

Forest Dieback, *Spiegel* Article Series: “The Forest is Dying: Acid Rain over Germany” (1981)

Abstract

In the fall of 1981, the weekly news magazine *Der Spiegel* published the first of three articles on *Waldsterben*, or forest dieback. The article’s byline “Sulfurous precipitation poisons forests, air and food” alerts readers to the health and environmental risks of acid rain. Numerous experts warn of a ticking “time bomb” in German forests and suggest that massive forest dieback is imminent. The tone of the article makes clear that, even in the early 1980s, “forest dieback” was an emotionally charged subject in the Federal Republic.

Source

Acid Rain: “There’s Something in the Air”

Sulfurous precipitation poisons forests, the air we breathe, and foods (I)

Experts warn that “a time bomb is ticking” in West Germany’s forests. The widespread death of fir and spruce, experts fear, is the first omen of a world-wide “environmental disaster of unimaginable proportions.” That’s because the cause of this silent forest destruction, acid precipitate from the smokestacks of power plants and refineries, threatens not only flora and fauna but also human health. In a three-part series, Spiegel investigates the scope and causes of this danger.

One of the first people to notice it was Karl Scheffold, chief forester in the small Black Forest town of Alpirsbach. It was “about ten years” ago, he recalls, when the imposing crowns of 200-year-old fir trees became sparser, and the treetops, up to 45 meters in height, turned gray.

Since then, there is “hardly a fir tree left that hasn’t been affected” in Scheffold’s Black Forest district.

The so-called pathological wet core in the trunk interior – a pulpy, rotten mass that normally comprises at most a tenth of the cross-section of a fallen tree – now often takes up 80 percent or more, and for a few years now even the young firs have been losing their needles prematurely. Forest Director Scheffold: “If things continue this way, the Black Forest will have to be renamed the Gray Forest.”

A few hundred kilometers to the northeast as well, in the Bavarian Forest, the state of the firs “brings tears to your eyes,” admits Munich forest botanist Peter Schütt.

In the Lower Bavarian Forest, one fir after another is withering away, even in the fenced-in model mixed-wood forest of Myrrha von Aretin, who strictly avoids the use of toxic chemicals, and gives friends the impression that she “knows each of her trees by name.” The baroness suspects: “There’s something in the air.”

Recently, less sensitive conifers have even become just as sickly as the firs. On the western slope of the Bavarian Forest, four-fifths of all spruces are already wasting away.

“In the fall of 1980,” the forest scientist Professor Schütt observes, “damage to the spruce trees became more frequent for the first time. It radically increased in the winter, in amount as well as intensity. Many trees die within

a few weeks.”

Up in the north, in East Friesland near Krummhörn, for some time now poplars and alders have been so weakened that they only retain their leaves on the leeward side. In Taunus, where according to the Usingen Forestry Office extensive spruce death is “imminent,” alkaline sludge is falling onto the forest floor.

In the Rosengarten State Forest near Hamburg’s Black Hills, forester Wilken Wiebalck has the humus strewn with lime – in the vague hope of being able to cure the already rampant tree disease there this way.

Whether in Eastern Bavaria or Eastern Friesland, the Black Forest or the Black Mountains, many areas this year are affected by forest calamities, much more so than ever before. Reports of damage and descriptions of manifold symptoms are constantly arriving from more and more Federal States:

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☐ In Baden Wurttemberg, there are 64,000 hectares of infirm firs, and thousands of spruces are sick too. “And we have to fear,” said the Freiburg forestry botanist Hans-Jochen Schröter, “that the spruce deaths will spread all the way to the north.”

If Schröter is right, then spruce disease alone would put half of the West German forest stocks in danger over the long-term: Almost ten of the twenty billion forest trees that cover almost a third of the Federal Republic belong to the *Picea abies* [European spruce] species, considered the bread and butter of forestry.

This environmental distress appears to be more damaging to the German forest than the sum of all the dangers that have ever troubled forestry: red heart and weevil, forest fires and animal browsing. For forest experts, the damage reports add up to a disease pattern that makes some fear the collapse of the entire ecosystem. In the woods, says Hesse’s State Nature Conservation Officer, “a time bomb is ticking.”

After forestry researchers in the 1970s went down some wrong paths and contended with a veritable “odyssey of suppositions, speculations, and hypotheses” (Schütt), it is now considered likely that this tree damage cannot be traced back to a single cause; rather, it is apparently a so-called complex illness, which nevertheless appears to have a primary cause.

With each passing month, more evidence lends force to a hypothesis (discussed for years now) with highly explosive political implications:

☐ The various tree diseases appearing everywhere probably have a common cause: the increasing air pollution over West Germany, especially sulfur dioxide (SO₂) from oil heating, exhaust mufflers, and above all the smokestacks of power plants, smelting works, and refineries.

☐ The rapid death of the particularly SO₂-sensitive conifers is – with increasing sulfur pollution – only the “tip of the iceberg” (Schütt), the beginning of the end for many other tree species.

☐ The sulfur compounds that fall on the Federal Republic as dust or “acid rain” damage not only the third of the country that is forested but also cause billions in damage to other useful plants as well as to buildings and other structures, and they increasingly threaten the health of tens of thousands of citizens.

If the SO₂ theory is borne out further, warns the forest botanist Schütt, “an environmental catastrophe of hitherto unimaginable proportions” threatens the Federal Republic. Friends of the Earth Germany [*Bund für Umwelt und*

Naturschutz Deutschland or BUND] see the country's green lungs as consumed "by black breath."

"The first great forests," says the Göttingen soil researcher Professor Bernhard Ulrich, "will die out within the next five years. They can no longer be saved."

The sulfur dioxide, which is threatening disaster, is in second place in the West German air pollution table in terms of quantity (behind carbon monoxide), but clearly in first place in terms of harmful effects.

Sulfur – that substance whose smell was associated with the devil in the Middle Ages – is released whenever fossil fuels are burned, liquefied, gasified, or converted into electricity. About 3.5 million [metric] tons of SO₂ fall on the Federal Republic annually, double the amount recorded in 1950.

It is becoming increasingly clear what this satanic substance can do to dead and living matter alike. Whenever smog alarms threatened the Ruhr area in recent years, sulfur dioxide was the main cause.

The colorless, stinging, stinking gas – combined with above average carbon monoxide pollution – appears to be responsible for the fact that, for example, in some parts of Duisburg up to four times as many people suffer from chronic bronchitis as in rural areas and that the lung cancer mortality rate in the Ruhr or Saarland is also far above the national average.

Just how dangerous the toxic gas smog can be, above all for children, the elderly, and the sick, has been known for decades. This was shown most dramatically in 1952 in London, where smoke and fog combined into such a toxic haze that 4,000 people died within three days. In December 1962, when smog once again billowed through the Ruhr, 156 more people died than in the same period the previous year.

What falls from the sky in Germany, not only on the Rhein and the Ruhr, shares only a name with the rain of pre-industrial times. Not water, but rather diluted solutions of sulfuric and nitric acid fall here – always aggressive enough to corrode even marble, stone, and iron.

Thus, Cologne Cathedral, constructed of sandstone and limestone, has weathered faster in the past 30 years than in the previous 300. The renovation of the Gothic masonry, now covered with a kind of protective coating, costs four million marks every year.

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That this concrete-devouring rain would be particularly damaging to plants is no wonder – and this is a well-known fact: little-leaf lindens and larches, spruces and firs, for example, have been classified by botanists everywhere as particularly SO₂-sensitive, and are no longer permitted by forestation officials in the heart of the Ruhr district.

Every good reference work has long noted that sulfur dioxide has an "especially toxic" effect on plants. For example, *Römpp's Chemistry Lexicon*: "conifers die in great numbers, when the air contains even the slightest traces of SO₂."

The Bonn Advisory Council for Environmental Questions likewise points out in its report that not even extreme SO₂ amounts are needed to damage trees – quite the opposite. With just a "small concentration and longer exposure time," it states, "the concentration of sulfur in the leaves is especially high." The result is reduced "growth capacity, harvest yields, and plant quality."

While these circumstances have been well-known since at least the 1960s, another finding is apparently more recent for many West German environmental scientists: the sulfur damage is not, as was assumed a few years ago, limited to a few particularly contaminated forests on the edges of industrial zones.

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Tall smokestacks – whose construction is always cheaper than the installation of complex filtration systems – are responsible for slightly decreasing SO₂ pollution in areas like the Ruhr, whereas it is rising in places like the Black Forest and Bavarian Forest. “Our sick forests,” says Hesse’s Nature Conservation Officer Wentzel, “are the victims of tall-smokestack policies.”

Sulfur-spewing monster chimneys, some taller than 300 meters, have been acting like chemical weapons throughout the Northern Hemisphere for years – only less rapidly. Toxic clouds drift from the USA to Canada, emissions from Western Europe make the rain over Scandinavia acidic. The damage will be global long before the year 2000. Meteorologists are recording completely uncontaminated rain in exotic zones such as Samoa in the Pacific Ocean. Otherwise, there is only the clean precipitation left over from the pre-industrial age, deep-frozen in Greenland pack ice.

The pure rain from earlier centuries conserved in this way has a so-called pH value under the “chemical neutral point” of 7.0, close, so to speak, to a biological neutral point of 5.6; the scale of pH values runs from 0 (extremely acidic) to 14 (extremely alkaline).

At the Schauinsland weather station in the Black Forest, the average pH value of precipitation in 1965, when it was first recorded, was still 5.2. Three years later it sank to 4.6. At present, the average pH value of rainwater in West Germany is 4.1.

Because a decrease in the pH number corresponds to a tenfold increase in a liquid’s acidity, these data show that the rain falling on West Germany today is more than ten times as acidic as it was 16 years ago.

During the winter heating season, when the sulfuric smoke from domestic fires billows from the chimneys, sometimes even thirty times the previously normal value is measured. “Nowadays when it rains,” says Heinz Detlef Gregor of the Federal Environmental Agency in Berlin, summarizing the results of numerous individual measurements, “pure acid comes down often enough.”

As much as these developments frighten experts, apprehension about the ecological ramifications of acid rain has apparently hardly been communicated to politicians or to the public at large.

For West German citizens, 40 percent of whom take a walk in the woods at least once a month, it seems difficult to comprehend that this green splendor could eventually come to an end. Oaks, pines, beeches – for most people, the entire forest is still bursting with health.

The silent death of German forests is easily suppressed, because not only are state and federal politicians awkwardly silent, but also some citizen activists fighting against nuclear projects. The realization that sulfur clouds from coal-fired power plants contribute to the death of the forests definitely bothers many opponents of nuclear power who are betting on coal.

The dangers for West Germany’s forests are still largely unrecognized in part because the scope of the damage is hardly revealed to laypeople on their Sunday walks in the woods, for instance: whatever dies or dries up is usually

removed through routine thinning.

The Göttingen soil scientist Ulrich is certain that even today “most people on a walk would be completely shocked by the condition of our forests, if the forester did not regularly remove the diseased timber.”

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To be sure, the portion of fir trees in the South German mountain forests is relatively low at less than ten percent, and in isolated cases no more than forty percent. Nonetheless, the foreseeable total loss there of this tree species (Schütt: “the pine is taking its leave”) can hardly be offset.

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Forestry researchers such as the Göttingen soil scientist Ulrich believe that the complicated chemical, meteorological, and biological processes leading to the death of fir trees can be plausibly reconstructed.

Scientists are certain that the SO₂ gases rising up from dense metropolitan areas are converted by sunlight and air humidity into sulfuric acid and sulfurous acid, which rain down hundreds, even thousands of kilometers away.

The acidic clouds release their toxic load primarily over mountain slopes; along with this falls gaseous and particulate sulfur compounds, so-called dry rain.

Forests at high elevations, on ridges, and on the windward side of low mountain ranges (the Harz mountains, Hunsrück mountains, and Franconian Forest in Germany, as well as the Vosges in France, the Carpathians in Poland, and the Bohemian Forest in Czechoslovakia) are thus especially endangered.

Conifers are even more endangered than deciduous trees. Oaks and beeches can at least shed their sulfuric ballast along with their leaves in the fall, and they offer only a few vulnerable surfaces in the winter. By contrast, evergreen conifers are disproportionately exposed to damp precipitation and dry rain alike.

The amount of toxicity that has accumulated in the soil over time is suggested by the statistics of the international economic organization OECD. According to these, the amount of sulfur blown into the air more than doubled between 1950 (12 million metric tons) and 1972 (25 million) alone. In 1978, exactly 46.62 kilograms of pure sulfur fell on every single European head – almost a hundredweight.^[1]

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NOTES

[1] The GDR came in first (118 kg per capita). Highly sulfurous brown coal is burned there, as in Czechoslovakia (103 kg per capita). The Federal Republic’s average was 29 kg per capita.

Source: “Da liegt was in der Luft. Schwefelhaltige Niederschläge vergiften Wälder, Atemluft und Nahrung” (I), *Der Spiegel*, Nr. 47, 1981, pp. 96-110. © Der Spiegel. Reproduced with permission.

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