Forest Futures in the Making: Legal Infrastructures and Multispecies Speculation in Planning Climate-Adaptable Forests

Irene van Oorschot
Erasmus University Rotterdam

Corresponding author
Irene van Oorschot
Erasmus University Rotterdam
Erasmus School of Social and Behavioral Research
Burgemeester Oudlaan 503062 PA Rotterdam, The Netherlands
✉ vanoorschot@essb.eur.nl

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Abstract
Forests are increasingly thought of as a crucial instrument to combat a host of climate change associated stressors and threats such as soil erosion, atmospheric CO_2, and heat stress. As such, forests have become enrolled in seductive progress stories of envisioning future climate change mitigation and adaptation. In this article, I trace how these seductive visions are materialized in practices of planning and planting new forests. Drawing on fieldwork and interviews with practising foresters in the Dutch National Forestry Agency, this piece tries to tell smaller, unheroic understories of new forests in the making. In so doing it creates the necessary empirical and conceptual space to attend to the way multiple temporalities become implicated in the making of "forests for the future". Tracing the agencies of legal infrastructures, the rhythms of seasonal plant life and human labor, the intrusion of climate change, and the speculations on future multispecies becoming that characterize these practices of planning and planting, this piece highlights how temporalities matter to the way we think and practice our response-abilities in times of ecological crises.

Keywords
temporality; climate change; environmental policy; forests; multispecies theorizing; resilience.

1. Forest Promises, Progress Stories

Forests make for good stories. Given rising CO_2 levels, desertification, increasingly frequent droughts, and rising temperatures, forests are increasingly approached as crucial allies in our struggle against runaway climate change. In their landmark article "The Global Tree Restoration Potential", for instance, Bastin et al. (2019) suggest we think of forests as instruments in climate mitigation efforts. In addition to the protection of existing forests, they point out that the active afforestation of 0,9 billion hectares of currently unforested areas may contribute to the capture of up to 205 gigatons of carbon. The Trillion Trees initiative – a cooperation of Birdlife International, the Wildlife Conservation Society, and the WWF – moreover asks us to imagine forests as "our greatest hope"[1]. Within these narratives, afforestation becomes

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a crucial tool in the human arsenal to combat climate change and a powerful way to dream "dreams of progress" (Tsing 2015, 155).

These promises of mitigation-through-forestation are by no means uncontroversial. Commentators point out that estimates of its potential vary widely; that a commitment to afforestation may end up endangering foodways, particularly in developing countries; and will "lower ambition mitigation and [contribute to] lock-in situations in other sectors" (Doelman et al. 2020). Other commentators have pointed out that afforestation projects, particularly as they are tied up in carbon offsetting schemes and markets (e.g., the Reducing Emission from Deforestation and Forest Degradation or REDD framework), in fact promote "carbon colonialism", in which forest peoples are disciplined into the "green economy" (Dehm 2016).

Yet the promise of forests remains, the stories told seductive. These progress stories proliferate, too, in the Netherlands. In this densely populated country with roughly 11% of forest area[2], forests and promises of afforestation play an important part in imaginaries of circularity and hopes for carbon capture. In its 2019 climate accord, the national government committed itself to the afforestation of an area of 37.000 hectares across the Netherlands before 2030 as part of a move toward climate-neutral land-use in 2050 (Rijksoverheid 2020). Here, too, the extent to which such afforestation strategies will indeed meaningfully contribute to carbon neutrality and climate mitigation is very much in question. The actual additional capture of carbon may be rather modest – official projections range between 0,4 and 0,8 million tons yearly for the entire 37.000 hectares of "new forest". Commentators in the Netherlands have nevertheless responded hopefully and enthusiastically; some welcomed the "forest strategy" or *Bossenstrategie* as a belated yet ambitious attempt to prioritize forests within broader nature and climate policies (van Duinhoven 2021). In this sense, these afforestation ambitions represent powerful and mobilizing *stories* that gather allies – and generate funding – in the present (Doganova and Kornberger 2021).

Part of the power of the vision of mitigation-through-afforestation, however, also lies in the way these visions reproduce the logic of modern progress stories (Tsing 2015), in which a largely abstracted Mankind appears as a heroic savior. In temporal terms, afforestation-through-mitigation stories make possible an imagination of the future in which we *will have acted* (Povinelli 2021). Implicitly neoliberal, this narrative told in the future perfect tends to sideline concerns with the *emission* (rather than storage) of carbon, and is characterized by a technocratic horizon in which authorized agents – forestry agencies, national and international governments – will have taken the necessary steps to capture carbon. Capitalizing on a broadly emerging interest in and fascination with forests and trees in the Netherlands and beyond (Nixon 2021), the story of mitigation-through-afforestation does a considerable amount of political work in assuring us that action is being taken so that we may traverse the present and arrive in a greener future.

While afforestation strategies present powerful stories of human agency in an age of climate calamity, they are also partial: they highlight some agencies and not others. On the one hand, they pay too little attention to the human actors – foresters – that are tasked with turning them into a reality and tend to gloss over the rather more complex workings of state or state-adjacent bureaucracies tasked with realizing them. On the other hand, they magnify the role of human actors and designs, and provide little insight in the agencies of nonhuman

actors in the making of forests: the agencies, for instance, of soil and its nutrient status and hydrological characteristics, and perhaps even more tellingly, they neglect the agency of trees in the composition and orchestration of forests. Indeed, if these afforestation stories do not only *do* work in mobilizing allies (Doganova and Kornberger 2021), they also *demand* work: new forest do not materialize out of thin air.

For the foresters whose afforestation practices I studied planning and planting new forest raises difficult and above all pragmatic questions. Where do we locate "new forest" in a densely populated country as the Netherlands, and at the cost of what other landscape types, uses or values? Concretely, how do we find space in the Dutch planning contexts, in which existing space is overlaid with intricate bureaucratic webs of planning classifications? These questions do not only have spatial dimensions, but temporal ones as well. How do we time actual planting work so that it does not disrupt the seasonal habits of trees and other forest life forms? How, crucially, do we make sure these new forests can themselves stand the test of climate change – the test of time? How will we account for climate change-associated threats like acidification, more extreme weather events (storms particularly), changing species ranges and increasing risks of insect, bacterial or fungal plagues in the making of a forest for the future?

In this piece, I bring these practical and everyday planning and planting realities into view in order to complicate grand narratives of afforestation. This piece, by empirically attending to the making of forests for the future, thematizes in particular the role of multiple temporalities. Approaching foresters as bureaucrats whose work is organized in reference to project temporalities as well as embedded within legal infrastructures, I particularly zoom in on moments of *temporal interferences* (van Oorschot 2021) that emerge out of a tension between the schematized forward push of projects, the slow pacing of bureaucratic procedures, and the seasonality of tree growth and human (guest) labor schedules (Section 3). Moving on to a discussion of the particular *kinds* of forests that are being planned (Section 4), I examine these planning practices as active in the orchestration of particular versions of future forests, in which tree and forest temporalities play a crucial role. Planning a new forest, for these foresters, is a practice of anticipating future relationships between trees, and entails an understanding that it is necessary to give the beings with whom one composes – in this case, trees – the chance to establish relations among each other. It is, in other words, a practice of taking trees and tree species seriously as "architects" in the forest as a multispecies assemblage (Tsing 2015, 169) and in that sense constitutes an open-ended, speculative mode of making and managing forests.

Together, these sections complicate the framing of afforestation as either an unproblematic solution to climate change or as naïve and ultimately empty political posturing in the name of sustainability. The *understories* I am tracing here, by contrast, bring us down to earth – where in the end we always already are – and position us in complex bureaucratic and ecological worlds. These "smaller, unheroic stories" (Bensaude-Vincent 2021, 217) also bring into view the crucial role of *multiple temporalities* in forest planning and planting. They show how progressive, future-oriented practices are enacted within a *temporal thicket* of bureaucratic temporalizations, seasonal rhythms of plant growth and seasonal labor, and projected and emerging multispecies relationships between trees.

2. From Scientific Forestry to Emerging Concerns with Climate Change: Situating the Dutch Forestry Agency

In this piece I draw on data gathered in the context of two related research project: the first on the circulation of "resilience" within environmental policy circles globally and within European environmental policymaking; the second, an ethnographic analysis of climate-adaptation in actual environmental management practices in the Netherlands. Especially this second project informs the analysis I will be presenting here, which concentrates on the way Dutch environmental managers within the National State Forestry Agency (Staatsbosbeheer) give shape to its stated purpose to "help in different ways to mitigate climate change and its consequences" (Staatsbosbeheer 2020a, *author's translation*). In contribution to the 2019 government Climate Accord, in which the cabinet communicated its goal to afforest 37.000 hectares in the Netherlands, the Agency aims to afforest an area of 5000 hectares before 2030. In the following I will briefly situate this project within the history of the Agency, and comment on my own attempts to find an empirical footing within it.

2.1 The Dutch State Forestry Agency: Modern Forestry and Beyond

Staatsbosbeheer is in many ways uniquely positioned to help contribute towards the climate goals of Dutch government. It is the largest environmental management agency in the Netherlands, and historically has had close ties with the Dutch state going back to the late 19th century. Over the 19th century, import of cheap wool from Australia had made sheep-herding in the Netherlands' eastern, nutrient poor soils less economically viable. Seeking a rational solution to the problem of these now unproductive wastelands (*woeste gronden*) the Dutch government appointed a set of experts to exploit these areas through forestry in 1899, which group then was established as *Staatsbosbeheer*, the National Forestry Agency (Boosten 2016). In its early history, the Agency prioritized timber-production in rationalized same-age monocultures, which aligned the Dutch approach with modern scientific forestry efforts throughout Europe from the early 18th century onwards. This type of forestry, often called scientific forestry, emphasized the planting of a relatively select number of fast-growing tree species and felling these all at once at the most economically opportune moment in their growth cycle, which decisions were made based on increasingly sophisticated modes of calculating future yields (Doganova and Kornberger 2021). Temporal orientations were crucial in constituting both the forest and the state itself. Over and against peasant communities or indigenous populations, whose use of the forest was deemed unsustainable, the state, as an "enduring, solid, and unitary" power (Mathews 2011, 31), both required and guaranteed continued and sustainable timber yields (Radkau 2008; Mathews 2011). This temporal orientation to timescales beyond that of the typical human being continues to be evoked in the Dutch saying *boompje groot, plantertje dood*, which translates to "[when the] tree [is] big, [the] planter [will be] dead". The continued and sustained use of forests, moreover, would in scientific forestry be realized through the reduction of trees to "self-contained [and] equivalent" objects (Tsing 2015, 168). Despite romantic approaches to forests as spaces of wilderness beyond and outside of civilization, forests in the Netherlands are disturbances planted on already

disturbed grounds. As such they tell stories of "the relations between capitalism, state formation, and plant colonization" (Mathews 2018, 146). In the Netherlands, as elsewhere, these "power-laden histories of natural-resource extraction and state-making leave traces on tree and landscape form" (Mathews 2018, 395). Forests become legible as the outcome of – and the continual unfolding – of both ecological and state histories (Tsing 2015; see also Hourdequin and Havlick 2015). A good example is Figure 1, showing a plot of Sitka spruce, visually rendering evident the standardization of trees in single-age and single-species stands.

Yet over the second half of the 20th century, Dutch forestry also experimented with other ways of managing, or indeed "doing forests" (Tsing 2015). They did so in response to emerging concern with the vulnerability of monoculture stands to bacterial or fungal plagues, and reaction to a series of extreme storms in 1972 and 1973, which demonstrated the vulnerability of straight rows of trees planted in monocultures to sudden gusts of strong wind. Moving away from scientific forestry and its emphasis on monocultures of single-age forest plots, Dutch foresters developed what is now called "integrated forests management" (see van der Jagt et al. 2000; van Raffe et al. 2006). This mode of management not only combines different forest uses and environmental values – recreation and enjoyment, production, and ecological values – but is also characterized by selective felling (rather than the felling of entire stands at once) and a greater emphasis on diversity, both at the species and age level. Emphasizing multiple nature values, including tourism and recreation, additionally assisted the Agency in drawing out its public role and in financially sustaining itself – a more pressing concern once it was semi-autonomized and delinked from the Ministry of Agriculture, Nature and Food Quality in 1997 (Committee Evaluation Staatsbosbeheer 2003).

2.2 Climatizing Forestry: Doing Dutch Forests in the 21st Century

Up until a few years ago, however, forests were not central to Dutch environmental policy agendas. A series of largely right-wing cabinets and post-2008 budget cuts significantly affected the National Forestry Agency's financial bottom line, as a result of which it has had to rely more on income from recreation and tourism and on timber production. Meanwhile, EU legislation and directives such as EU Birds and Habitat Directive and Natura 2000 often targeted more open and varied landscapes, so that rather little attention was paid to Dutch forests. At the same time, the consequences of climate change for Dutch forests became more palpable. Hotter summers with more and more severe heatwaves and extreme weather events such as storms significantly have affected the vitality of Dutch forests over recent years. In combination with high levels of nitrogen deposition from livestock production, these stressors are especially consequential for forests on the sandy and poorer soils of East Netherlands, planted in the 19th century (Boosten 2016). Particularly plot-wide infestations by the European spruce bark beetle or *Ips typographus* – its name referencing the calligraphic traces it leaves beneath spruce bark – required foresters to clear entire plots, leaving landscapes of stumps in their wake.

In producing a concern with the very viability of forests in the future, these events set into motion a policy process that increasingly sought to draw out links between climate change and the potential of forests for mitigation and adaptation efforts. This *climatization* of forestry (cf. Aykut et al. 2017), was accompanied by a proliferation of "environmental regimes of anticipa-

Figure 1.

A production stand of declining Sitka Spruce on the Utrechtse Heuvelrug, affected by the green spruce aphid *Elatobium abietinum*, one of the plagues to which such monotonous stands are particularly vulnerable. Photograph by the author, December 2022.

tion" (Dolez et al. 2019), in which scientific experts (particularly from the Dutch University of Wageningen) as well as a diversity of forestry NGOs such as the Belgian-Dutch *ProSilva* took on a crucial role in developing ways to monitor and experiment with forestry and to translate scientific or experimental knowledges into usable information for foresters on the ground.

It is at this historical juncture that we see the new Dutch Forest Strategy emerge in 2020. Buoyed by a global focus on trees and tree cover as crucial instruments in climate mitigation as well as by the emerging visibility of the unfolding consequences of climate change for the Dutch forests, a variety of environmental, private, and state actors came together to craft a strategy to revitalize Dutch forests. Based on this intensive collaboration, the Dutch Minister of Agriculture, Nature and Food Quality Carola Schouten presented the National Forest Strategy in 2020. Called "Forest for the Future", the plan expresses a commitment to "a healthy, future-proof, and societally valued forest" (Ministry of Agriculture, Nature and Food Quality 2020, 4). It highlights the "different uses of the forest" (*ibid.*, 4) and the "importance of passing these along to future generations" (*ibid.*, 4). To enable this, "policy is required that makes it possible to make decisions in the future as well" (*ibid.*, 4) While the Forest Strategy is focused on the execution in the coming ten years, "it has a horizon reaching into the next century" (*ibid.*, 4); after all, "forest requires a long-term trajectory" (*ibid.*, 4). Concretely, it highlights two crucial ways to future-proof forestry in the Netherlands: one, the revitalization of existing forests, and second, the planting of 37.000 hectares of new forest, amounting to a 10% increase in forest nationally. New forest, the Forest Strategy elaborates, will help to "realize biodiversity goals and to capture carbon, as we have agreed to do in the Climate Accord [of 2018]" (*ibid.*, 9) but will also contribute to "more possibilities for recreation, a lessening of heat stress in cities, improved soil water storage, and additional timber production for the circular economy" (*ibid.*, 9). Passages such as these highlight how the storage of carbon – so present in transnational narratives about the possibilities of afforestation – is folded into the strategy as one of several forest "ecosystem functions". In the same year, the National Forestry Agency published its own organization strategy for the next five years. Resonating with the Forest Strategy, it was titled "Resilience and Connection" (Staatsbosbeheer 2020b), and similarly emphasized the many different functions and uses of forests which it would seek to enhance by revitalizing existing forests and planting new forests. In response to the national goal of afforesting 37.000 hectares, it committed itself to planting 5000 hectares of new forest.

In this piece, I examine how this afforestation plan was realized in practice. Part of a broader research project into modes of valuing forests in an age of climate calamity, this piece draws on an ethnographic research project into forestry in action. This project has an observational component, which consists of field-visits and excursions into forests with the forester in charge (done in three locations in the provinces of Limburg, Noord Brabant, and Utrecht), and of observing everyday forestry practices, particularly moments of forest inspection (what is called *de schouw*). It also comprises the in-depth study of plans, documents, and strategy proposals that accompanied the adoption of the Forest Strategy, as well as a mapping of the concerns and challenges as these are detailed in the professional journal *Natuur, Bos, and Landschap* ("Nature, Forest and Landscape") and in the Agency's own magazine, *Staatsbosbeheer Magazine*. To uncover the practical implementation of the "new forest" project specifically, I selected five "new forest" locations in different provinces and on different soil types

(sand or clay) in conversation with two high-ranking decision-makers within the Agency. Over October and November 2022, I interviewed a total of 13 foresters or project managers tasked with the practical implementation of the project, two public spokespersons of the Agency, one high-ranking decision-makers in the Agency, and one forest advisor within the agency. The data gathered within these interviews are complemented by observations, photographic materials, and policy texts where appropriate to the argument in this piece.

Over the course of these interviews, it became evident that issues of time, periodization, and the future were absolutely crucial to these projects. On the one hand, "the future" is continuously evoked as requiring actions in the present. In that sense, the future is a powerful ally (see Doganova and Kornberger 2021). In the words of one of the interviewees, "it gives us opportunities": it allocates funding and crucially, opens the doors of municipal and provincial authorities, which – as I will discuss below – play an important role in authorizing spatial reallocation requests. At the same time the temporal boundedness or the "projectness" (Law 2002) of the project, which ends in 2030, also raised some flags for some of the foresters. Used to thinking in much longer timescales, these "temporal dissonances" (Wiber 2014) between policy timescales and realities on the ground are a source of worry for these foresters; the same project manager warns us that:

> [Y]ou simply can't change your internal policies every four years. What you plant now will be there for 70, 80 years. The descendants of these trees will there be for another hundred [years] at least.

However, as I elaborate in the section below, legal-bureaucratic temporalities, seasonal rhythms, and speculations on future multispecies relationships in the forest-to-be take on especial significance in these planning and planting practices. In the following, I analyze these temporal concerns in more detail, as they hold the key to understand and situate the "progress story" of afforestation within the bureaucratic and multispecies worlds these foresters inhabit.

3. Reclassifying Nature: Legal Infrastructures and the Intrusion of Seasonality

The Forest Strategy reinvigorated a holistic, nation-wide concern with Dutch forests, yet its implementation is irreducibly local. In the early stages of the new forest initiative, project managers assigned to the new forest initiative were firstly and crucially tasked with finding the *space* to plant new forests. In the densely populated and spatially regulated country of the Netherlands, this would prove to be an especially challenging task.

Particularly influential in the context of the new forest initiative is the so-called Dutch Grant Scheme for Nature and Landscape (*Subsidiestelsel Natuur en Landschap*), or SNL[3]. This grant scheme details and indexes the subsidies that the twelve Dutch provinces make available for the purpose of maintaining "specific characteristics" of various "nature types". The SNL is developed specifically to classify (what it understands as) "nature" into 17 non-overlapping classes that require their own management types. Within these types, more granular distinc-

tions may be made. For instance, nature type "forest" is composed of four classifications, including wet forests (N14), dry forests (N15), forests with a production function (N16), and cultural-historical forests (N17). In doing so, the SNL folds within itself multiple logics of ordering landscapes. On the one hand, it draws on landscape elements such as hydrological metrics and soil composition to distinguish between nature types (e.g., sandy soil, clay soil). At the same time, these classifications also enact social histories: the forests on dry soils in the East of the Netherlands are precisely the forests that were planted in the 19th century. The SNL is shaped by economic considerations as well. For instance, the standard cost that is calculated – and hence partially subsidized – for "forests with a production function" is much lower than it is for other types of forests, as the economic value of timber production taking place in these forests is subtracted from the overall operating costs.

A forest, then, is not just a forest. It is also a category in a broader grant scheme and as such active in the distribution of responsibilities and funds. The SNL in precisely this sense is an important *legal infrastructure* (Turner and Wiber 2020), connecting provincial governments, planning authorities, and nature managers in a "web of relationships" (Turner and Wiber 2020, 8). Designed explicitly as a uniform, broadly recognized "nature language", the SNL also relies on particular epistemologies, bringing to the fore not just natural elements such as hydrology and soil composition but also human histories of use (in the category of the cultural-historical forest) and human designs for extraction (in the category of forests with a production function). And last, it also codifies specific forms of doing forests, as it specifies the type of management and its purpose and defines it as consisting of the maintenance of an area's fundamental characteristics. In so doing it materializes and solidifies specific landscape forms. In its regulative and legal operation of defining the type of management appropriate to specific types of nature, then, the legal infrastructure, like any legal artefacts, of the SNL is also *performatively active* in co-producing the realities it is meant to regulate (Pottage and Mundy 2005; van Oorschot and Schinkel 2015).

For casual wanderers through the Dutch landscape, this legal infrastructure is not especially evident; infrastructures, much like landscapes themselves (Mathews 2018), often fade into the background of social action. The project managers and foresters I spoke with, however, are intimately familiar with its ordering force. Finding space for new forests, for them, meant that they had to request formal changes in the classification of specific areas with the relevant (provincial) authorities. Yet reclassifying nature is a rather sensitive and risky process. It was sensitive, as the Agency's project managers would have to make the case that in reclassifying nature from one type to another, no other important nature types were effectively lost, for instance, natural areas with rare species or areas that are crucial to other national or supranational regulations such as Natura2000 or the EU Birds and Habitat directive. As a solution to this dilemma, project managers often selected areas classified as nature type N12.02: Herbaceous and fauna-rich agricultural fields. As these plots were often used as agricultural fields up until recently and have a history of fertilization, their soil tends to be rich in nutrients. For that reason, they are also less likely host to endangered or rare species, as these are usually outcompeted by relatively common, fast-growing herbaceous plants that end up dominating a particular site. As project manager Rinke explains:

> We've been looking for these areas that, ecologically speaking, lag behind in their development. So for instance with these grasslands, you'd like to see a development in the direction to a certain vegetation stage, but you're not getting there because of [the dominance of] certain species.

Trying to select sites that, in the eyes of these project managers, "lag behind" in their development, these project managers however ran up against bureaucratic rules and regulations. Precisely because these nature classifications are not simple descriptions but active in the distribution of legal accountabilities and responsibilities, bureaucrats or local politicians could resist or dispute the proposed reclassification. For instance, in one case provincial bureaucrats argued that the relatively low ecological value of specific agricultural fields was a function of the Agency's management, which primarily consisted of annual mowing to retain the area's open character, but did not include more expensive management interventions, such as the removal of the top, nutrient-rich layer of soil. "But we are not charged with *developing* these areas", project manager Hans objects: "We are tasked with *maintaining* their fundamental characteristics". Here, the emphasis on selecting sites that "lag behind" in terms of their ecological potential led to time-intensive discussions about the precise distinction between maintaining fundamental characteristics, e.g., through annual mowing, and *developing* its fundamental characteristics, for instance through the (costly) removal of the top layer of nutrient-rich soil. Depending not only on local politics but also on the whims of specific bureaucrats, then, proposals to change the formal classification of areas into a forest classification may receive either a "go" or a "no go". Sometimes, such decisions are reached quite fast – within a few weeks – but legal regulations on government communication and decisions tended to give bureaucrats quite a long time to decide.

Given the time span of the project – the ten years between 2020 and 2030 – a delay of a few months or even half a year may not seem to make the difference, yet there are nevertheless repercussions that reverberate through forward-oriented logic of planning. A particularly pressing concern for the foresters I interviewed was the rhythmic temporality of seasons, and the effect of climate change on these seasons. For one, planting season is usually in the winter, between the moment the young trees lose their leaves on the one hand, and the start of the bird breeding season on the other. However, climate change is causing milder autumns, so that the period the young trees are in leaf is extended. Climate change is also causing spring to arrive earlier and in so doing, is moving up the breeding season of bird species. Effectively, then, the planting season is growing shorter and shorter. Project manager Lore estimates that:

> [I]t now realistically comes down to planting in January and February, really. So if you really want to make progress, it isn't practically plannable.

Additionally, not all trees can be planted using labor-extensive, mechanical methods. The heavy machinery used to plant new forests in neat rows is not usable on waterlogged soils, for instance on the heavy clay found in the North and West of the Netherlands. Planting by hand is certainly a possibility, but often requires low-waged migrant labor. This, too, represents a seasonal intrusion in the planning process, as these migrant workers often travel

back to their families in eastern European countries during December and January. Working through these tensions, the Agency has in the first two years of the project managed to realize the planting of 450 hectares of new forest (Staatsbosbeheer 2020b), which amounts to space of only 12%, an observation which suggests that the projection of 5000 hectares by the end of 2030 may be rather optimistic.

Trying to make space for new forests, then, is also a matter of negotiating between the forward push of the project and the realities of both human and nonhuman seasonal rhythms. Legal infrastructures, bureaucratic due process, and seasonal temporalities produce either propitious occasions – a "go" is received in time to order and plant new trees in a small window of time – or lags and interferences. Legal infrastructures and the procedures that detail the reclassification of natural areas are capable of halting or pausing the forward trajectory of a project, and may lead to a further proliferation of formal communications and requests. These legal-bureaucratic "syncopated rhythms" (Wiber 2014) leave an indelible mark on the planning of new forests as they shape where such forests may be planted and when, while climate change and its impact on seasonality is creating even more pressure points in the temporalities of planning a forest. These pressure points, I want to suggest here, can be thought of as *temporal interferences*, in which human designs and modes of temporalizations are undercut or brought into tension with nonhuman rhythms and cycles. Derived from the study of legal procedures and documents (van Oorschot 2018), the notion of *temporal interference* draws attention to moments and encounters within which legal modes of ordering space and time confront, and emerge in tension with, other temporalities. These forests, then, are not so much taking shape *in* time as being shaped *by* legal, forward-oriented temporalities and their interferences with the changing rhythms of human and nonhuman seasonality.

One way to tell smaller stories about grand narratives of mitigation-through-afforestation, then, is to stay with the bureaucratic infrastructures these foresters inhabit. Top-down plans of afforestation may mobilize allies and (not unimportantly) funding, yet always unfold and materialize within legal infrastructures and their particular modes of ordering space, agency and responsibility, and time. Crucially, however, they also unfold in specific sites and locations, where landscapes are transformed and trees are planted. In the following section, then, I resume this understory by highlighting the particular composition of the planned and planted forests, and emphasize in particular how speculations about multispecies relationships and temporalities inform the forester's forest plans.

4. Speculating on Multispecies Relations: Working With and Against Non-Human Temporalities

The moment an area is marked out for forestation, project managers develop a detailed sense of what *kind* of forest they seek to establish. Operating with a temporal horizon that transcends the "projectness" of the new forest initiative, project managers aim for these forests to be as "resilient" to both known and unknown future developments and phenomena. A good forest, in other words, is a forest that will be there into the next century. Resilience or, in Dutch, *veerkracht*, is a notoriously fuzzy notion. Rooted in the study of ecosystems

(Holling 1973), the notion of resilience tends to be used to refer to the capacity of specific ecosystems to respond to, bounce back from, or adapt to unpredictable episodic or long-term ecosystem disturbances. It is not difficult to fathom why this conception of ecology, having its roots in the 1970s, has been especially influential in the last decades. After all, climate change is a collection of unpredictable stressors par excellence. Even though climate models afford some sense of trends over time, they "are however imprecise in forecasting when and where the next megafire, superstorm, of flood will be" (Petryna 2018, 571). Runaway climate change "renders untenable the very concept of projection" (*ibid.*, 570), so that it becomes imperative to make ecologies resilient to these unpredictable stresses.

In this sense, planning and planting a "vital" and "resilient" forest is a matter of anticipating not just (known, theoretically calculable) risks, but also of taking into account the reality of unpredictable and unknown "disturbances" that disrupt models and expectations based on past observations. For the foresters I worked with, the paradigmatic example of such unpredictable disturbances are bacterial, fungal or insect plagues, for instance, the above mentioned and disastrous spruce bark beetle *Ips typographus* or the equally destructive fungus *Hymenoscyphus fraxineus*, causing Ash dieback. Some of these plagues, like the *Ips typographus*, are native to Dutch ecosystems, and only become a problem when trees are weakened due to prolonged stressors. Others may be imported through global entanglements of trade and commerce to then ferally proliferate within disturbed landscapes (see, e.g., variety of species brought together in the Feral Atlas[4]).

One never knows when such plagues strike precisely but when they do, their consequences are dramatic. While the broad field of forestry has devised different ways of anticipating the unknowable, and developed crucial knowledge practices such as monitoring and sensing in order to keep track of change over time (see, e.g., Gabrys 2020; Dolez et al. 2019) the question for the foresters I studied here is a less a scientific one and more a pragmatic one: how do we make sure the forests we plant now will stand the test of time? Here, their choices at the species level are revealing of the way these known and unknown disturbances are anticipated in actual practices. At the species level, foresters are for instance increasingly selecting more drought and heat-resistant species, yet these must also be species that are capable of surviving other weather extremes and irregularities, such as late spring frost or the temporary inundation that results from partial flooding. Specifically, the littleleaf linden (*Tilia cordata*) and the European hornbeam (*Carpinus betulus*) are selected to respond to these anticipated disturbances. The littleleaf linden can handle not only periods of drought but also temporary inundation, hence contributing to its expected resilience in a changing climate characterized by weather extremes. Meanwhile, the European hornbeam can withstand both droughts and spring frost.

However, the resilience of forests to unpredictable future stressors is not just enacted as a matter of choosing individual species. It is also a matter of knowing how to *combine* tree species. A helpful visualization is Figure 2, a reproduction of an image detailing the planting plan of one of the afforestation locations. In this image, we see the different planting plots as these have been decided upon by the project manager and the local foresters. The colors and numbers in the map correspond to a detailed list of species that are to be planted within these delineated spaces. Looking at the species list, we see for instance that plot number 4, denoting

an area of 0,38 hectares, is to be composed of three tree species: the littleleaf linden, common oak, and birch in a proportion of 70%/15%/15%. But this plot is relatively homogeneous compared to plot number 16, which includes six species: hazel, common privet, redcurrant, sweetbriar rose, basket willow, and hawthorn.

Figure 2.
A schematic overview, taken from a planting plan, detailing specific plots.
Courtesy of Staatsbosbeheer.

This image testifies to one of the core techniques used to design these new forests: the techniques of *mixing* and *lumping*. The mixing of multiple species together, first, is not necessarily new – it has been a staple in Dutch forestry since the rise of "integrated forest management" in the 1990s – yet it is thought to be uniquely suited to allow a forest to stand the test of climate change. In a mixed forest, even newly emerging pests or plagues represent a fairly small problem. Even if a fungus, bacteria, or a type of insect devastates one particular tree species, forester Larry explains, "you'll still have some forest left", and remaining tree species may happily colonize the open spaces in the forest that follow such plagues or pests. Importantly, mixing is also a technique that mobilizes relationships between trees. Through mixing, it is possible to complement trees that require hospitable soil with species that generate especially nutritious leaf litter. The littleleaf linden chosen in the above example is well known for its capacity to enrich depleted soil because its leaf litter degrades relatively fast. Trees with such leaf litter, which also include for instance the European hornbeam, are often referred to as "caring" or "nursing" (*verplegende*) trees, and planted in the vicinity of trees whose leaf litter has a less "caring" effect on the soil's top layer, such as the acidic leaves of the oak or beech.

However, too much mixing is undesirable. Tree species, after all, have different needs and different growth speeds. Fast-growing species that do well in full sunlight, for instance, may literally come to overshadow other species with their quickly developing crowns. To avoid this from happening, foresters may also strategically lump some species together, so that fast-growing species compete mostly with each other rather than with slower growing trees. Figure 2, again, captures both the technique of mixing and of lumping quite precisely. While creating an overall mixed forest, variation in specific plots is much smaller, which ensures the optimal growth conditions for the different species.

4.1 Working With and Against Species- and Ecosystem Temporalities

Mixing and lumping as spatial choices are inextricably bound up with temporal considerations, specifically those having to do with the phenomenon of *succession* in forest ecology. Succession, any introduction to forest ecology tells us, is the process by which afforestation is expected to take place in the absence of human interference (Bijlsma et al. 2010). Starting with open field home only to lichen, succession is the process by which a specific area gradually evolves into a fully established forest. After the colonization of such an area by small annuals, then perennials and small shrubs, and then finally, shade-intolerant trees, succession theoretically ends in a so-called "climax forest", which in these Western European conditions, depending on elevation and soil type, is usually a broadleaf forest composed of a relatively small number of species. Making new forest, then, can be described – as one forester does – as "kickstarting the succession dynamic":

> There's the phenomenon of succession of course, but really, we don't want to wait for that to happen. We want to plant trees now, in order for a forest microclimate to establish itself quicker.

In order to establish this desired forest microclimate, foresters plant sun-loving and fast-growing species that tolerate relatively poor soil. Foresters privilege Birch, for instance, as it is a good example of a "pioneer tree" that, without interference, would likely establish itself in such conditions anyway, much like the willow and black alder that are also a staple of afforestation designs. These trees provide adequate shade for more shade-tolerant species and their leaf litter enriches the soil, hence contributing to the survival of trees that depend on this rich layer of humus. Another pioneer species is the poplar, a species recently rediscovered for its capacity to metabolize nitrogen and in so doing, creating a more hospitable soil type for species like the oak. In later stages, the pioneer species will likely themselves be outcompeted by other species. This is not necessarily a problem: as they are decaying, they may start to qualify as "veteran trees", home to cavity nesters and other critters.

Planning a forest is, on the one hand, then, a process of kickstarting a more-than-human phenomenon of succession and forest development: of composing and cranking up an assemblage of evolving relations between tree species. But it is also a practice that requires, in the words of my informants, "aftercare", both immediately after planting and in the (much) longer term. In the early days of the new forest, aside from occasional watering and fencing

saplings off from hungry deer, it is especially important to make sure young trees survive their transplantation and the circumstances in their new habitats. But aftercare does not end there. Over time, specific tree species themselves may also become a problem for other species or even the desired forest at large. Here, it is not so much growth speed but growth *curves* over time that may create trouble. Beech trees, for instance, are relatively slow growers in their youth, but when they do arrive at their adult sizes, are highly competitive: not only do they cast a lot of shade on the forest floor, but their leaf litter is also so acidic as to suppress many kinds of vegetation and tree growth in the understory. Figure 3 is a picture, for instance, of a beech-dominated part of a forest, in which the understory has been markedly suppressed.

While planning a new forest is then understood as "kickstarting succession", this ecosystem temporality may also cause problems in the much longer term. Climax forests are notoriously unvaried due to the competitive advantages of climax trees, and an unvaried forest is vulnerable to unpredictable stressors. Planning a new forest in the present also generates the necessity, then, for continued and long-term management, one forester explains:

> [A]fter 30 years or so, we'll have to have a look if we need some work to be done, whether the species are developing themselves well or whether we have to correct a few things. We try to steer a little, and to make space for the species we like to see there.

"Correcting a few things", "steering a little": these phrases reveal the modalities of environmental management – and perhaps care – that become necessary for a forest to not only become but also *stay* varied and mixed. Succession can be "kickstarted", but it must simultaneously be kept in check in the longer run.

Planning a new forest emerges as a practice, here, speculating and *continuing to observe* what specific species are capable of – what relations they seek, what webs of interdependence they sustain, what modes of becoming they thwart. Noting that this process is fundamentally experimental and ongoing, forester Pete emphasized that organizational knowledges for this type of management are not always there:

> [Y]ou can't really go on anything, because fifty years ago, they [foresters] didn't work like this. We're consistently trying out new things and drawing lessons from it.

Coupled with unpredictable climate change, this makes the particular shape and form of the eventual forest – in Dutch, its "end image" (*eindbeeld*) – "highly uncertain". Planning a new forest, then, is an irreducibly anticipatory and speculative practice, in which the specific agencies of trees are mobilized to orchestrate a "vital" and "resilient" forest. It is also a practice of anticipating, in a Spinozan register, *joyful* relations between trees: relations that multiply the possibilities of individual trees and of the forest itself as an emergent effect thereof (see van Dooren et al. 2016). But planning a forest is also a practice of guarding against potential *sad* relations in these possible multispecies worlds, for instance, that between "invasive" species and the forest, or between species with different growth tempos. Crucial to these evolving and ever-changing multispecies relations are the differently paced habits and tendencies of tree species, which together make up the "polyphonic assemblage" (Tsing 2015, 23) that constitute a "forest".

Figure 3.
A beech-tree dominated part of a forest in the Veluwe, the Netherlands. Typical is the marked lack of an understory due to the acidic leaf litter of the beech. Photograph by the author, November 2022.

5. In the Thicket of Time: Understorying Anthropocene Response-abilities

Tracing the work practices that are set in motion in response to progress stories of climate adaptation, this piece has aimed to tell smaller, perhaps unheroic stories. Stories of foresters as bureaucrats who are writing reports and requests, attending meetings with local politicians and bureaucrats, and drafting up detailed planting plans behind their computers. Stories, too, about the particular kinds of forests being planned, and the particular kinds of management and care these forests will need in the future. In so doing, this piece has brought multiple temporalities into view. Aside from the long durée of forest ecology, we have encountered the pacing of bureaucratic due process and the agencies of legal infrastructures in ordering planning work. We have encountered, too, the way seasonal rhythms, themselves increasingly "out of joint" due to climate change, are throwing up unexpected temporal interferences that disrupt the project's forward-moving push. We have also encountered the forest itself as a becoming composed in time, and of times: emerging out of the differently paced growth curves and needs of particular tree species, these new forests appear, in Tsing's crucial phasing, as "polyphonic assemblages" (2015, 23) that require continued observation and care.

Taken together, these observations suggest that future-oriented work is itself irreducibly shaped by multiple temporalities. Plans, strategies, and visions may sketch progress towards a better, more sustainable future, but are active first and foremost in generating practices in the bureaucratic and ecological now (Doganova and Kornberger 2021). As such this piece builds on and extends approaches to future-making in actual practice, showing in particular how legal-bureaucratic forms and their agency, as well as nonhuman agencies and vulnerabilities shape the becoming of a planned forest. In this way, these observations can also be read as a response to a more hidden motif in dominant understandings of the Anthropocene, which paradigmatically approach it as the intrusion of geological time into human time (Chakrabarty 2018, 5). Yet this piece suggests that matters are more complicated. Not only is climate change deeply affecting the way we envision futures; the very practices we design in response are themselves irreducibly shaped by *thickets* of crisscrossing temporalities shooting off into various directions and futures.

Thinking in the temporal thickets of practice generates different stories. If, with Haraway, we emphasize that "the point is to make a difference in the world, to cast our lot for some ways of life and not others" (Haraway 1997, 36), we need a mode of thinking that is capable of starting "in the action" (*ibid.*, 36). Specifically in thinking time, I find resonance with Bensaude-Vincent (2022, 213), who emphasizes that we must have eye for the "small unheroic stories" and the "diversity and heterogeneity of temporal regimes" (*ibid.*, 217) to think ways to become and compose with nonhuman others toward an uncertain future. Caring speculation must be crucial in such attempts, precisely because forecasts and projections are betraying their limitations in times of runaway climate change (Petryna 2018, 570). Here, too, there might be important lessons for us to learn from and *with* these foresters. Engaging with the possibilities and desires of individual species within broader webs of interdependence and care, the speculative practices as I highlighted them here strike me as places from which to think broader modes of responding to ecological crises. Neither conservation of pasts states,

nor top-down, technocratic planning for the future suffice, after all, to meet what we euphemistically call "challenges". Instead, a radical sense of openness towards possibly nurturing and caring webs of interdependence that we may compose with seems more promising indeed. Composing-with, here, is neither a matter of full control, nor of a hands-off emphasis on "rewilding" (which often requires quite a bit of technocratic management and control). Instead, it is seeking a mastery in "non-mastery" (Taussig 2020). If we seek a "politics that grows not from opposition to or critique of our current systems but one that grows from attention to another way of being, one that involves other kinds of living beings" (Kohn 2013, 14), in the practices of these foresters we may just find the possibility of a broader ethics of engagement.

Notes

[1] Source: https://trilliontrees.org/.

[2] Forest cover in the Netherlands, World Bank Data 2021: https://data.worldbank.org/indicator/AG.LND.FRST.ZS?locations=NL.

[3] Bij12, *Het subsidie stelsel Natuur en Landschap (SNL)*: https://www.bij12.nl/onderwerp/natuur-subsidies/snl/.

[4] See Tsing, Anna L., Deger, Jennifer, Keleman Saxena, Alder and Zhou, Feifei (2021) *Feral Atlas: The More-than-human Anthropocene*. Available at: https://www.feralatlas.org/ (retrieved November 18, 2023).

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