He looks like an arsonist, but he's actually a firefighter setting a firebreak.

PHOTOGRAPHY: GETTY IMAGES

Fighting Fire with Fire

Fire is often successfully **FOUGHT WITH FIRE** – for prevention purposes and as a last resort.

When we think of forest fires, the places that automatically come to mind are Greece, Portugal, Australia, and California. What we often fail to realize, however, is that forest fires are a not an uncommon occurrence in more northerly latitudes, too. Take Russia, for example. There are between 20,000 and 35,000 fires a year in Russia's 800 million hectares of coniferous forest, the largest contiguous wooded area in the world. Each summer, the fire departments there face the monstrous task of fighting fires in an area almost as large as the U.S.

Even damp Germany is a forest fire country. "The authorities registered roughly 1,000 forest fires in 2009," says Detlef Maushake, Training Director for Wildland Firefighting at the German aid organization @fire, which provides firefighting and rescue assistance to its European neighbors but was also recently deployed to Haiti following the devastating earthquake there. "Open-area fires are not included in the statistics. We estimate that the total number is roughly four to five times greater than the reported cases," he adds. And the number of fires is increasing: The average surface area consumed by forest fires in the Mediterranean region annually has increased fourfold since the 1960s.

People are the main cause of fire

Is climate change the reason for these huge numbers? Maushake sighs. He is often asked this question, but he cannot provide a definitive answer. Researchers suspect that the number of fires in the unpopulated expanses of Siberia, the U.S., and Canada certainly could increase due to dry conditions and elevated temperatures. The greenhouse gas carbon dioxide released by these fires could then cause the atmosphere to heat up even faster as part of a vicious cycle. In densely populated Europe, however, experts such as Maushake consider humans to be the number one cause of fires. And not just in Europe. An estimated 95 percent of all fires worldwide are caused by people. The root cause is often carelessness, such as a BBQ fire in difficult terrain or a car with a hot catalytic converter that is parked over dry leaves. However, the experts also often find evidence of arson – driven by malice, pyromania, insurance fraud, or real estate speculation aimed at turning supposedly useless forest into productive pasture or expensive building land. Unfortunately, fires are sometimes lit as a job-creation measure. In Spain, Portugal, and Greece, most firefighters are hired on an as-needed basis, and some are not above creating the need themselves.

The consequences of this game with fire can now be seen nearly year-round on television. There is always a fire burning somewhere, and when the forest fire season comes to an end in southern Europe it is just beginning in the southern hemisphere, particularly in Australia and Africa. Fires burn on more than 300 million hectares worldwide each year. Thousands of people are forced to flee the flames. "We're seeing a global trend of fires not only covering greater areas in many regions, but also having much more serious consequences," notes fire ecologist >

Once they have jumped, smokejumpers are on their own

> Johann Georg Goldammer, who heads the Global Fire Monitoring Center in Freiburg, Germany, and has been assessing forest fire activity throughout the world for many years.

Smokejumpers: help from the sky

Unless the fire was caused by lightning, a forest fire always begins as a ground fire. As long as the fire hasn't yet jumped to the canopy, the fires are easy to extinguish. The firefighters use shovels, fire swatters, chain saws, brushwood branches, and a tool called a Pulaski fire axe that has an axe on one end and a grub hoe on the other. Sometimes the crews even fight the flames with their bare hands.

In the extensive coniferous forests of Russia and the U.S., smokejumpers have proven to be the most effective strike force against fire. They parachute out of airplanes or rappel from helicopters into the threatened woodland and begin a battle against the flames that sometimes lasts for days. During this entire time, the smokejumpers are completely on their own. This style of firefighting was invented in Russia in the 1920s. The aerial fire service still exists today and goes by the name Avialesookhrana, which translates roughly as "Aerial Guarding of the Forests." The first Avialesookhrana firefighters climbed onto the wings of a transport plane and parachuted into a fire-encircled village in 1930.

There are two ways to stop a fire: You can use something like sand to cut off the supply of oxygen to the fire or you can remove all of the flammable material from the path of the fire. A trench in the soil measuring no more than 30 centimeters in width is enough to stop a ground fire. If necessary, the firefighters start a small, controlled backfire to deprive the actual fire of fuel. "This is a good tool for stopping the flames in remote regions or in terrain that is impassable or contaminated with munitions and thus inaccessible to vehicles," says Maushake. In Germany, the forest is generally so well-developed because of commercial forestry that the forest roads can serve as such lines of defense. It is a completely different story in the dense macchia (thicket, shrubland) that is often encountered in southern European countries.

Even today, the methods of the smokejumpers hardly differs from the work of the founding fathers. Of course, the parachutes can be steered more precisely nowadays and there are satellite navigation and radio telephones. But once the strike force has jumped, the firefighters are on their own until the fire is extinguished – in which case they march to the nearest road to be collected – or they are evacuated by helicopter. But at least one thing has changed dramatically: The staff working for the American aerial fire service now have much better protective clothing than their predecessors had.

Learning from the U.S.

The firefighters in the U.S. and the volunteers of the German @fire group wear bright yellow uniforms rather than the dark blue ones associated with town and city fire departments. "They don't heat up as much in the sun," explains Maushake. The protective clothing of the wildland firefighters is also less heavily padded than that of structural firefighting units. "Although the other clothing offers greater protection, the clothing and equipment worn outside – including the helmet (editor's note: see also news, page 6) – has to be light because we sometimes have to wear it for days," says Maushake. "We have to be able to deal with the heat for long periods of time." (see also page 6)

Another piece of mandatory equipment for his people is a protective tent that folds up into an easy-to-handle package. It is made of a special fire-resistant fabric with a vapor-deposited aluminum layer that reflects up to 95 percent of incident heat radiation. "It's like the airbag in a car," says Maushake. "You'd rather not have to use it, but it's safer to have one with you."

So far, this professional firefighter has traveled to the U.S. ten times for additional training in order to learn from colleagues there how to extinguish forest and brush fires. "The biggest difference between an open-area fire and a structural fire is the dynamics of the fire," explains Maushake. "There are more variables outside. A cloud in front of the sun can be enough to dampen the fire. Forest fires move. It's like in chess: You have to think ahead!"

If the flames have already engulfed entire trees, there is little that the teams on the ground can do. In such a situation, it's time to call in the water bomber planes. The CL-415 was developed specifically for this purpose by the Canadian firm Canadair. This amphibious aircraft can scoop up an impressive "payload" – 6,000 liters in 12 seconds – while flying low over a

Water bombers fight a fire from the air. In mountainous areas like this one, helicopters are also used for this purpose.

PHOTOGRAPHY:: REUTERS

body of water at 120 kilometers an hour. The water is mixed with fire-retardant chemicals before being dropped in order to enhance the extinguishing effect. Flying just 30 meters above the burning treetops, the pilots open the four valves of their water tanks, either gradually or all at once so that the mass of water can break through even dense canopy. Evergreen International Airline has a Boeing 747-200 that has been reconfigured as a water bomber. It rents this unique aircraft to governments as needed. The jumbo water bomber can hold up to 77,600 liters of water and was first deployed in July 2009 to fight forest fires in Spain.

Fire planet earth

Leaving aside the absolutely destructive power of conflagrations that hardly ever occur without human involvement, nature is much less distressed by the flames than we humans believe. Many ecosystems actually need the power of flames in order to exist. Computer simulations have shown that in a world without fire there would be one-third more forest, but many biodiverse landscapes such as heaths would be lost forever if fires did not periodically sweep over them.

Ever since plants populated land masses, there have been large-area fires on the planet. The oldest evidence of this includes 420 million-year-old charred remains of plants that geologists found hidden in deep layers of rock. “We live on a fire planet,” says fire ecologist Goldhammer, who advocates allowing fires more room to breathe. What appears at first glance to be a curious strategy has been >

The jump into the (often) unknown: A smokejumper floats down into the burn area to fight the fire on the ground.

Catastrophic forest fires

October 1825: 160 people, many of them prisoners, die in the massive Miarmichi Fire in the Canadian province of New Brunswick. 16,000 square kilometers of forest are destroyed.

August 1936: The Russian lumber town Kursha-2 burns to the ground in a conflagration; 1,200 people die.

August 1975: In a fire on the Lüneburg Heath, 74 square kilometers are destroyed and five firefighters die.

Between 1997 and 1998: 97,000 square kilometers of rain forest burn down in Indonesia and release 2.6 gigatons of the greenhouse gas carbon dioxide.

July 2005: 130 square kilometers of forest burn down in the Spanish province of Guadalajara; 11 firefighters die.

July/September 2007: Fires burn throughout Greece. More than 3,000 separate fires destroy 2,700 square kilometers of forest and plantations; 84 people die.

February 2009: In the Australian state of Victoria, 400 separate fires destroy 4,500 square kilometers of bushland. 173 people perish in the flames, 414 are injured.

August/October 2009: The Station Fire rages on the outskirts of Los Angeles. It destroys 89 homes and consumes 650 square kilometers of brush and forest surrounding Tujunga Canyon, an important local recreation area and tourist attraction. Investigators determine that the fire was started by an arsonist. Two firefighters die in the line of duty. Murder charges are filed against the unidentified perpetrator.

PHOTOGRAPHY: PICTURE ALLIANCE

> finding increasing support among wildland firefighters for a number of years now. In short, they are beginning to fight fire with fire. Their aim is not to extinguish the flames, but rather to prevent or at least control them.

Fires only become really dangerous when there is too much flamm able material lying around in the forest. The dead plant material from the previous year remains on the ground, and once the snow has melted and the sun has been shining for two days, material burns like tinder.

Things were different when rural populations still used to gather up even the smallest of twigs to heat home and hearth. Goldammer compares the effect of a controlled low-intensity ground fire in a forest to light thinning by humans. As a result of either, weaker trees disappear, healthy ones remain and young trees can grow because they receive more light on the forest floor. Such fires could prevent the dangerously hot fires that leave nothing of the forest behind other than a few charred stumps.

Integrated fire management

"We shouldn't prevent fires, but rather reduce their intensity," says Alexander Held, an internationally recognized fire manager at the consulting company Working on Fire in Germany. When he speaks of the "fire industry," he is also referring to services such as those his company offers to governments or large property owners. These include monitoring the land areas, as well as educational campaigns and training programs aimed at teach-

ing the general population the merits of controlled burning. Held calls this "integrated fire management," and says that only about 10 percent of the associated activities are related to fire suppression; the rest are aimed at prevention.

Better a controlled burn

Controlled burning enjoys a long tradition in many parts of Africa. The landowners set many small fires that consume the dead plant material while leaving the living plants undamaged. Such fires are not destructive. These regions look like a checkerboard when seen from the air. Catastrophes are rare in areas where this technique is properly applied.

"The people burn land early in the year when the plants are still green and the air is damp. Under these conditions, the fires go out overnight with no human intervention," explains Held. He recommends that European fire managers adopt a similar strategy: "It's going to burn anyway, so it's better to settle for a controlled burn that is easier on the vegetation and the soil." Held considers the fighting of fires to be a hopeless undertaking. "Greece has the most aircraft, and still there are massive fires there every two years."

Things are changing, however. "More and more countries are finding the courage to fight fire with fire," says Held. And he calls on them to show even more courage and take new approaches to fire management. "However, it's difficult to convince the authorities that they should start 1,000 little fires around Athens every spring," he admits. **Hanno Charisius**

US FOREST SERVICE PHOTO

"It's a Lifestyle"

JOHN TWISS, 63, is the President of the North American National Smokejumper Association. Between 1967 and 1976, he himself jumped out of airplanes over forest fires and often stayed for days until all the flames were extinguished. He lives in Custer, South Dakota.

Do you remember your first parachute jump from an airplane into a burning forest?
Of course! It was more than 30 years ago. The training had me well prepared, but that's precisely what makes it exciting: You know exactly what you're getting yourself into.

What does a forest fire sound like?
A small fire doesn't make a lot of noise. A large fire that consumes entire trees can get pretty loud, like a train. When you hear this noise, you know that you're in trouble and need to get away as fast as you can.

What goes through your head when you're flying to a deployment?
If it's a long flight, you normally sleep and save up your energy. On short trips of up to three hours you chat with your colleagues, check your equipment, and study the map of the drop zone.

What's the first thing that a smokejumper does after landing?
If you land in a tree, you have to see that you get down to the ground. The next thing is to look for the package with the tools, food, and drinking water that was dropped right after you. Then you put out the fire, pack everything back up and march off in the direction of the agreed pickup point.

How long does such a deployment last?
You stay until the fire is extinguished or the command post orders you to another location. That can take up to three days. That's how long the food lasts.

And when the food is gone?
Then you either eat what you can find or nothing at all. Food and water are often dropped from a plane if you're out there for a longer period of time.

That sounds like an occupation full of hardships.
The optimal age for a smokejumper used to be under 30. Nowadays you meet active jumpers who are over 50.

What else has changed?
The parachutes are easier to steer nowadays. That makes it easier to steer past boulders and trees. And I'm pleased that smokejumpers are being deployed today for the controlled burn-off of combustible material in areas at risk from forest fires. That will probably happen more frequently in the future.

Further information online: www.draeger.com/385/firefighting