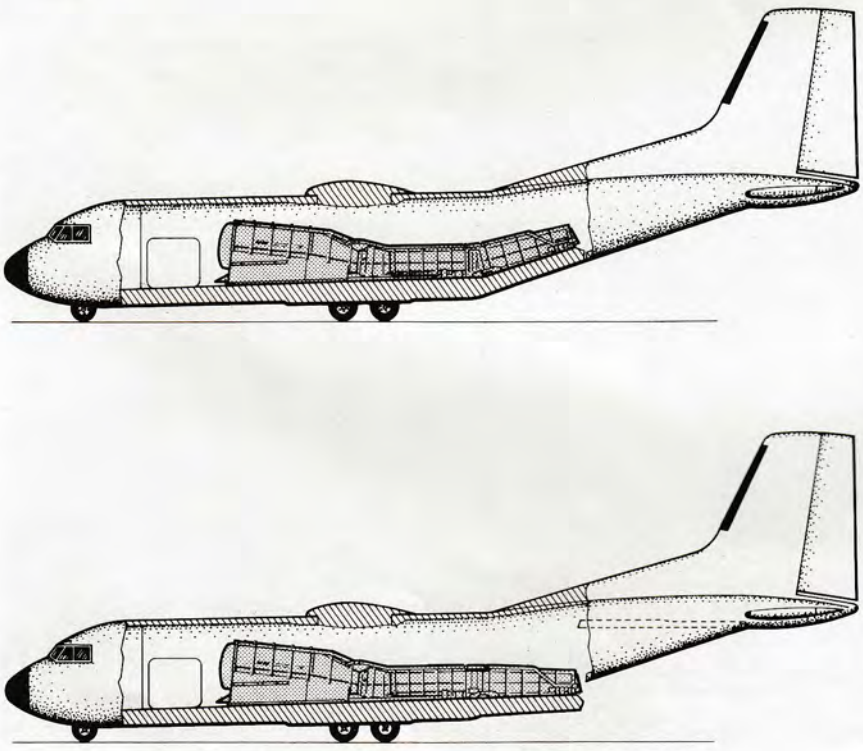

Figure 4.—Schematic of MBB-firefighting-kit installed.

Considerations should be made about the use of fire retardants as well as about the testing of forest fire danger index systems. The use of prescribed fire should be integrated into the fire management system.

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