

percent of storm damage happens to conifers growing in unstable plantations that fall over with wind gusts of 60 miles an hour. I don't know of a single case where an old deciduous forest left to its own devices for many years has suffered comparable damage in similar weather. And so all I can say is: let's have a bolder approach to wilderness!

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— MORE THAN JUST —
A COMMODITY

IF YOU LOOK at the shared history of people and animals, the final decades of the twentieth century and the first decade or so of the twenty-first century have been positive. It's true there are still factory farms, experiments done on animals, and other ruthless forms of exploitation; however, as we credit our animal colleagues with increasingly complex emotional lives, we are extending rights to them, as well. In Germany, a law that improved animal rights under civil law (referred to in Germany by the shorthand *TierVerbG*) came into force in 1990. The goal of this legislation is to ensure that animals are no longer treated as objects. More and more people are giving up meat altogether or giving more thought to how they buy meat to promote the humane treatment of animals.

I applaud these changes because we are now discovering that animals share many human emotions. And not just mammals, which are closely related to us, but even insects such as fruit flies. Researchers in California have discovered that even these tiny creatures might dream.⁷³ Sympathy for flies? That's quite a stretch for most people, and the emotional path to the forest is even more of a stretch. Indeed, the conceptual gap between flies and trees is well-nigh unbridgeable for most of us. Large plants do not have brains, they move very slowly, their interests are completely different from ours, and they live their daily lives at an incredibly slow pace. It's no wonder that even though every schoolchild knows trees are living beings, they also know they are categorized as objects.

When the logs in the fireplace crackle merrily, the corpse of a beech or oak is going up in flames. The paper in the book you are holding in your hands right now is made from the shavings of spruce, and birches were expressly felled (that is to say, killed) for this purpose. Does that sound over the top? I don't think so. For if we keep in mind all we have learned in the previous chapters, parallels can definitely be drawn to pigs and pork. Not to put too fine a point on it, we use living things killed for our purposes. Does that make our behavior reprehensible? Not necessarily. After all, we are also part of Nature, and we are made in such a way that we can survive only with the help of organic substances from other species. We share this necessity with all other animals. The real question is whether we help ourselves only to what we need from the forest ecosystem, and—analogueous to our treatment of animals—whether we spare the trees unnecessary suffering when we do this.

That means it is okay to use wood as long as trees are allowed to live in a way that is appropriate to their species. And that means that they should be allowed to fulfill their social needs, to grow in a true forest environment on undisturbed ground, and to pass their knowledge on to the next generation. And at least some of them should be allowed to grow old with dignity and finally die a natural death.

What organic farms are to agriculture, continuous cover forests with careful selective cutting are to silviculture. In these forests (called *Plenterwälder* in German), trees of different ages and sizes are mixed together so that tree children can grow up under their mothers. Occasionally, a tree is harvested with care and removed using horses. And so that old trees can fulfill their destinies, 5 to 10 percent of the area is completely protected. Lumber from forests with such species-appropriate tree management can be used with no qualms of conscience. Unfortunately, 95 percent of the current forest practice in Central Europe looks quite different, with the use of heavy machinery and plantation monocultures.

Laypeople often intuitively grasp the need for a change in forest management practices better than forestry professionals do. The public is getting increasingly involved in the management of community forests, and they are insisting the authorities embrace higher environmental standards. We have the example of "forest-friendly" Königsdorf near Cologne, which reached a mediated agreement with the forest service and the regional ministry for natural resources and the environment that heavy machinery no longer be used and deciduous trees of a great age never be cut down.⁷⁴ On the other side of the Atlantic, in Virginia, the mission of the

nonprofit Healing Harvest Forest Foundation is to “address human need for forest products while creating a nurturing co-existence between the forest and human community.” The foundation supports community-based forestry initiatives and promotes the use of horses, mules, and oxen to remove felled trees and the practice of removing single trees that are struggling when harvesting timber, leaving the healthiest standing.⁷⁵

In the case of Switzerland, a whole country is concerned with the species-appropriate treatment of all things green. The constitution reads, in part, that “account [is] to be taken of the dignity of creation when handling animals, plants and other organisms.” So it’s probably not a good idea to decapitate flowers along the highway in Switzerland without good reason. Although this point of view has elicited a lot of head shaking in the international community, I, for one, welcome breaking down the moral barriers between animals and plants. When the capabilities of vegetative beings become known, and their emotional lives and needs are recognized, then the way we treat plants will gradually change, as well. Forests are not first and foremost lumber factories and warehouses for raw material, and only secondarily complex habitats for thousands of species, which is the way modern forestry currently treats them. Completely the opposite, in fact.

Wherever forests can develop in a species-appropriate manner, they offer particularly beneficial functions that are legally placed above lumber production in many forest laws. I am talking about respite and recovery. Current discussions

between environmental groups and forest users, together with the first encouraging results—such as the forest in Königsdorf—give hope that in the future forests will continue to live out their hidden lives, and our descendants will still have the opportunity to walk through the trees in wonder. This is what this ecosystem achieves: the fullness of life with tens of thousands of species interwoven and interdependent.

And just how important this interconnected global network of forests is to other areas of Nature is made clear by this little story from Japan. Katsuhiko Matsunaga, a marine chemist at the Hokkaido University, discovered that leaves falling into streams and rivers leach acids into the ocean that stimulate the growth of plankton, the first and most important building block in the food chain. More fish because of the forest? The researcher encouraged the planting of more trees in coastal areas, which did, in fact, lead to higher yields for fisheries and oyster growers.⁷⁶

But we shouldn’t be concerned about trees purely for material reasons, we should also care about them because of the little puzzles and wonders they present us with. Under the canopy of the trees, daily dramas and moving love stories are played out. Here is the last remaining piece of Nature, right on our doorstep, where adventures are to be experienced and secrets discovered. And who knows, perhaps one day the language of trees will eventually be deciphered, giving us the raw material for further amazing stories. Until then, when you take your next walk in the forest, give free rein to your imagination—in many cases, what you imagine is not so far removed from reality, after all!

NOTE FROM A
FOREST SCIENTIST

THE UNDERGROUND SOCIAL networks of trees that Peter Wohlleben describes in his home woodlands of Germany were discovered in the inland temperate rainforests of western North America. In the early 1990s, when searching for clues to the remarkable fertility of these Pacific forests, we unearthed a constellation of fungi linking manifold tree species. The mycelial web, as we later discovered, was integral to the life of the forest. Peter's account that these networks, as in our old-growth forests, are also important to the well-being of the beech, oak, and planted spruce forests of Europe is heartening.

My own search for this web in my home forests began as a quest to understand why weeding paper birches from clear-cut plantations went hand in hand with the decline of planted Douglas firs. In the rows of saplings, I would often see clusters of firs suffering from the loss of their birch neighbors. Yes, trees decline and die naturally—gracefully, beautifully, generously—as an essential part of the irrepressible life cycle

of the forest. But this pattern of premature death had been concerning me for some time. The loss of synergy between broad-leaved trees and conifers, it turns out, was a concern of Peter's, too. Across the forests of Europe, planting and weeding to create clean rows has been practiced for centuries.

With the web uncovered, the intricacies of the belowground alliance still remained a mystery to me, until I started my doctoral research in 1992. Paper birches, with their lush leaves and gossamer bark, seemed to be feeding the soil and helping their coniferous neighbors. But how? In pulling back the forest floor using microscopic and genetic tools, I discovered that the vast belowground mycelial network was a bustling community of mycorrhizal fungal species. These fungi are mutualistic. They connect the trees with the soil in a market exchange of carbon and nutrients and link the roots of paper birches and Douglas firs in a busy, cooperative Internet. When the interwoven birches and firs were spiked with stable and radioactive isotopes, I could see, using mass spectrometers and scintillation counters, carbon being transmitted back and forth between the trees, like neurotransmitters firing in our own neural networks. The trees were communicating through the web!

I was staggered to discover that Douglas firs were receiving more photosynthetic carbon from paper birches than they were transmitting, especially when the firs were in the shade of their leafy neighbors. This helped explain the synergy of the pair's relationship. The birches, it turns out, were spurring the growth of the firs, like carers in human social networks. Looking further, we discovered that the exchange

between the two tree species was dynamic: each took different turns as "mother," depending on the season. And so, they forged their duality into a oneness, making a forest. This discovery was published by *Nature* in 1997 and called the "wood wide web."

The research has continued unabated ever since, undertaken by students, postdoctoral researchers, and other scientists, with a myriad of discoveries about belowground communication among trees. We have used new scientific tools, as they are invented, along with our curiosity and dreams, to peer into the dark world of the soil and illuminate the social network of trees. The wood wide web has been mapped, traced, monitored, and coaxed to reveal the beautiful structures and finely adapted languages of the forest network. We have learned that mother trees recognize and talk with their kin, shaping future generations. In addition, injured trees pass their legacies on to their neighbors, affecting gene regulation, defense chemistry, and resilience in the forest community. These discoveries have transformed our understanding of trees from competitive crusaders of the self to members of a connected, relating, communicating system. Ours is not the only lab making these discoveries—there is a burst of careful scientific research occurring worldwide that is uncovering all manner of ways that trees communicate with each other above and below ground.

Peter highlights these ground-breaking discoveries in his engaging narrative *The Hidden Life of Trees*. He describes the peculiar traits of these gentle, sessile creatures—the braiding of roots, shyness of crowns, wrinkling of tree skin,

250 convergence of stem-rivers—in a manner that elicits an aha! moment with each chapter. His insights give new twists on our own observations, making us think more deeply about the inner workings of trees and forests.

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February 2016

ACKNOWLEDGMENTS

I VIEW THE fact that I can write so much about trees as a gift, because I learn something new every day as I research, think, observe, and draw conclusions from what I have discovered. My wife, Miriam, gave me this gift as she patiently took part in many conversations about what I was thinking, read the manuscript, and suggested countless improvements. Without my employer, the community of Hümmele, I would never have been able to protect the beautiful old forest that is my preserve, where I love to wander and which inspires me so much. I thank my German publisher, Ludwig, and publishers around the world for giving me the opportunity to make my thoughts available to a wide readership. And last but not least, I thank you, dear reader, for having explored some of the trees' secrets with me—only people who understand trees are capable of protecting them.