

eco@work

April 2019

Sustainable reading
from the Oeko-Institut

Forests

For climate and biodiversity

Natural silviculture Interview with Graf von Hatzfeldt

Forest management – the rational approach



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Forests have been part of our lives since time immemorial, constantly interacting with human communities. A forest is a high-value ecosystem which makes vital contributions to biodiversity, soil conservation and climate regulation. It also provides us with some of our most important natural resources, including wood, the material that first made human settlement possible. In light of these highly diverse functions, rational and balanced forest management is of key significance. It must consider the sometimes conflicting interests of commercial use and environmental protection, both in Germany and worldwide.

Forests have always been on the Oeko-Institut's agenda, thanks in part to the support provided by Hermann Graf von Hatzfeldt, previously a longstanding member of our Committee and Advisory Board and whose expertise as a forest owner has greatly benefited our organisation. So I am delighted that he has kindly agreed to share his thoughts on the challenges of ecological forest management and climate change adaptation in the interview in this issue of *eco@work*. Forests have often featured in our research, either as a individual aspect or as the main thematic focus; an example of the latter is the Forest Vision study, which we also profile in this issue. Perhaps unsurprisingly, the study proved highly controversial, reflecting the multitude of conflicting attitudes and approaches to the topic of forests. Nevertheless, I believe that the Oeko-Institut has an ongoing responsibility to initiate and engage in debate about contentious issues, as our colleagues from the Energy and Climate Division demonstrated in this instance.

I wish you pleasant reading and hope you will soon find time to enjoy a tranquil walk in a forest near you.

Yours,

Michael Sailer

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“Improving the forests is wonderful work”

When Hermann Graf von Hatzfeldt took over the Hatzfeldt-Wildenburg family forests in 1969, a clear-cutting system was in operation. Naturalness and species diversity were absent. Today, his forests in Rhineland-Palatinate, Brandenburg and Thuringia are managed ecologically. A private landowner from Siegerbergland, von Hatzfeldt has not only converted his forest operations to natural silviculture but also pioneered the introduction of Forest Stewardship Council (FSC) certification for sustainable forestry in Germany. In this interview with *eco@work*, he recalls his early days as a private forest owner and discusses natural forest processes and the impacts of climate change on his woodlands.

Graf von Hatzfeldt, what does natural silviculture involve?

When we started out, it was a revolutionary concept: it stood conventional forestry on its head. By conventional forestry, I mean allowing the trees to reach a certain age and then carrying out clear-cutting. Natural silviculture is very different: it relies on near-natural species-rich mixed forests and continuous forest cover. As part of this approach, it is essential to look at the issue of hunting as well, in order to prevent saplings from being destroyed by browsing game animals.

Were you committed to natural silviculture from the start?

No, when I took over the company, earlier than expected, my first task was to familiarise myself with forests and how to manage them. It took me the first 10 years to learn what it was all about, then I spent the next 10 years changing attitudes towards natural silviculture. Improving the forests is wonderful work. Incidentally, I believe that never having studied forest management at university actually stood me in good stead. Had I done so, I might have been less inclined to challenge certain dogmas, such as clear-cutting, quite as vehemently as I did.

To what extent do you intervene in your woodlands today?

It varies. Our aim is to create resilient and productive forests. Spruce monocultures require more intervention; they require planting with a deciduous

understorey. With older forests, we apply a lighter touch and focus on growing high-quality trees. Maintenance, timber extraction and regeneration must always be viewed holistically as synergistic elements.

What lessons can we learn from nature?

There is so much we don't know. In our forests, we maintain some representative woodlands in a natural state in order to monitor what happens if we don't intervene. For example, we have found that beech can hold its own against spruce very effectively if given enough time. We have also come to recognise the importance of deadwood and diversity.

Does natural management pay?

Definitely. Over the past 30 years, we have doubled the amount of woodland under our management, and that speaks for itself. Allowing natural processes to do the work minimises costs and maximises yields over the long term.

You were a pioneer of certification based on the FSC sustainability criteria. What do you think of the scheme today?

FSC certification is very good for forests, of course, but for private forest owners, it rarely pays off, unfortunately: the financial benefits are minimal and it takes a great deal of effort to administer. As a result, many private forest owners have left the scheme.

Is climate change negatively impacting on your forests?

Very much so: storms are a major problem, but so are droughts, of course. It is almost impossible to sell dry wood in Germany at present as the market is saturated. We have seen a dramatic downturn in our profits as a result.

What action are you taking to prepare for other impacts of climate change?

In natural forests, there is continuous new growth, and that puts us in a stronger position. Nevertheless, we are taking action, of course. For example, we are attempting to vary the composition of our tree species and further increase diversity. We have great hopes of fir, which seems to have greater capacity to cope with temperature fluctuations than other tree species.

Thank you for talking to *eco@work*.

The interviewer was Christiane Weihe.



Talking to *eco@work*: Hermann Graf von Hatzfeldt, owner of private forests in Rhineland-Palatinate, Brandenburg and Thuringia



A photograph of a dense forest of evergreen trees, likely spruce or fir, shrouded in a thick mist or fog. The trees are dark green and stand against a lighter, hazy background. The overall atmosphere is serene and somewhat ethereal.

FORESTS

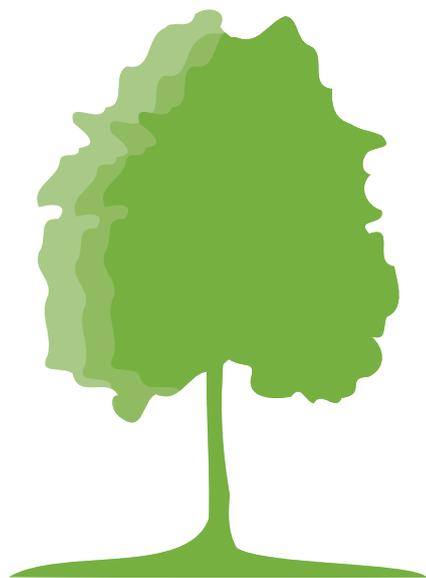
Adequate conservation, efficient use

The forest is a magical place. It is home to trees that are many centuries old, as well as to countless species of fauna: beetles and salamanders, toads and nightingales, foxes, deer and wild boar. Its air is filled with the scent of resin, wild herbs and fungi. It is a place where we can relax and unwind. For these reasons alone, forests should be valued and protected – but they perform many other functions as well. They play a vi-

tal role in protecting the climate by converting CO₂ into oxygen and acting as carbon sinks. They also produce wood, a major renewable resource. However, conflicts often arise between the management of the forests, on the one hand, and ambitious nature conservation and climate action, on the other. Researchers at the Oeko-Institut are addressing these issues.

Germany has a total of 11.4 million hectares of forest, covering one third of its national territory. Roughly half is in private hands; the rest is publicly owned. "The state of our native forests has improved slightly, from an ecological perspective, over the last 20 years," says Dr Hannes Böttcher, a Senior Researcher in the Oeko-Institut's Energy and Climate Division. "However, there are still some obvious shortcomings in terms of their naturalness and conservation of biodiversity." The coniferous monocultures which have developed in many regions as a result of intensive management are particularly problematical, he says: "They cannot really be classed as natural forests, and they were severely impacted by the drought in summer 2018."

Around 60% of German forests consist of conifers, mainly spruce and pine, with broadleaf trees, predominantly beech and oak, accounting for the remaining 40%. While they are growing, trees absorb carbon dioxide (CO₂) from the atmosphere and store it in the form of carbon in the wood. They thus perform an important function in climate regulation. For example, a 35-metre beech with a 50 cm diameter stores a total of 3.5 tonnes of CO₂ over 120 years, while the equivalent figure for a 100-year-old spruce with similar dimensions is 2.6 tonnes.



Locking in 3,5 tonnes CO₂:
a 35-metre beech, 120 years old,
with a diameter of 50 cm

When trees are harvested, the carbon stored in the wood is removed from the forest. For a time, it remains captured in the downstream timber products, but is released if the wood is burned. A forest's carbon footprint depends on whether harvesting or growth predominates. Germany's forests currently act as carbon sinks, which means that they absorb more carbon than is removed through harvesting. According to Germany's National Forest Inventory, which – under the Federal Forest Act – must be produced every 10 years and was last compiled in 2012, at least one billion tonnes of carbon are currently stored in Germany's trees and deadwood. "An important question for scientists is how much CO₂ our forests will be able to store in future, how much timber we will be able to harvest with that in mind, and how this will impact on key forest functions," says Dr Böttcher.

THE FOREST VISION

This significant issue has been addressed in an Oeko-Institut study: researchers working on the Forest Vision Germany project, commissioned by Greenpeace, looked at how various forest management scenarios impact on the carbon stock in forests and thus influence their contribution to climate change mitigation. "If forest management continues along its current trajectory, our calculations show that it will absorb an average of 17.2 million tonnes of carbon dioxide annually for the next 90 years," says Dr Klaus Hennenberg, a Senior Researcher at the Oeko-Institut. "With intensive forest management, which is what the timber industry wants, this falls to 1.4 million tonnes of CO₂ annually." With ecological forestry, however, the forests' contribution to climate change mitigation can be substantially increased: the Forest Vision scenario results in the formation of an average carbon sink of living forest biomass of 48 million tonnes of CO₂ per year, equivalent to roughly half the annual CO₂ emissions from passenger cars in Germany.



With ecological forestry, Germany's forests could store up to 48 million tonnes CO₂ annually.

"Ecological forestry means support for broadleaf trees, less frequent harvesting and increased target diameters, as well as additional protection of areas of relevance to nature conservation, such as old deciduous woodland," says Dr Hennenberg. At present, only around 4% of Germany's forests have been taken out of use and of these, just half are legally protected. However, ecological forest management does not primarily aim to support climate change mitigation: under the ambitious Forest Vision scenario, industrial forests can be restored to near-natural mixed forests, which are generally more resilient, e.g. to storms, provide more diverse habitat structures for rare and endangered

species and perform a recreational function for human communities. "In this way, the Forest Vision maps a pathway towards fulfilment of the National Strategy on Biological Diversity, which states that by 2020, forests with natural forest development will account for 5% of Germany's total wooded area." Based on National Forest Inventory data, the development of forests was modelled using the Forestry and Agriculture Biomass Model (FABio) pioneered at the Oeko-Institut since 2015.

FOREST VISION UNDER FIRE

"The study is intended to serve as a basis for a debate on the development of future-proof, sustainable and ecological forestry in Germany," Hannes Böttcher explains. "However, our analysis has come in for some sharp criticism." For example, the Scientific Advisory Board on Forest Policy at the Federal Ministry of Food and Agriculture (BMEL) issued a comprehensive statement in response to the publication of the Forest Vision. "Its main point of criticism was our methodology," says Dr Böttcher. "The criticism focused on the fact that the model did not define a sufficiently clear limit for the potential density of the forests. However, there is very little monitoring data available for comparison that would allow a clearly defined upper limit to be set." The study's extended time period – 90 years – was also criticised. "Due to the long production periods in forestry – several decades – the effects of changes in forest management become visible much later and have to be shown as well. It is clear that all the statements made about the future are beset with uncertainties. That's why the Forest Vision is not intended to be an accurate forecast of forest development but a possible projection based on specific assumptions. It would be interesting to see what kind of results would be generated by other models that rely on similar assumptions."

EFFICIENT USE

When assessing the environmental and climate implications of forest management, it is essential to consider the use of wood as a raw material. "Germany burns a vast amount of wood," says Dr Klaus Hennenberg. "In fact, almost 30 percent of the wood harvested in Germany is used as energy. All too often, it is broadleaf timber that ends up in the wood burner. A better option for the climate is to turn the wood into insulating material to reduce the consumption of heat energy." The optimal solution for the climate is to lock timber into permanent structures. "Timber is an excellent raw material and is suitable for many types of use in the construction sector," he says. It can also replace other materials with more emissions-intensive manufacturing processes, such as aluminium or plastic. These substitution effects can help to cut emissions in other sectors. "In essence, though, the primary aim should be to reduce resource consumption overall, including the use of timber," says Dr Hennenberg.

The Forest Vision scenario describes an average reduction of approximately 25% in harvested wood compared to the Base Scenario, which represents the continuation of the present forest management regime. So will wood have to be imported to meet demand? "That is a risk if we continue to be so wasteful. We need to think about how we can reduce wood consumption overall," says Dr Böttcher. According to the Oeko-Institut expert, this means keeping timber products in use and recycling them as much as possible. "Wood is suited to cascade use," he says. So it is important to design wood products that are easy to dismantle, collect and process, thus increasing their recyclability. "Every year, six million tonnes of waste wood are produced in Germany alone, and only around a third of it is recycled through conversion into chipboard, for example," says Dr Böttcher. "Two thirds of it cannot be reused: instead, it has to

be burned as it is contaminated with paint or glue that contains toxic substances."



Two thirds of waste wood in Germany is burned.

Forests supply us with this and other precious resources, make vital contributions to biodiversity and climate regulation and offer us a tranquil space where we can relax and unwind. Our task is to find ways of managing our use of the forests to ensure that they can continue to perform these crucial functions in future.

Christiane Weihe



As a Senior Researcher in the Energy and Climate Division, Dr Hannes Böttcher looks at various aspects of forests and their management: his areas of expertise include GHG balances of forest ecosystems and the forest sector, emissions from land use, land use change and forestry (LULUCF) and the biomass potential from agriculture and forestry.
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Protection instead of destruction

The survival of the world's forests is at risk. In Brazil, 7,900 square kilometres of rainforest were cleared over the past year, mainly to make way for agriculture. In Indonesia, forests are vanishing, often replaced by palm oil plantations: between 1990 and 2015, the country lost roughly a quarter of its forest area. Nigeria lost roughly 60% of its forest cover in the same period. The numerous forests in South America,

Asia and Central Africa are of vital significance for human communities, biodiversity, the environment and the climate worldwide due to their species richness, their function as carbon sinks and water reservoirs, and their role in soil conservation. So what can be done to halt the destruction of the world's forests? The Oeko-Institut explores this issue from various perspectives.

Forests around the world perform many important functions, as Dr Klaus Hennenberg, a Senior Researcher in the Oeko-Institut's Energy and Climate Division, explains. "They provide raw materials, not only wood. Local indigenous communities use them as a source of plants and animals for food, as well as medicines." The biodiversity of the tropical rainforests is legendary: they are home to 50% of the Earth's flora and fauna. The South American rainforests provide a habitat for 90,000 different plant species, and as many as 70 species of ant can be found on a single tree. But this diversity has already declined dramatically as a result of logging and continues to face major threats.

The world's forests also perform vital ecosystem functions. They serve as natural water reservoirs, for example: "Precipitation is intercepted by forest canopies and this improves the absorption of water by the soil. If there are no trees, there is a much greater risk of flooding," Dr Hennenberg explains. "Excessive logging in the rainforest disrupts the important hydrological cycle, and this can have a very serious impact on the local climate, for example." Forests are also important for soils. "Roots and foliage protect the soil. Without them, there is a risk of erosion."

As Dr Hennenberg emphasises, the world's forests are particularly important for regulation of the climate. "They are major carbon sinks, so if a forest is cleared or burned, CO₂ is released back into the atmosphere. It takes 80 to 100 years for a newly planted tree to store the equivalent amount of carbon. The destruction of forests on peatland produces particularly high emissions because carbon dioxide is then released from the soil as well. Climate change in turn has an impact on forest growth, and in many cases, this is likely to be negative. Deforestation often disrupts hydrological cycles, resulting in less rainfall in the region, and this can cause dieback of the remaining rainforest."



FORESTS
around the world

AVOIDING DEFORESTATION LOCALLY

What can be done to halt this ongoing deforestation? The Oeko-Institut explored this question as part of a project titled "Study on EU financing of REDD+ related activities, and results-based payments pre and post 2020". "REDD+ is a UN programme which provides financial incentives to support the conservation and enhancement of forest stocks," says Dr Hannes Böttcher from the Oeko-Institut's Energy and Climate Division. "Under the programme, less well-resourced countries receive institutional and private flows of funding for protecting their forests and reducing deforestation." On behalf of the European Commission, the project team from the Oeko-Institut, the Center for International Forestry Research (CIFOR) and consulting group COWI compared 41 countries receiving this financial support and identified those with the highest capacity to implement forest conservation measures under REDD+. "It is important to bear in mind that countries have very different starting points and that the data was highly complex and not always reliable," says Dr Böttcher. "The study showed that Malaysia, Ghana, Brazil, Indonesia and Ecuador have particularly high potential for forest conservation, and yet the countries with the highest potential are not necessarily receiving most of the funds." A total of USD 19 billion went to REDD+ between 2008 and 2015. However, as Dr Böttcher points out, countries' reliance on financial support varies considerably. Financial flows should therefore be prioritised, taking into account not only the REDD+ potential but also the extent to which action to avoid deforestation can be initiated and monitored in the country concerned.

What action can be taken at the local level to avoid deforestation? This question is currently being explored by experts from the Oeko-Institut's Sustainable Products and Material Flows Division. They visited Indonesia to conduct field research on the social and environmental flashpoints of palm oil cultivation, which is strongly linked to deforestation. "The main focus of our visit was to find out about the impacts of certifica-

tion schemes and due diligence on the local situation and to identify the limitations of these schemes and where there is a need for improvement," says Tobias Schleicher. The team conducted a large number of interviews with stakeholders. "We visited Java, Sumatra and Borneo and spoke to the public authorities, research institutes, businesses, industry associations and smallholder cooperatives," says his colleague Inga Hilbert. There is already one clear conclusion to be drawn: certification schemes alone will not protect the forests.

MORE SUSTAINABILITY IN EU POLICY – A MISSED OPPORTUNITY

The EU's recast Renewable Energy Directive (RED II) will roll back, not increase, global forest conservation, according to the Oeko-Institut. "RED II aims to increase the share of renewables in total energy consumption – but the way in which this is being done is a massive step backward for sustainability," says Dr Klaus Hennenberg. For example, RED II sets a target of a 1.3% increase in the share of renewable energy supplied for heating as a yearly average. "It is highly probable that much of this will come from wood, as this is the simplest option," he says. "RED II creates a massive incentive for more fuelwood use in the EU." This increased demand will probably be met from imports.

"Unfortunately, sustainability requirements are very poorly regulated," Dr Hennenberg continues. He is also critical of the reduced level of protection now afforded to high-value forests. "In the forestry sector – unlike the situation in agriculture – primary forests can now be used as a source of bioenergy in Europe; the same applies to forests on peatland, which are particularly problematical," he explains. As part of the Nature Protection and Advanced Biofuels project, commissioned by the German Federal Agency for Nature Conservation (BfN), the Oeko-Institut provided scientific background on the negotiations on RED II, including advice to the German Environment Ministry. In addition, the results of analyses and ambitious sustainability requirements at EU



Within one year
7,900 square kilometres
of rainforest were cleared in Brazil alone.

level were discussed with members of the European Commission, industry representatives and NGOs – but to no avail. "The Directive, with its weak sustainability requirements for forests, will remain in force until 2030, and unfortunately no other opportunities to move towards more sustainability will arise until 2025, when the review process begins," says Klaus Hennenberg. Until then, the Directive will simply worsen the threat to the world's forests.

Christiane Weihe



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