Grafting Change: Exploring the Intimacies of Plant-Human Relations at the Senegalese Urban Frontier

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Amongst a traditional healer's garden. Toubab DIalaw.

1. Introduction

When I arrived in Senegal in late August 2023, I found Dakar to be a heaving, sprawling city full of distractions; a mass of bodies constantly moving around, working, and making a living. Across all corners of the Cap-Vert peninsular there was an often-exhausting energy of enterprise and hustle. A frustration overcame me as I struggled to navigate the city, I quickly felt pushed to find a calmer location. After my first week, I had been put in contact with Ibrahima, I had told him I was interested in Senegalese trees: the way people work with or use them, and the diversity of relations that emerge alongside them. Ibrahima had worked for over a decade as a gardener and botanical specialist and suggested we visited a space he had been cultivating, now called le Théâtre de l'Engouement. I met Ibrahima in the central market square of Toubab Dialaw after taking a train and a sept-place out of Dakar, a donkey cart took us the remaining few kilometres through the brush and fields. Ibrahima gardened many spaces across town, often these were hotels or residences for (mostly) European tourists. In this theatre, Ibrahima had started with small gardening jobs until the owner trusted him with the entire control and organisation of the garden.

As we walked around, he explained the stories and origins of each plant and their medicinal purposes, rolling waves of information on Senegalese, Lebu, Wolof, Serer approaches to planting and tending of species. Each tree told a story of a different kind of relation, and the stories of changing relations. A *Pomme Cannelle* tree in the centre of the space had been brought here from Haiti. The theatre had been originally set up by a Haitian poet and political migrant who had fled Haiti first for Canada, France and the Soviet Union. After being invited to Guinee-Conakry by President Ahmed Sékou Touré, he left soon after, finding problems of dictatorship had followed him there. He crossed the border into Senegal, he passed away at the age of 95 in 2022. The tree, tended by Ibrahima and hanging over the poet's grave offered a memory of home in the face of exile.

Tending to this space for decades meant Ibrahima knew every tree individually, every tree's story individually. He was entirely at ease amongst the physicality of these trees. This was a calming space, which was now evolving from an original centre of Black arts, sculpture, poetry to be increasingly setup for the meditating European tourist, in search of an alternative space for reflection and environmental engagement, in a former colony. Yet this place was also a haven for plants, tended to by Ibrahima, which were otherwise threatened with a rapidly growing ecological degradation pervading out from Dakar's urbanising corridors. Toubab Dialaw was a smaller village down the coast. It's outskirts still allowed space for small forests and gardens, but the future wasn't guaranteed. The plants as much as the humans were tied up in the contradictory politics of Senegal's increasingly globally accessible position.

We approached a tall straight tree, thin, maybe 15 centimetres in diameter, and covered in spikes.

> *I: C'est un petit fromagier [Ceiba Pentandra]. The fromagier, it gets big like the baobab. It protects itself with spikes. We use the big ones to make pirogues.*
>
> *P: Wow I have never seen anything like that. Those spikes*
>
> *I: It pricks eh, but after when it – when it grows, it releases them. But these spikes protect. It is fighting with the little baobab, I should remove the baobab, they can't live together, they are both too big.*

This Fromagier, young but sturdy, would at full size typically enable the community life here on the sea as a fishing boat, although increasingly such boats make days-long journeys to Europe.

The Fromagier would play a significant role in my research, although I did not know it then. In the nearby town of Sébikhotane, the fromagier were selected as the tree to cleanse the soil, polluted by the heavy industries that had moved into the area over the last 15 years. Strong and hardy, fromagiers were never targeted by local populations for any medicinal barks or roots. The fromagier was in these senses a mundane and unexciting tree, reliable for its fast-growing wood. While it was competing with the baobab here, in Sébikhotane the fromagier would be a pioneer species in dying soils, laying the way for other species to settle in amongst their roots, regenerating and reinvigorating multispecies life, potentially building a new forest in the ecological devastation of heavy metal industrialism.

Walking with Ibrahima through this living, breathing forest, I was at the start of a 5-month long, crash course in Senegalese botany. I found the ways in which plants generated relations with other plant and animal species fascinating, particularly when the cities seemed so hostile to multispecies life. Paying attention to the interspecies communication unravelled a whole story of shifting natures, values, and priorities within Senegalese ecology and society. Ibrahima was a fantastic introductory guide into these plant stories. He had spent his life moving around, gathering and travelling with plants and through this he had built a specific vision of the trees he worked with:

> *Ibrahima: So here we have different species of trees, some which we found on the site and others which were planted, taken from far away… Here we have a plant that we call the Ngigis in Wolof, so the name in Latin is Piliostigma Reticulatum. The Ngigis, its good for toothache.*
>
> *There is a woman who cares for toothache with the Ngigis. Each time I bring her leaves, and she even asked me today to bring some. But with every plant that cares/heals, whatever you take whether it's the leaves, the bark, the roots, we must ask permission of the tree before we do that, you cannot come and take.*
>
> *The hours they count, the position of the sun that counts, for example – with some roots you cannot cut them within your own shadow, that's not good. There are certain things to recite, to ask for permission to allow it to heal. The Ngigis is good for everything related to toothache… But it's also good for scars, it's also good, you take a leaf, you eat it, you use the bark as a bandage, and you attach it and that will heal the scar.*

By engaging with people like Ibrahima, following and trusting a local gardener with an appreciation and understanding for the processes of traditional healing practises, I was starting to enter the intimate spaces of plant-human symbiosis, the spaces of collaboration and mutual care. These were spaces where specific species were being propagated by humans because of long-established histories and knowledges of the plant's healing properties. These were historical intimacies and exchanges between species. The word for tree in Wolof is *Garab*, which also means to heal or to remedy. Faye (2018) breaks down the word's etymology further suggesting that '*ga'* means 'to protect', while 'rab' means 'génie' in French, which one may variously transfer to the English: genius, spirit, genie or wizardry.

Unlike the Fromagier before, I rarely encountered the Ngigis again. Only when working through my interview data in Europe did its name ever reappear, then in Latin form. I had come across it while photographing ecology students surveying a private Catholic woodland, it was months before

I joined the dots of the Wolof and Latin names and realised it was the same species. According to Faye's (2018) study of Senegalese medicinal plants threatened with extinction, the Ngigis was meant to be entirely extinct in eight different regions of Senegal. Yet here it was, living in this small yoga retreat on the edge of a burgeoning urbanisation, and again available in a private Catholic woodland on the edges of an industrial town. As my time in Senegal grew, and as I came to realise the sheer variety of species I may encounter, I started to generate a spreadsheet of species names, labelled in Wolof, Serer, English, French and Latin. After each outing I would try and cross-reference the species I found in each location, logging it against what grew to a total of 27 walking interviews in varying locations. My familiarity and understanding of the plants grew slowly, I was never great at identifying them in the field, but with photographic aides my skill increased.

This usually was not such an issue, as I walked and talked with plant-knowers in their familiar spaces, I allowed them and their relations with the plant to largely guide me and direct my gaze. Through these plant-knowers, I was gradually being introduced into niche ecological spaces of species protection that were, within wider Senegalese society, increasingly hard to access. For those in the cities, the roots, barks and leaves of the plants were only available to those who knew best how to navigate the markets and itinerant plant sellers of the Dakar, Thiès and Thiaroye markets; even then certain species were entirely unavailable (Faye 2018). As I started to focus on the spaces where plants and humans were in closest proximity, I engaged in a snowballing ethnographic inquiry with experts in plant knowledge with whom I was able to slowly gather piecemeal stories of plant-human relations. These were relations of collaboration and competition, plant-colonisers, plant-philosophers, plant-diplomats. Quite often these were tender relations, an act of literal tending: watering, feeding, positioning, grafting, healing, decontaminating, yet the wider societal context saw brutal bulldozing and clearing of entire ecosystems and relations in a matter of weeks or months, almost entirely in direct sight of those closest to the plants. Ibrahima told me there were spaces he could never return to, experiencing the sorrow of whole forests cleared.

In the remaining introductory sections, I lay out the context of the study, exploring Senegal's urban explosion and the ways it has reorganised multispecies lives so far, and the anticipated future direction. Following this, I offer some brief methodological frameworks and wider literature inspirations for my ethnographic approach, although these are expanded on throughout the chapters. Towards the end of the introduction, I pose my research questions, and offer a guide for the chapters going forwards, finally showing a list of key research participants mentioned in the work.

1.1 Context of Study: Intimate Plant-Human relations and the Senegalese Urban Frontier

When not travelling or in Sébikhotane, I spent most of my downtime in a research centre in the SICAP area of Dakar. This part of the city was historically setup to house well-to-do government workers in spacious villas, proud of its tree-lined streets, and small plazas of benches and fountains. Being one of the wealthier areas of the city, non-human life just about remained. At dusk, enormous fruit bats would screech and cackle while hopping between the few remaining mango trees. Skeletal cats roamed from compound-to-compound feasting on the bones of fish and chicken discarded by platters

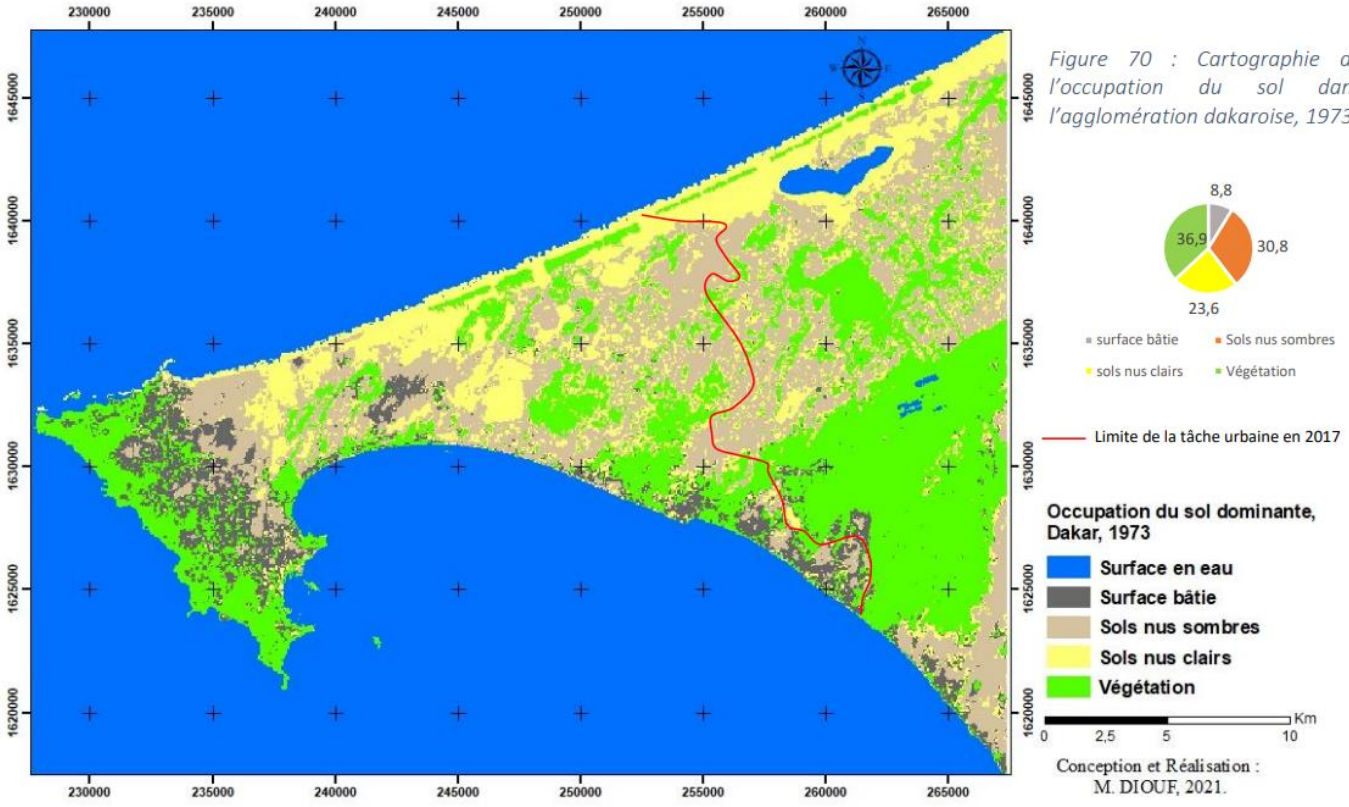

Figure 70 : Cartographie de l'occupation du sol dans l'agglomération dakaroise, 1973

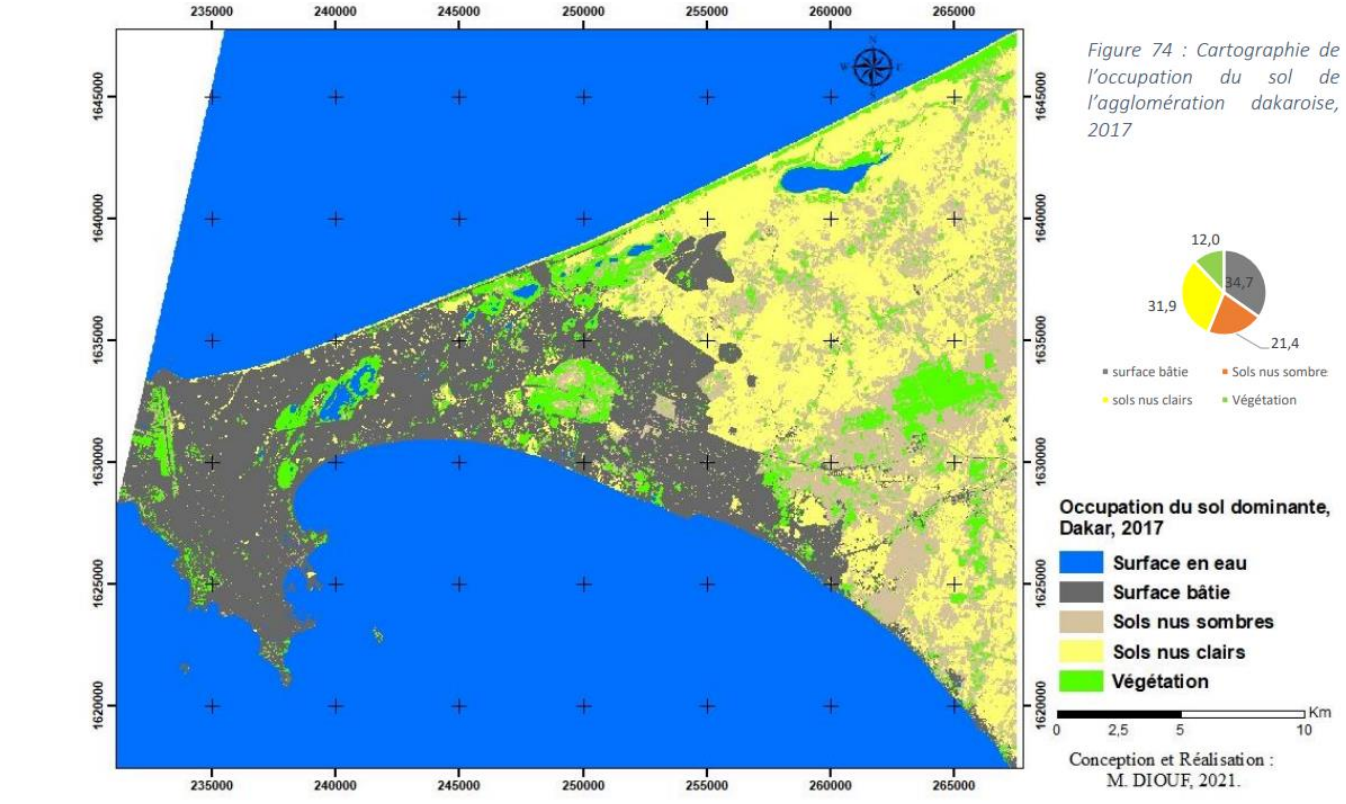

Figure 74 : Cartographie de l'occupation du sol de l'agglomération dakaroise, 2017

Figure 1 – The change in land cover on the Dakar peninsula between 1973 and 2017. Grey areas denote built up land, fluorescent green denotes vegetation, while other colours demonstrate clear and shaded soil. Sébikhotane lies just East of the map perimeters (270000, 163000). (Diouf 2022)

the city. Yet like the rest of the city the pressures of space on the cramped peninsular started to weave their way into every part of life.

Only those who proactively defend the space of trees saw any greenery remaining. The sound of construction dominate in all areas and in the rush to build, the streets constantly present new sets of obstacles. Sewers expand or promises of improved internet tear up cemented streets. Construction dust and pebbles mixed with the litter, often flow through gushing open sewers. My French-Senegalsese hosts were upset by the drastic daily changes that surrounded them. Without remaining vigilant, trees that had existed for decades may be cleared at a moment's notice. One-storey villas were extended on all sides, eating up any available space for extra rooms for rapidly growing families. As I ate breakfast, there would be shouting conversations up to the builders on neighbouring plots, haggling over which branches of the central mango tree could be cleared to facilitate cementing. Decathlon stores occupy the space where a small baobab grove used to stand.

Unavoidable, unrelenting changes were taking place in the city. What I had seen remained on the wealthier side of the city, with the city's disparities rapidly increasing and less well-off suburban areas, such as Pikine, seeming multiple challenges of wastewater discharge, seasonal flooding, unstable electricity supply, poor sanitation from waste dumping and unsuitable sewage management (MURHLE RoS, 2016). Dakar's population has grown 16 times since 1950 from just 230,000 people to roughly 4 million current inhabitants (Diouf 2022). The city's average yearly temperature has grown 5°C since 1950 while the area taken up by built land has quadrupled, from 40 km² to roughly 160km² since 1973; vegetation coverage has fallen by more than a third from 180km² to just 50km². The dramatic effects of this change are visible in Figure 1.

Concern for plant relations in the pressing social, economic and political human challenges of the city may (somewhat understandably) be interpreted as the misplaced handwringing of an uninitiated European. Yet I maintain that a focus on plant relations is doubly a focus on human relations, and such a focus directly addresses questions of quality of life and health, while also challenging the neoliberal values placed central in contemporary Senegalese urban design. Within Senegal generally models of healthcare provision are falling short of World Health Organisation requirements, with just one hospital for every half a million people, four times the recommendation of the WHO (Faye 2018). In Faye's (2018) study of the threats to medicinal knowledge in Senegal, we are reminded that impoverished and poorly educated communities (within Western terms) have always engaged in a well-established knowledge of traditional medicines and plant-knowledge, which is drawing increasing European interest within pharmaceutical industries. Yet when we turn to the Senegalese Ministry of Urban Renewal, Housing and Living Environment's (2016) plan for urban change we see that with explosive populations and unmanaged construction, many urban services are also becoming increasingly inaccessible. The closing down and exclusion of urban green space such as the forest of Mbao (Dutrait, Duperrex and Verger, 2024), and the graphs presented by Diouf (2022) highlight the extent to which vegetation is increasingly no longer easily accessible within urban contexts. As populations move to urban spaces, the question becomes less about the endangering and loss of certain species, it becomes more a question of to what extent plant-human modalities of care remain easily accessible to local populations.

Efforts to address the escalating problems of urban life in Senegal are taking place. Former President, Abdoulaye Wade (2000-2012) who initiated Senegal's developmental *Plan Sénégal Emergent* (PSE), envisaged a new economically active international West African business hub, with Dakar as its centre (Samb 2016). As part of this a new urban plan was drawn up to allow Diamniadio to become a new economic hub of business, industry and education, to relieve pressure on the city's old colonial centre and contemporary business hub, Dakar-Plateau, which is located at the furthest tip of the Cap-Vert peninsula (Figure 2). The report, within its plan for a *'City of Hospitality'* more widely recognises that the sustainability of the area in its current state, is rated as incredibly low. The first key issue in the report is a recognition that the ''The environment of the Study Area is deteriorating

with a decrease in green areas, farmlands, and wetlands and an increase in pollution of the air, water and soil. (MURHLE, RoS 2016, p.S-1). Further problems registered by the Ministry of Urban Renewal, Housing and Living Environment (2016, p.S-1) report is the 'inadequate control of urban development and limited supply of affordable and formal housing, are increasing the risks of disaster and aggravating the living conditions'. Much of this results in an incredibly inefficient movement of people and the inadequate development of appropriate infrastructure.

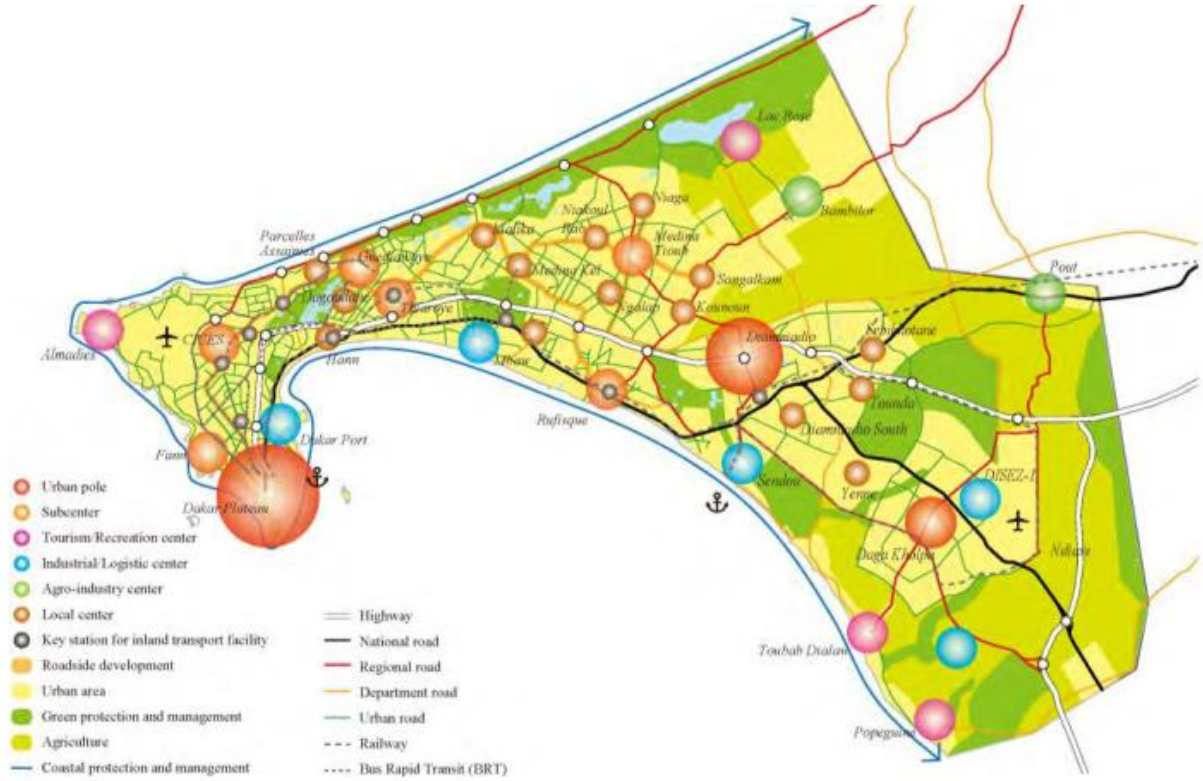

Figure 2 – Map of Project for Urban Master Plan of Dakar and Neighboring Area for 2035. A plan within Senegal's developmental Plan Sénégal Emergent, envisages the creation of a new urban pole, business and industrial centre at Diamniadio (centre of map) to relieve congestion at the central business hub of Dakar-Plateau (Peninsula tip). (Ministry of Urban Renewal, Housing and Living Environment, Republic of Senegal 2016)

Ultimately, however this thesis is not about Dakar, the research was not carried out in Dakar and the city was not the focus of the study. The geographical focus culminated in the town of Sébikhotane, which I argue is part of an unfolding and expanding urban frontier. Figure 3 demonstrate Sébikhotane important regional position, located as the furthest extension of the Dakar metropolitan area, East of Diamniadio. The town increasingly welcomes ta mix of those seeking to leave the overcrowding of Dakar, as well as migrants from the Senegalese interior attracted by the town's economy which has a favourable mix of employment in construction, heavy metal industry, agriculture and agro-forestry with cheaper rents relative to neighbouring Diamniadio. The town is a passing point for the Route National 2 to Thiès, a new national toll-road, the former colonial railway, the under construction rapid transit railway linking Dakar-Plateau to Blaise Diagne International Airport and a number of small surrounding villages, of particular interest to this research is the village of Yéba. In this sense it is located at the centre of one of West Africa's most rapidly developing urban corridors.

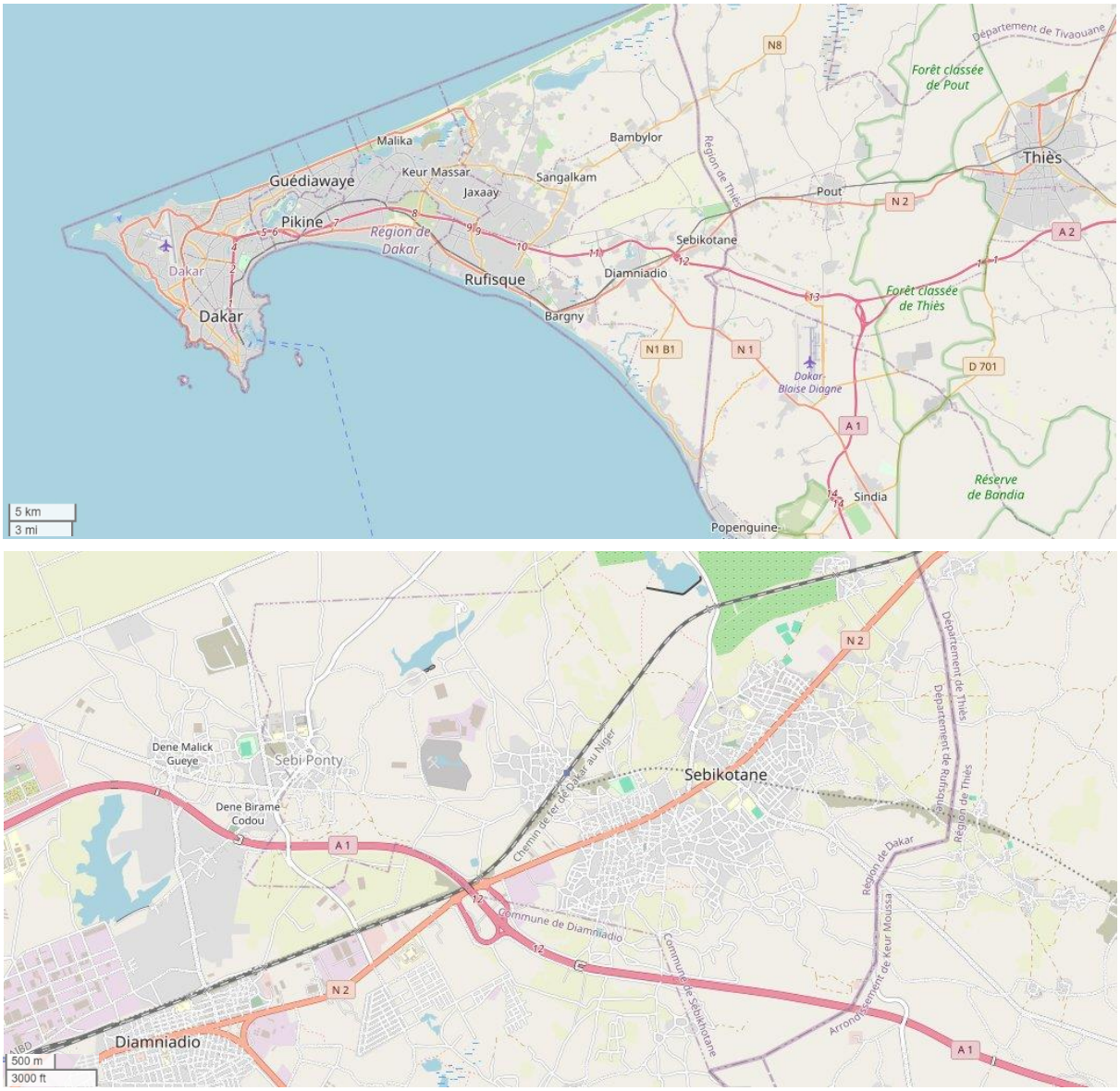

Figure 3 – Sébikhotane position. The former Dakar-Bamako colonial railroad is indicated by the thicker striped line. The route of the new Train Express Regional line is indicated by the thin dotted line cutting the town in two. The village of Yéba is indicated by the small group of roads on the bottom left of the lower image. The FabriMETAL steel factory is located just North of the central motorway junction, Someta iron recycling factory just East of the junction, the Gravita battery-recycling factory just South. Due to the extremity of pollution Gravita has since moved, further details in Chapter 4.

(Images from OpenStreetMap 2024)

Sébikhotane was formerly classed as a small village and generally lauded by the wider Senegalese population (who haven't recently visited) for its beautiful forest-scapes and idyllic nature. Like the wider region it has expanded rapidly with Dakar's urban boom. The town's former issues were limited to a growing corporate agricultural land encroachment (see Chapter 3) yet the principle driver of change is now the rate of construction alongside the arrival of numerous heavy metal industries, welcomed into Diamniadio new urban pole, most arriving in the last 15 years (see Chapter 4). Between 2002 and 2022 construction within the classified forest increased by 300%, while the amount of

exposed soils increased by 250% (Projet AirGÉO 2023). Part of this comes with the arrival of the new Train Express Regional (incomplete at time of writing), which is a final legacy of President Macky Sall's (2012-2024) claim to infrastructural development, connecting the Blaise Diagne International Airport to Dakar-Plateau, itself completed in 2014.

1.2 Patchwork/Patchy Ethnography? Plant-Human Intimacies and Senegalese Plant-Knowledge

While the research is not always entirely focused on Sébikhotane, the town makes up the majority of my field experiences, and beyond some brief reflections on rural multispecies labour in Chapter 2, it is the focus of my studies. I offer my ethnographic work here then as a contribution to focus on this particular patch within the damages of the Anthropocene. While a small geographical area, through embracing patchy approaches, one becomes able to talk about much wider processes at hand. Anna Tsing, Andrew S. Mathews, and Nils Bubandt's (2019, p.S186) write in *'Patchy Anthropocene: Landscape Structure, Multispecies History, and the Retooling of Anthropology',* that the patchy Anthropocene is 'the uneven conditions of more-than-human livability in landscapes increasingly dominated by industrial forms'. Crises of the Anthropocene, they argue, require an anthropology 'that takes landscapes as its starting point and that attunes itself to the structural synchronicities between ecology, capital, and the human and more-than-human histories through which uneven landscapes are made and remade'.

I build on their ideas by integrating other ideas within multispecies studies, such as those which take seriously 'Intuitive Interspecies Communication' (Barrett *et al*. 2021). Where most studies in this field have focused on animals, I interpret this approach, within this more plant-focused setting, as a fundamental demand to recognise the ways in which knowledge, particularly environmental and interspecies knowledge, is embodied in daily, banal actions, which operate through extra-sensory means, those means of understanding plants which extend beyond our typical understanding of sense. How, for example, an understanding of the medicinal qualities of plants comes to be integrated with a different way of looking, than that of the typically geographically distant research of (European) university institutions. Turning back momentarily, for example, to the conversation with Ibrahima in the theatre of the Haitian poet, as he pulled leaves from the Ngigis to bring to a neighbour, I asked:

> *P: How do you ask permission from the tree?*
>
> *I: in Senegal there are multiple ethnicities – there are Wolof. In Wolof there are two words, lay and niass – for plants don't have thorns, in Wolof we say garab nam lay. Then we say Bismillah, because Bismillah is that which opens everything in the Quran – bismillah, it's the beginning of everything. So you say Bismillah.*

The Quran becomes mixed with African traditions, themselves a blend of ethnic differences and cosmologies, different outlooks between Wolof and Serer, all in a dialogue with the Ngigis. This dialogue, which is part touch, part speech, part spirituality, memory and part genetic, biological complexity, part ecological damage, all comes to the surface in the minutiae of plant-human relations. It is the entirety of the relationship that interests me. Naturally it is impossible to always capture every element, but through 'patchy' ethnographic methods I hoped to be able to expand the agency of the plant, paying attention to plant's sensory capacities and the expand the legitimate yet undervalued knowledge that could be found within the relationships between plants and humans. Faye (2018, p.94) asks:

> *How should we understand ethnicities that engage in processes of trance by using the fibres of the Ngigis, or recite incantations as they heal?*

Can you understand the relationship between a plant and human if you remove the details of the entrancing animist rituals or the Quranic incantations? Faye suggests that the power of the plant, in its medicinal qualities comes from the entirety of the relation. Its power is validated only by the "value of the offer to the plant, the correct harvesting time, the verbal acknowledging of the plant, the position of the plant harvester who must avoid cutting their shadow if it appears on the root" (*ibid.*, p.98). Plants interact with humans in extra-sensory ways, which often exceed the bounds of rational understanding.

Senegalese, and more widely African, understandings of these extra-sensory capacities, remain missing in academic research. A mixture of a lack of institutional university funding, a lack of trans-continental research collaboration and political instability, make coherent, over-arching studies of the state of African fauna and flora limited, and knowledge of environmental change patchy. During my own fieldwork period in Senegal, I visited the Université Cheikh Anta Diop several times. Supposedly one of West Africa's most prestigious universities, with impressively accessible entrance fees for Senegalese students, I found the campus eerily abandoned on every visit. Protests against the then-incumbent President Macky Sall had been led by students, and the campus was deemed too dangerous to continue studies. Armed police guarded the entrances; cows roamed the campus interior. It remained this way certainly until the election of a new president, which came in the tumultuous start of 2024. The one-time activity I saw on campus was a conference on African Literature and Ecology, where professors jetted in from European and South-African universities to muse on the state of African Ecology through literature (largely printed by European publishers). Within this context, the study of plant-human relations remains underdeveloped within local African contexts.

Faye's (2018) study of medicinal plants in Senegal is a rare exception in environmental research. It's strength is its regionally focused study of local knowledges, which includes 132 interviews across 24 different locations spread between the Niayes region, the Saloum delta, the Ferlo reserves, and the National Park of Niokolo Koba. It specifically avoids carrying out studies within more Southern regions, such as the Casamance, as there is a general understanding that the enormity of the tropical forest in this region means most of these species will likely exist in some form. The study, targeting traditional practitioners of medicine is however an attempt to understand the extent to which such species are still directly available to some of the most urbanised populations of Senegal, with a recognition that "there are some significant threats to Senegalese local traditions… herbalist practises and markets will soon suffer profound unchangeable environmental mutations within African cities" (*ibid.,* p.36).

As Abbott (2021, p.1059) highlights: "consideration of trees has historically been confined to disciplinary, quantitative perspectives embedded in botany, earth sciences, resource management, environmental sustainability, and sustainable development wherein trees are largely viewed as senseless, bio-mechanical matter to be controlled and used for human consumption and economic gain", yet ultimately plant and human lives are fatally entwined. Western studies of Southern or indigenous environments, particularly in the study of trees and plants can, barring some key exceptions, largely be divided into three methodological camps: molecular, or sub-plant analysis, satellite analysis, and studies which ignore Africa. Ethnopharmacological alongside fields such as agricultural studies tend to explore the dynamics of molecular compounds of plants, trying to extract information to facilitate plant manipulation for a specific economic output. The results are explained in an extortionately isolating jargon of intricate chemical terms, breaking down a plant's essence into

a specific chemical compound, likely extracted through a gel, itself developed through centrifugal action. Earth science or resource management approaches explore the African environment through landscape analyses of satellite data, where individual species are rarely identifiable and whole ecological lifeworlds are summarised in pixels. Ethnobotanical studies, for their part while often exploring wider social relations of plants and humans, often engaging in relations with indigenous or Southern communities, often conveniently tend to skip over the African continent. Seemingly anything of interest in the field is taking place in Asia or South America. While all of these frames of studies certainly have their legitimate uses, there seems very little space for an African middle-ground, where local plant-knowers are invited to speak about the plants they regularly relate to, and where there is an extent to which African environmental imaginaries are invited to collaborate in a research agenda. Long, distanced gaze on African ecological relations requires a fundamental re-evaluation, if not at least it requires a complementary ethnographic, regionally or locally focused study.

This research using the notions of a patchy or patchwork ethnography creates a space for the broad variety of relations between plants and humans to unfold, following the knowledge of Senegalese plant-knowers. I refer to the 'intimacies of plant-human relations' because this research is about "embodied, sensuous research and experiential understanding" (Abbott 2021, p.1066). In their 'Manifesto for Patchwork Ethnography', Günel, Varma, and Watanabe (2020, p.n/a) reflect that ethnographic approaches fail to reflect how research is 'reshaped by researchers own lives and our multiple professional and personal commitments'. Part of these intimacies of the research is thus exactly this, trying to be true to my own personal experiences within the fieldwork, my interpretations of research subjects, humans and nonhumans, and reflecting on the limitations of my own personal approaches, and in this way recognising the limitations of research practises in general. My methodological approach, which integrates photographic practises alongside interviews and more ethnographic (more-than-visual) observation are themselves constituted by 'fragments, gaps, and absences' (Günel, Varma, and Watanabe 2020, p.n/a), aporias which leave room open for thinking.

As I reflect in Chapter three, part of this comes from a visual impairment of my own but part of comes from failing to sense beyond these means, failing to be able to engage with plants, and having to relearn how to engage, in order to better understand the more-than-human communities I interacted with. Contemporary multispecies approaches are engaging in conversations which explore, question, undo and rebuild the boundaries of interspecies communication, pushing for more intuitive and embodied understandings of the species around us. Recognising the knowledge of plant-knowers, particularly recognising the informal knowledges of everyday or banal plant-experts, is in part an attempt to legitimise and take seriously a study of human intuition. Where intuition is recognised as a serious and legitimate aspect of knowing, integrated into vegetal experts daily encounters with their environments. Such an argument builds on a growing recognition amongst plant physiologists (Mancuso and Viola 2015) and fungal biologists (Sheldrake 2020; Simard 2021) that human life is dependent on vast plant, fungal and other nonhuman networks which remain entirely overlooked and largely misunderstood, with roughly 95% of fungal species supporting plant life yet to be named (Sheldrake 2020). If academic, Western, institutionalised science has no name for these species how can we know them? Where might one find a source of knowledge capable of interpreting the life-worlds of these species?

1.3 Research Question, some definitions and thesis structure

This research takes place from the ground-up, starting in and amongst the plants that are most significant to Senegalese life, guided by experts who have experienced ecological change directly

across several decades. People I refer to as plant-knowers have a form of 'vegetal expertise' which I aimed to recognise as broadly as possible throughout my study; operating with a basic ethos that those who live amongst the threatened plants are likely the most capable of understanding them. This ultimately comes to include 27 interviews with 18 individuals, who vary from photographers, cooks, agro-foresters, PhD ecology students, professors, poets, entrepreneurs to gardeners, with many more inbetween. With some key plant-knowers, I carried out various interviews, although in most settings interviews were almost entirely unstructured. They were more accurately described as conversations which I recorded, always with consent beforehand, wherein I had rough ideas of what I wanted to learn from someone. Most often allowing people to speak opened whole perspectives on plant-human relations which I would have been unable to consider on my own.

In this thesis, I pay attention to the broad variety of these stories of plant-human relations, foregrounding plant-human interdependence and mutual vulnerability, while highlighting and interrogating the ways in which Senegal's galloping shift to urban life reorganises these relations. While initially aiming to focus on one species of tree, the Kad (Chapter 2), I expanded my focus to allow a number of local plant species to act as points of reflection for wider plant-human relations in this context of urban change. I ask primarily:

How does paying attention to plant-human intimacies allow new insights into the eco-social upheaval of Senegalese urban life?

Secondly, on a more theoretical or philosophical level:

How can research tending to plant-human relations open up space for different (non-human) values to make-sense in a dramatically changed ecological setting?

I use the term ***eco-social***, to expand the sense of a 'social community' beyond the human, to recognise the role that plants, fungi, bacteria or animals may have in generating a lively more-than-human society. Further to this, I understand the term ***non-human*** in a Venn-diagram biological sense, as in anything that is literally not a living human. I try not to place any positive or negative value within the terms human or non-human, they are simply there to allow a distinction and to pay attention to the ways non-humans may otherwise be excluded from research practises. Similarly, **more-than-human** has no positive or negative value, but is a term used to recognise communities beyond humans, although this differs from non-human, as it sometimes also includes humans. At times I refer to animals in a general sense, I include humans within the category of animals.

The term 'make-sense' here in this setting is perhaps more complex to explore, although I touch on it in all chapters, particularly so in chapter 3. Briefly, it is an attempt to expand the legitimate modes of understanding the world, to plant-based forms of sensing, paying attention to the ways plants make-sense of the world. Drawing from IIC, across all interspecies communication there must be a basic recognition of the uncertainty of communication or translation. Before engaging in interspecies communication, it is necessary first to recognise the sheer variety of potential styles of communication, which often extend far beyond typical human understandings of what communication entails. For example. Barrett *et al.* (2021, p.151) suggest proximity to a being is not necessary for communication because an exchange need not occur between beings who are in direct physical proximity, communication can take place "without the need for proximal visual, auditory, olfactory, voice or other cues humans normally associate with direct interactive communication". Alexander (2017, 6:00) similarly argues "even if you think it's your own thoughts, realise that the tree's intelligence is overlapping its messages with your [individual] sensory system." Plants, often in partnership with enormous, distributive fungal networks are capable of widespread, more-than-

human sensory communication by constantly measuring gravitational and electromagnetic fields, as well as numerous chemical gradients throughout the air and soil (Mancuso and Viola 2015). Plants often act as colonies, their intelligence distributed between all the different cells in their bodies and further communicated through fungal soil networks which generate ''spatial, non-local aspects of morphic fields within and around entities'' (Abbott, 2021, p.1066). Such an approach allows sensory analysis to expand beyond the five main human-centred senses. In chapter 3, there is a particular attempt to focus in on embodied sensory modes, including intuition, and move away from visual/ocular centric forms of sensory understanding.

Going forwards, chapter two is a brief step away from urban spaces to explore how the exhaustion of rural multispecies relations pushes younger populations into the cities. Chapter three starts to engage in-depth with plant knowledge, sense-making and observation beyond the visual, within the overwhelming context of an agroforester's protective personal garden. Chapter four engages in walking-photographic methods as a means to understand the town of Sébikhotane. Building on the field encounters across numerous walks in collaboration with local photographer Cheikh Junior, I interrogate how the displacement of earth and the corporate control of land affects small-scale farmers and the withering relationships between local women and the Kinkéliba plant. The final chapter reflects on the work of the wider research community within which I was welcomed into, le Projet AirGÉO, and the pressing questions that remain over the imagined futures of toxicity and plant-human relations throughout the town, drawing on fieldwork with ecology students from the Université Cheikh Anta Diop within the protected forest of a catholic monastery, as well as the vegetal verges of Sébikhotane's heavy metal industries. Here I also present a glossary of select species encountered on fieldwork.

1.4 Research Participants

Below I offer a table of research participants with whom I had key discussions, the main chapters in which they are relevant, their general spatial affiliation, whether they were involved in the *Projet AirGÉO* or not, and brief details regarding their occupation. This is not a full list of all the people I interviewed (18), but the interviews that seemed most relevant or insightful.

Participants' names are real. Further details on members of Projet AirGÉO can be found on their website. None of the listed participants requested anonymization when offered.

Table 1 – Key research participants as presented in the thesis

Name	Based in	Involved in Projet AirGÉO?	Other details
Aminata (Chapter 4)	Yéba, village outside of Sébikhotane	No	Director of women's entrepreneurial association
Awa (Chapter 4)	Dakar region	Somewhat	Chef and domestic worker
Cheikh Junior (Chapter 4)	Sébikhotane	Yes	Photographer
Claire (Chapter 5)	France	Yes	Eco-poet and Researcher
Ibrahima (Introduction)	Dakar region	Somewhat	Gardener
Marion (Chapter 4)	Dakar and France	Yes	Director of Kër Thiossane
Maximilliane (Chapter 3)	Sébikhotane	Somewhat	Agro-forester
Mayoro (Chapter 5)	Dakar	Yes	President of Association G.A.R.A.B and Assistant Researcher of Projet AirGÉO
Mbaye (Chapter 2)	Baol region, South of Touba	No	Farmer
Yann (Chapter 5)	Dakar	Yes	Anthropologist at Université Cheikh Anta Diop (Senegal), Centre National Recherches Scientifiques (France). Lead Researcher of Projet AirGÉO

1.5 Research Participants: Key Plant Informants

Recording conversations was fundamental within the challenges of language. Not only was my French imperfect, plant species were all constantly being referred to in at least four different languages: French, Wolof, Serer, Latin; none of which are my native English. Aminata (in Chapter 4) who lives in the village of Yéba, for example, was likely naming Serer names of plants, where people in Sébikhotane, just down the road, may be naming them in Wolof. Educated specialists in plants largely referred to them in Latin or French, but may sometimes know the Serer of Wolof name, depending on their own background as in the ecology students in Chapter 5. An argument could be made for having created a photographic list of all plants, so that everyone could name them as they wished or recognised them, however the fundamental reality of Sébikhotane meant that it was hard to photograph everything because species were so scarce. Furthermore, reference guides to plants, such not to be that thorough and prioritise regional plant collections rather than exhaustive nationwide collections. There was no established guide to plants in Sébikhotane, other than people, yet people were often just as unreliable for many other reasons: distraction, tiredness, or lack of interest, being the main reasons.

The various names of a tree uncover specific details of the tree's movement. Some details being more obvious than others. Faye (2018) notes the histories that can emerge in a plant-species name, arguing that "Senegal has always been the showcase of research material in many agricultural, forestry and educative domains, as can be seen in the widespread presence of '*Senegalensis'* as a term given to many plant and animal names" (p.134). The *Khaya Senegalensis* even borrows its first word directly from the Wolof name 'Xai'. European naming has however not been always so unashamedly generous in recognition of Senegalese species diversity. The story of *Faidherbia Albida's* is explored in the following chapter.

Below is therefore a very short glossary of significant species encountered during the fieldwork. Throughout the thesis, I use the terms used by the research participants to refer to the tree in the language they use. When the tree is first mentioned in any language I also include the Latin name. I offer this table as a playful invitation to the reader to actively challenge and separate out trees from one another while reading. I also hope the table serves as a basis for understanding the complexity of carrying out such research while operating in a multilingual environment, where any tree's named must constantly be cross-checked in multiple different guides to be able to follow the story of a specific species. At times, working out specifically what tree was being discussed at any point was a matter of detective work, rewinding and relistening to audio tapes over and over, while comparing photographs of leaves to Wolof or Serer names.

This is a reference only for the trees which are significant within the write-up of this particular research, it does not include all the trees encountered in ecological surveys on fieldwork. A full list of surveyed plants can be found in the appendix, these are however only offered in Latin (cross-referencing and correctly spelling 70+ species names in four different languages would have been unreasonably tedious, and also not reflective of the limited references made to these trees in the fieldwork encounters I had).

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Table 2 – What's in a name? Key plant species across the thesis and their names in 4 languages

Latin Name	**French Name**	**Wolof Name**	**English Name**	**Brief notes**
Ceiba pentandra	Fromagier	Bèntéñé	Kapok	Fast-growing large tree, used to make pirogues
Combretum micranthum	-	Kinkéliba	-	Small shrub emblematic of Sébikhotane, leaves create a medicinal anti-diabetic tea.
Faidherbia Albida	Acacia Albida	Kadd	White Acacia	Supports agricultural soil development, loses leaves in rainy season
Khaya Senegalensis	Cailcédrat	Xai	African Mahogany	Large tree with medicinal bark
Piliostigma Reticulatum	Semellier	Ngigis	-	Medicinal toothache plant, considered heavily threatened or extinct within urban Senegal

2. Kad-arachide-human labour: agriculture, exhaustion and the limits of multispecies collaboration

Arachide cultivation, known in English as groundnut or peanut, has long driven Senegal's economy since its colonial introduction as a cheaply produceable crop, highly valued on export markets for its sources of vegetable oils and fatty acids. While useful for stabilising national economies and creating quick revenue source, arachide has left a lasting legacy in fundamentally reorganizing much of Senegal's rural economy around the crop's production. Peanut production is a multispecies affair which draws together some of the most exhausting forms of labour, by both humans and plants, which operates in a complex balancing act to sustain livelihoods and lifeworlds on the edges of the Sahel.

My initial research proposal aimed to explore the role of one particular tree, the Kad, and its role as a plant-mediator, as it facilitates and balances the minutiae of field chemistry, biology and socio-ecological conflict through its inverted seasonal rhythms. Through my first few weeks in Senegal, following this tree through three or four different settings, from the deep heat of the Diourbel region, via Thiès to the more lush coastal fields of Toubab Dialaw, I found this style of research challenging because of the tree's relentless proximity to multispecies exhaustion. Communities that depended on the work that the tree did, in feeding soils and cattle, were often at the harsh edges of agricultural sustenance, with younger family members keen to find a way out of farming. After several weeks following the tree I opted to expand my research beyond this singular species to explore the potential for other species to provide stories beyond exhaustion, an exhaustion which I had also felt seeping into my own body from the environment.

This chapter is then a story of this exhaustion. I draw on how the embodied experiences of farming in soils, plants, trees and humans drive a shift away from the rural, and a rejection of plant-human collaboration in search for alternative sources of energy and life, beyond the arduous monotony of the field.

2.1 Mediating soil: Kad and the delicate balance of farming

When the Dakar-Bamako railroad was launched in the late 19th century, it was declared by the French General Faidherbe that the railroad would act as a new 'line of penetration' throughout the country allowing the nation-state further inland (Surun 2011). Railroads entered what was seen by French generals as virgin territory or 'Terres Neuves', despite the ongoing presence of Fulani pastoralists, in doing so they broke the economic dominance of African groups in local economies (Pheffer 1975). Around train-lines new easily accessibly land would become available allowing farming and new peanut-based extractivist economies to sustain the needs of the French metropole through the exporting and sale of peanut oil, at the time a lucrative good, much like contemporary palm oil (Pires 2012). Agriculture by early farmer-settlers often depended on peanut-based ecological monocultures, although techniques of crop rotation, fallowing and the support of Kad tree's inverse seasonal effects allowed increased soil stabilisation (*ibid.*). The Kad's Latin name *Faidherbia Albida* thus pays tribute to the historical moment of the expansion of peanut cultivation across the country, along rail-lines wherein this tree-soil-mediator sustains life, through strengthened soil, in an otherwise highly challenging environment.

I first encountered the Kad near Diourbel, in a village that had cropped up along the now redundant trainlines of Figure X. Visiting my Wolof teacher's family, based in a village south of Touba. Here I spent a week with the family farming; helping weed their fields of millet, peanut, haricot beans and hibiscus.

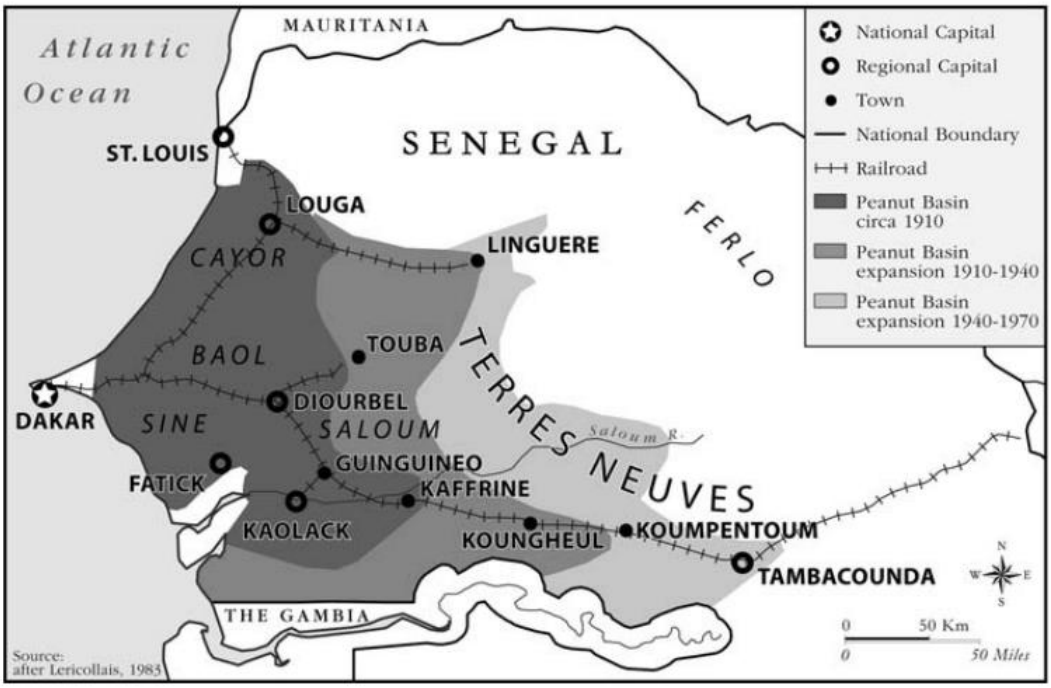

Figure 4 – Railway expansion and the formation of new 'peanut basins' from 1910 to 1970. (Pires 2012)

With the trainline long redundant, the village was based on the RN3, a fast, rumbling road running from Diourbel to Touba. The village balances its economic life on a mix of small boutiques, the local school and small-scale agricultural production. The village was made up of various family compounds, each home to large families of roughly twenty to thirty people. It was the rainy season when I visited and occasional migrant workers drifted through, working on electrification or water infrastructure projects. There were tailors, mechanics, kiosks, and a small police station but primary incomes in the area depended on peanut production. In this Baol region there were certainly no problems with limited sunlight, but the hot, dry climate and soils meant that even while agriculture was the main industry, there was little scope for variety. Maintaining good agricultural practise was a delicate balancing act of minute chemical and biological processes, a successful crop required farmers to balance nitrogen, water and sunlight for photosynthesis, without stressing the plant through excessive heat exposure, all while protecting against animals and pests.

Mbaye, the head of the household I was visiting, had previously run small boutiques in Dakar and Diourbel but in the long summers between studying he taught himself how to cultivate. These were the drought years of the 1980s, when conditions were particularly challenging, yet he suggested agriculture became his love:

> *"I cultivated what I could, just a little. But in French we say 'C'est en forgeant qu'on devient forgeron' [In forging, one becomes a blacksmith]…*
>
> *Nowadays everyone asks me about the fields: how to cultivate, how to weed, when, especially when, is it one should work the field …*
>
> *The cereal that we grow the most here is the millet suuna, this millet is very very very technical. There are moments when it needs heat, moments when it needs cooling, moments when it needs sunshine, when it needs wind, when it needs to be weeded. One must know those moments."*

Learning how to cultivate these plants during one of Senegal's most significant contemporary droughts, when studying and business was slow, required a gradual self-led attentiveness. Coming from a family typically from merchants, it was agriculture, and paying attention to plants, that allowed Mbaye to find a way to earn a living from the village. Garnering expertise over the years meant that he was now the reference point for others trying to learn.

On my first morning in the fields, we ate a quick half baguette with haricot beans and left on the donkey cart to the fields. There were maybe six or seven of us, everyone working the family field, the youngest son maybe just five years old with the rest of the boys staggered ages up to their mid-twenties. Families each had fields of roughly six hectares, and each family grew the same mix of beans, peanut, and hibiscus, rotated each year with the nearby millet fields. Distinguishing between the haricot, peanut and diversity of weeds was relatively easy. I came to recognise the distinct 6 leaf pattern of the peanut and the long winding stems of the haricot with its broad, flat fat leaves. Each weed tangled in a specific way; with some you had to follow the stem to the base and others were a quick easy tug from the leaves. There were tall grassy types and others which resembled British ferns, some were metres long and wound around peanut stems, blocking the haricot bean path.

We had set off early, but it was already hot, by midday we were likely to approach close to 40 degrees. I wasn't sure I'd eaten enough but was working on the generosity of the family who had arranged to host me. I sipped an enormous water bottle every few minutes, and even though I worked in the small patch of shade available, I quickly reached my limit after just over an hour's work. One of the son's explained their method of working, it was based on Taylorist economic principles, each had their own stretch of field, maybe a metre or so wide, and would work up through the field. That way each person could check how well they were working. I felt the words of former President Abdoulaye Wade, were being echoed in the field, his image and *Father of the Nation* could be spotted on walls throughout the village. Wade's neoliberal development had pushed the *Plan Sénégal Emergent* and the ambition to create Senegal, with little natural resources, into an '*atelier de production'* comparable to Tunisia (Samb 2016).

We picked with one hand and collected with the other. Weeds were deposited in open spaces to allow decomposed nitrogen back into the soil. Compost was hard to come by; every piece of organic matter available was returned to the soils where possible:

> *Lots of people don't make compost because they are lazy. They don't want to work during the dry season. It's in the dry season that we make compost, we work, put it in the fields, work, put it in the fields, work… Lots of people leave for elsewhere to search for work, they leave the fields like that. If people stayed during the dry season, there would be more, but never enough. The demand is strong.*

Millet *(suuna)* is the primary cereal of the area and the carbohydrate basis of human existence in the region. It is nitrogen intensive but a particularly hardy, drought-resistant crop. Peanuts are often planted alongside haricots, conveniently, both of these are very efficient nitrogen fixers, while also providing strong sources of protein and fatty acids (Hamidou *et al.* 2018). Peanuts and haricots fix nitrogen through a special relationship with *Rhizobium* bacteria which operate within their root

networks (*ibid.*). Without this relationship, gaseous nitrogen (N2) would remain inert in the atmosphere. *Rhizobium* bacteria break the tight atomic bonds between nitrogen particles into ammonia (NH3), providing peanut plants with direct access to Nitrogen, the principal element of soil fertility, in exchange the plant roots offer bacteria simple sugars to encourage further cultivation (Mancuso and Viola 2015). As we worked the fields, Mbaye's eldest son demonstrated how the peanuts would be cut, just above the legume to allow the most nitrogen rich part of the plant to return to the soil. As this plant would decompose, the nitrogen would return. The millet, rotated onto the field the next year, would have the strong nitrogen-base needed to grow its (up to) four-metre height each rainy season. Bacteria-plant-human was the basic recipe of collaboration that sustains life in otherwise deeply challenging Sahelian climates.

Photograph 2 – Weeding amongst peanut leaves in the sandy soils of the Baol.

One of the central parts to the productivity was however clearly the Kad tree. Dropping its leaves in the rainy season, the Kad added much needed nutrients through decomposition, while allowing plenty of sunlight through at precisely the moment the crops photosynthesise. In the dry season as the fields empty, herders come to feed their livestock on the newly budding leaves of the Kad. Livestock droppings then also further enriching the soils. The cumulative nutritional effects of the Kad were clearly notable. In perfect circles around each tree the crops would be taller, denser, stronger. Their strength a mixture of leaf mulch, cattle dung and well-timed photosynthesis. The yield of the peanut fields was greatly enhanced by these trees. New Kads were however unlikely to emerge. Many trees were cleared by those looking for firewood. Mbaye could identify many saplings in the fields, they had been there for years, but each year they would be cut back for herders' firewood. There were other trees here, but as far as Mbaye was concerned, they were redundant; fodder to protect the Kad. So long as these other trees stood, he said, they won't cut down the Kad.

Between farmers and herders, the tree acted almost as an ecological mediator. Common ground could be found in the importance of the tree which would feed both the herds and the soils.

Likewise the small attentive efforts of Mbaye's family: clearing weeds, cutting the plants at precise points, decomposing weeds far from the Kadd to distribute any remaining nitrogen, the semi-obsessive compost development; all allowed the family to complement the work of the tree and increase peanut yields outside of its influence. The collective work between the Kad, the family, herder and cow dung, and millet-peanut crop rotation allowed for a delicate point of nutritional security.

2.2 Escaping exhaustion: life beyond the Kad

Photograph 3 – Kadd on the outskirts of Baol villages, rainy season.

As we progressed through the field, a daughter of the family joined us. She was hoping to join the army and weeding was her training in intense physical work. Like most of the young people in the village, she had interests far beyond agriculture. Languages were a big opportunity and girls, increasingly learning French, also attempted small phrases in Spanish. Throughout the village, with school terms not yet having begun, there was an energy of young vitality I had never quite experienced in Europe. As darkness descended, evening culture, tea, coffee, Wass drinking, was dominated by the exchanging of teenagers' petty cash. Throngs of 12 years olds crowded the small paths, interspersed with the occasional village elder striding through the masses. Working adults were nowhere to be seen. During the afternoons crowds of boys jostled the football pitches while the girls wound their way quietly around the basketball courts.

Mbaye lamented this future of the village: young people were only interested in football, Europe or studying. The harvest season clashed with the school calendar, and Mbaye, like most, now depended on the migrant labourers to help with the harvest. Previously it had been a whole village effort. Farmers throughout the village would work together and rotate through the fields gathering produce. Although they would go unpaid, the cost of feeding neighbouring villagers for several days harvesting now worked out more expensive than paying a few days wages to Southern Senegalese, Guinean or Malian migrants. Mbaye preferred the migrants: these were good workers, they would sleep in the open, get up early, work long hours and move on when the work was done. They didn't

need to waste money on a room. Younger generations didn't want to work the fields and were more busy with education. I didn't have time, space or enough Wolof to properly interview younger generations, but walking to the football fields, and to nearby lakes or watering holes, it seemed clear that life started outside the field. Away from the *Kad,* there was space for enjoyment.

In another Kad-peanut field, on the other side of the country, I had heard a similar story. Ibrahima had introduced me to a friend in Toubab Dialaw, a traditional healer, who in this coastal region had far greater diversity of plants and trees, with much richer soils, than the village in the Baol. Yet he too would find no way forward for his children in agriculture. His sons were uninterested and only his fishermen friends, on days off from the sea would come and help him weed fields or gather crops:

> *Yes, cultivating isn't simple. Before we used to do it as a family but with new generations it's difficult. They don't believe in it, they work in other things. All the people that help me here are people I know, friends, people from school. It's difficult now. People go to the school, they go to the city.*
>
> *But also, there's a problem with the state. Why do I tell you that? Because they don't give opportunities to farmers to encourage them, or to give them options. If you imagine the dry season gets longer, the unemployment it's difficult, when you have unemployment, you need ingredients, its difficult, when you wake up to harvest, its difficult, you see it discourages people, its not encouraging. If they gave us little things we would be more encouraged*

His sons, were now away, developing their education or employment opportunities in Senegal's cities. The two younger daughters were still around helping prepare meals, and the school term would not yet begin for another month. Even Ibrahima, not a farmer but a gardener and traditional healer, saw no future for his children in his line of work. His son was excited to finally earn money in the police. It was the cities where opportunities were. While I could only see construction eating up the city, dominating and clearing land, the species-rich brush being decimated around urban peripheries. For younger generations who grew up near fields, it was the grinding, exhausting boredom of agricultural work, that made them desperate to make their mark elsewhere, to explore life's options.

In these fields, I could not draw easy conclusions with the older men that I came to interview. Heads of households, I sometimes felt it was a symbol of respect or duty to engage them in an interview. Yet in the Baol, I felt I learnt more from an evening on the young crowded streets than from the sluggish mornings working the field. Even when my largely absent Wolof meant we could barely talk. Similarly, the absence of the farmers' sons in Toubab Dialaw and the older men assembling in another peanut field, showed where the younger energy was (not) being directed. Away from fields and away from the *Kad* trees, the *Plan Sénégal Emergent* set up by Wade and continued with Macky Sall's infrastructural dreams, was drawing the energy of youth to the cities.

3. Tending to Plants: Health, Virality and Death

I was keen to move away from the Kad. My last real encounter with those trees took place a few weeks later in a field South-East of Thiès, where they once again dominated the landscape. Here there were however ambitions to expand the range of tree species. I was accompanying an agro-forester, Maximilliane who had been hired by a family to provide consulting on the most effective use of the field, which they had recently bought. The family lived quite some way away, close to Dakar, but the field was to be run by the two daughters, as an additional source of family income. The parents would build a house here and the whole family could come along on weekends to work and tend the fields. Maximilliane explained the field had been expensive and I got the loose impression this was likely a more middle-class family than others I had encountered before. I was curious who had previously owned the land, who this family were and what had encouraged them to buy a field so far away from their home. Maximilliane did not know who owned the field, but mentioned that:

> *Usually it's the same reason – the people are old they can't work anymore – they sell because the children have left – I was in the village but I never saw young people. All the young people have left. You don't see families. Because if you are young what will you do here, I would have left for the [Catholic] missions*

The story by this point felt like old news, I wondered whether I would learn anything new. Maximilliane took the time to explain how the field could be transformed into a small-scale orchard, supporting mango and citrus trees. This variety of species would have been unobtainable in the Baol region. Here in Thiès, we were on the most Easterly edge of the Niayes region, a climatic and hydro-geological zone, which stretches 180km along the coast from Dakar to St Louis and 20km inland, where cooler coastal winds combined with more complex soils, allow for a high level of agricultural productivity. He again explained what to plant where and when to develop a profit. It was too late for watermelons and the well would need developing if the family were to try such a hydrologically intensive crop. Mandarin would be better at the family's other plot of land near St Louis, they benefitted from the cooler Northern air.

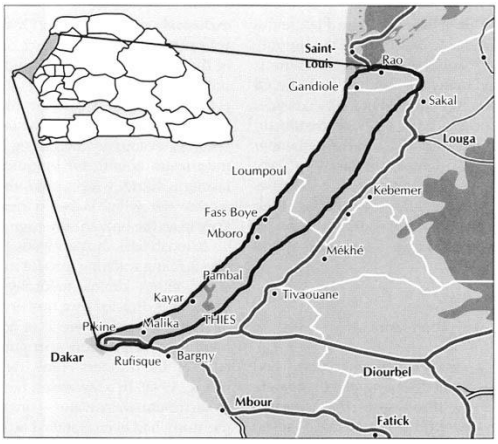

Figure 5 - The Niayes Region. (Pires 2012)

3.1 Virality and Pan-African Ecology

Maximilliane would sell trees to this family from his own nursery, this was however no straightforward activity. These plants were very much integrated into growing global networks of economic and ecological relations, Maximilliane explained:

> *Because we work on diffusion, the propagation of species, it must be controlled. If propagation is not controlled, we have the risk of disease. If species are sensitive to diseases. The tristeza is there, it's the biggest illness amongst citrus fruits, the tree dies slowly and that's a catastrophe for orchards.*
>
> *In the Mediterranean they have a lot of this disease. So, we have a problem, when people go to Morocco, they see nice fruits and they bring grafts, or fruits. More and more Morocco exports fruits to Senegal, and this exportation means*

> *there is no phytosanitary check. Normally at borders this should be done, to see if this mandarin is affected by diseases. Containers arrive in Senegal which are not properly controlled.*
>
> *There are small-scale orchards, these are amateur orchards without training, so you rarely see an orchard of more than 40 hectares. From this fact there is no training. The guys know how to cut a plant, graft, and plant but there is no training on citrus contamination.*
>
> *The species like papayas, that's a catastrophe, there are viral illnesses which are everywhere in Senegal. So, if we make papayas, we must check if the species we have is resistant to this disease, PSV, a parasite which inflates the size of the leaves' cells. The plant cannot breathe anymore, they plant goes yellow and dies. The inside of the plant becomes black, they call it black root.*
>
> *That's very present in Senegal at this moment. We have to check which species we introduce, what are the strengths and weaknesses and which of our local varieties produce. So we try to avoid importing varieties, because that leads to what I have just mentioned.*

Plants have always manipulated our behaviour, encouraging their own distribution and propagation through the development of fruits (Mancuso and Viola 2015). Fruits may seem to humans a convenient source of sugary foods, yet from the evolutionary perspective of a tree, fruits are an extremely convenient byproduct in the quest to protect seeds. Trees are tended to and protected by animals, including humans, to encourage growth, while the fruit itself protects the seed, until the moment of full maturity, where animals gather and distribute the seeds encouraging species continuation. Plants, whose lifeworlds largely operate through much longer time scales, with a reduced sense of individualised bodies within a species, demonstrate particular slow forms of agency, and desire to collaborate with humans, through the gradual, evolutionary selection of certain traits over others (Mancuso and Viola 2015). Yet in certain senses, as Maximilliane highlights, some trees have become far too effective in their own propagation.

Global economic networks of plant distribution, accompanied by questions of poor border control permitting the free movement of species, has allowed certain species to proliferate far beyond boundaries of typical interspecies competition. The over-selection and dominance of certain species on an international level, increases the chances for the spread of viral diseases, undermining global food chains while simultaneously sidelining localised species and fruits, which are ignored over the human tendency to cultivate more economically valuable species. In Thiès, these problems were made living in the stems of the trees which Maximilliane would graft. The threat of viral decay was incredibly real and further developed in Maximilliane's eyes the need for Senegal to push further attempts at training and development, prioritising its own economy and protecting its own ecology to create a sustainable future. Between his agricultural tips, Maximilliane interspersed sentiments of disapproval at the country's organisation, and wider organisation in Africa:

> *Have you seen the clementines in Morocco? That's what they sell here, but they need the cool air. that's not development. Development we create something; projects which last. Petrol, Gas, I don't believe in it because it's something which passes.*
>
> *Me? I believe in agriculture, I said that to Colonel Gadaffi, when he visited in France.*

P [Laughing]: You met Gadaffi?

M: No, I know him, he came to France to buy cows, I was doing an internship there, we even ate a meal together. He said I want to develop via petrol, I said, if you develop with petrol, one day it will finish, the people will be part of the poorest country, one needs different activities

Tending to mandarins meant tending to a much wider set of relations beyond the plant in the field. Tending to mandarins, protecting local species, and creating sustainable plant-human practises was a clearly political act for Maximilliane. Successfully growing and paying attention to the fruits and the trees required much more than soil nutrients and sunshine. Planting trees for Maximilliane was fundamental to a pan-African developmental discussion. Moroccan export markets inflated prices and the risk of disease in Senegal; Libyan oil development lacked economic diversification and risked political and economic instability. Maximilliane saw ecological diversification and the protection of species as an act which went hand in hand with a Senegalese form of economic security and sustainability. Attentiveness to ecological details was tied into the economic realities of the country.

Maximilliane's position and life-work allowed for me to engage with a much broader range of plants, yet on this first day he had largely only spoken to me about the Kad trees, while largely focusing attention on offering advice to the family. I had really wanted to talk about his reforesting projects, I had been put in contact with him because he worked on trees related to the AirGÉO project. In the car, on the return journey, I tried again to strike up a conversation. Maximilliane's answers were short and it was difficult to get conversation to flow in the directions I found interesting. At times he blatantly did not understand my questions and defeated I sat back quietly in the car. He promised however that the next day to show me his family home and the tree nursery he had developed there. He showed me where his house was, told me to arrive just after 3 and then the driver turned round and dropped me back at the police station.

3.2 Photography, Plants and Extra-sensory communication in the green, green garden of Sebikhotane

Finding the correct methodological approach to the study of plant-human relations was a challenge I faced quite early on in my fieldwork. Despite the support of the broad network engaged in the AirGÉO project, I still personally struggled with my own lack of understanding of local vegetation change. When I arrived in Maximilliane's garden, my self-doubt reached a peak, the scene is best captured in a field note:

The gardens were more accurately a garden. It was ultimately a cramped and crowded space, but the extent of verdure in every visible direction gave a sense of enormity to the space that was likely representative of the years of work and knowledge crammed into the area. Maximilliane started working on the garden, gathering species in the late eighties and early nineties.

A table, holding what seemed more like an ornate sculpture than a plant, was the opening of a number of paths into the garden. The first path I took which hugged the edge of the house was a line of teetering bushes, with bright pink popping flowers covering a table of short wooden sticks and more plastic sheets. Around a slight bend rose some stunning flowers which attracted even more magnificent butterflies. Butterflies were however a bad sign, said Maximilliane, unimpressed by their presence. Some of the plants may be eaten up by their larvae.

> *The branches of a low tree was populated with large 10litre water bottles, empty, dusty and dangling from the branches. A chair with a plastic shopping bag with an image of a lime cut open, was sat next to a sheet of plastic. The plastic when unfurled revealed tiny sprouting plants.*
>
> *'One of the women needs to come and sort these out, they're ready.'*
>
> *The garden overall gave me a sense of my own incredibly limited plant knowledge. Confronted with grapefruit trees, lemon trees and hundreds of other species in such a compact area, I became rapidly aware I was in over my depth and that I knew very little.*
>
> *I took photos somewhat maniacally, hoping that in the bewilderment of this green, I might later be able to process and organise the plants I saw on a screen. Beyond this, I was also aware of my own limited eyesight. Having being diagnosed with a visual impairment known as Autosomnal Dominant Optic Atrophy, or as the doctors like to call it: ADOA in the OPA-1 gene, I was even more aware that I often couldn't actually see the differences in the plants in front of me. Colour was an issue for me, but all of my vision in all of its capacities is reduced by a weakness in the optic nerve. As we walked round, Maximilliane would say, 'Have you seen the grapefruits' and I felt embarrassed to realise I had been under a grapefruit tree, my favourite fruit, but until it was actively pointed out to me I could not distinguish between the fruits and the leaves. I just saw a very big tree. Part of this was my condition, not being able to see, unable to immediately separate out colours and textures others would more easily see, but part of it was also not being able to look. Not knowing how to look, not having ever had so much greenery to look at. Not knowing how to tell my brain: look for the fruit, look for the leaf. Many of the other things to look for I wouldn't even know their name. I didn't really know how trees work, how they grow.*

The overwhelming nature of this garden, and the realisation that I had truly encountered an expert within my field of study, wherein my own knowledge was incredibly dwarfed, was exciting and anxiety inducing at the same time. Perhaps I also felt dwarfed by the plants. Maximilliane was keeping these plants specifically because they represented a life in the town of Sébikhotane that was disappearing, some of the species here, were thought to be largely extinct (for a list see the end of chapter 5). The barren sands of the local hillsides were formerly forests full of the life of all these plants. Having seen the hills (which I describe in chapter 4), and now seeing this space, I also came to realise the extremity of loss within this town. The loss had for many people been gradual, but entering from the dusty streets into this space almost felt like a moment of time-travel, the slow lives of plants were continuing in this space, unimpeded, in a way which they could not in any other part of town. Maximilliane's ability to tend to plants, perfected over decades was demonstrated in this one small space.

Maximilliane was an expert in understanding plants, there was no doubt about it. His garden was a unique centre of study, tending, propagation and development. It truly was a testament to some of the most intimate relationships possible between plants and humans. I ended up returning multiple times, trying to see what I could learn from simply being amongst the plants. Within the town it was also undoubtedly the most serene spot, an oasis away from my lodgings which featured the construction of the TER line 24 hours a day throughout the night. I returned again and again:

> *When I arrived, having once again walked the dusty length of the town, a stimulating mix of incomplete pavements, dried up, littered streams and all the diversity of street vendors, sat stood or lying on their wares, Maximilliane was sat on the same chair I'd left him on. A couple of young boys, the sons of a woman who lived nearby, were loading wheelbarrows full of excess foliage, slowly being plucked away by Maximilliane and his single pair of secateurs; all to be carted away to an undisclosed location. Their mother later came in and was busy tidying stacked trays of propagation pots. Another woman, Maximilliane's niece also joined and helped.*
>
> *I walked round slowly following Maximilliane, asking questions where I could and otherwise trying to be helpful with menial tasks. The grafted grapefruit trees needed their sprouting leaves clipping Maximilliane pointed out – having first shifted several heavy pots, and potted plants, I busied myself by trying to find every single minutely sprouting leaf on the grafted plants. There were roughly thirty extremely young tree trunks to process, each maybe 1cm wide. It gave me a solid ten minutes of work. Once again, Maximilliane could more easily see the budding leaves which despite my attention, I had overlooked, again never sure if I wasn't looking or seeing well. He snipped them off in seconds, correcting my shoddy work.*
>
> *The pots I had cleared allowed space later for the day's main event. Two enormous piles of soil and sand were dumped in one of the only clearings in the crowded garden. The two piles would have to be mixed to make an effective compost – then moved to another part of the garden. After a couple of hours I felt things were slowing down with the afternoon heat, I made indications I would leave but had overlooked that I was invited for lunch. Advised it would be too hot to walk back, I waited, sat and spoke with one of Maximillianes brothers.*

Human communication with nonhumans remains imperfect. Maximilliane's ability to navigate this space came from his years of training, attention and tending to plants. He had worked across universities in Senegal, having received an initial scholarship to study in France.

If I had spent more time with plants, I maybe could have asked better questions to Maximilliane, yet perhaps marvelling at my own inadequacies was enough. Marder (2017) suggests that to hear and (re)present nonhumans ethically, "we must learn to listen to the lacunae and silences in [their] language, leaving plenty of room for the untranslatable (and, hence, the unspeakable) in... practices of translation" (p. 105). The sense of wonder in this space connected back to other similar experiences, also evoked by plants: botanical gardens and overgrown forests. It was, within the wider context of the industrial town, a relaxing place to enter, quiet and fresh. Communication with species perhaps happens in ways hard to articulate through text, interspecies communication:

> *"draw[s] on a diversity of intuitive capacities… includ[ing] the mutual, direct exchange of visceral feelings, emotions, mental impressions and thoughts, embodied sensations of touch, smell, taste, sound, as well as visuals in the mind's eye" (Barrett et al., 2021, p. 151).*

Wijngaarden (2023, p.11), who works with animal communicators, explains how it may be that an animal communicates with a human. One communicator Sita, suggests:

> *"[Sometimes it's] more a feeling, more an awareness, that's beyond words. I feel sometimes we feel it is necessary to put something wordless into words. … I might find a whole string of words to actually answer the question, but for the moment the answer is no answer, no verbal answer."*

My turn to the camera while clearly in one sense anxious, may also then have been intuitive. Cameras allow for non-verbal frames of communication, an additional tool and frame for ethnography to work through, another frame for attentiveness and non-human sensitivity. Abbott (2021, p.1065) reflects on her short film, *Gestures toward Plant Vision*, as an attempt to approach ''tree ontologies in an exploration of potential vegetal perceptions and perspectives via adjustments to camera settings and editing effect''. Cameras have indeed long played a great role in facilitating a wider understanding of plant agency: time-lapse photography and video allows for a better human understanding of patterns of plant growth. Cameras as a means of technology thus offer a rich space for beginning a greater attentiveness to plant-life, yet they are by no means a perfect collaborator. Abbott (2021, p.1064) for example reflects:

> *"The more I came to know—and not know—trees and the complexity of their inner and outer lives, the more difficult it became for me to film and (re)present them in ways respectful and meaningful to them and their lifeways. Cinema is limited as a human-centered device and form of representation and communication. The abilities of the camera, I felt as I engaged different filmmaking styles and compositions of trees in their parts, entireties, and groups, pale in relation to the complexity of trees' inner workings, lifeworlds, and community connections."*

While I feel Abbott's reflection is useful to demonstrate the limitation of human understanding, there is a hint within her writing that she senses that this is a failure within the human and the human technology. She continues (*ibid.*):

> *"Another tension of ethics emerged regarding the co-constitutive effect/affect of humans entering nonhuman environs. To understand non-human worlds as non-humans experience and shape them without interference on the part of humans is impossible. Whatever the level of presence on the part of researchers and filmmakers, there is always invasiveness, a residue, a "cinematic footprint" (Bozak, 2012), no matter if nonhumans are the focus or contributing to the setting."*

Ultimately, we are just humans, we are animals, we are limited and imperfect in our communication style. Our cameras, are also imperfect. There is no philosophical or biological sleight of hand wherein we can fully attempt to understand trees and plant life. Perhaps a useful approach to understanding photography in these settings of plant-human relation, is to appreciate the extra-sensorial qualities of plants that extend beyond the human. Part of engaging with this extra-sensorial approach would be dial down the sensory importance of the visual. Within the context of my own visual impairment, my photographic practise partly comes out of a sense of wanting to extend the capacities of vision beyond my own body. Yet in a sense also alternately comes from a moment of appreciation for the way things sometimes fall, the inexplicable coming together of certain elements within a frame, where the image extends beyonds itself to summarise a much wider affective realm, beyond a simplistic human communication.

The image on the cover of this thesis, perhaps alludes to those emotions. I have very few useful photos from within his garden, because I was working with a fixed lens. The fixed lens requires you to be at a specific distance from your subject of focus. The garden was so cramped, with so many

plants falling in every direction that I physically could not take a photo which in any sense represented the space. In the cover photo of my thesis, is a table which is just outside the cramped space of the walled garden, here was a table which Maximilliane was working on, organising, collecting. The shot, with the light falling in from a gap in the foliage, is the only photo from the garden wherein one can easily distinguish a photographic subject. I close this chapter with a small selection of photos from the garden, which in turn perhaps evoke the cramped space and the chaos of tens of species living so intensely packed together.

A certain strength perhaps to plant photography is also then this basic appreciation that the subject of photography, the plant, communicates in modes entirely unsuitable to a camera. When engaging with photography as a method in this context, it is worth considering that it is not the visuality of the camera, or the image, that is of concern, it is rather the entirety of the embodied and sensorial experience through which a camera can allow alternative modes of perception beyond the human body. Looking back at my fieldwork, my ability to reflect has largely come from being able to trawl back through photos and return to memories, emotions and senses that took place when I took a specific shot. Each frame, I took for a reason, even if that reason was a sense of overwhelmed ambiguity of the meaning of it all. It is a style of paying attention.

Plants, just as cameras, allow different perspectives, ways of sensing. These sensorial differences are what interest me in this fieldwork. Such modes of understanding photography are also expanding specifically within West African contexts. Bajorek (2020, p.27), in studying the West African history of photography, argues for a

> *"trenchant critique of ocularcentrism and of the unabashed Eurocentrism of the "five sense" model, a critique that has resounded, methodologically, as a clarion call to attend, often (although not exclusively) through ethnographic methods, to both oral and aural or sonic dimensions of photographic interpretation and, by extension, to the medium's articulation with multiple and overlapping modes of memory"*

Through a photographically-aided attentiveness, beyond the visual, guided by the knowledgeable work of tree experts such as Maximilliane, one starts to enter into the complex world of tending plants, which in itself becomes a world of tending to politically and ecologically sustainable environments.

In the following chapter I expand on this notion of attending to the embodied experience of photography, its connections to embodied memories of walking by discussing the photographic walks in which I worked with Cheikh Junior. His landscape archives also offer more-than-human senses through a long-term, repeated photographic study of a landscape. His work allows greater sensitivity for non-human time scales and the gradual ways in which plant-human relations shift. In Chapter 5, I engage with Cheikh and Maximilliane together, alongside the wider eco-social community of le Projet AirGÉO, as we carried out surveys in a locally protected forest, offering more insights into the specific species at play, and the futures of the forest, with which Maximilliane in particular was concerned.

3.3 Imperfect Photographic Interlude: A fixed lens in a cramped space

The following three photos are from Maximilliane's garden. As I previously mention, the space was so cramped as to make photography with my 50mm fixed lens almost impossible. This type

of lens is supposedly the closest photographic approximation of the visuals of the human eye, offering sharp images and portraits with strong depths of field.

With each photo I offer some reflections on my exact bodily/camera position, to help articulate the difficulty of making a camera speak with a plant. Here the plants were in control, their vivacious presence dominating the space and guiding the camera.

Photograph 4 – Underexposed grapefruits

Despite the dazzling bright sky, the garden was dark and cool. I barely saw these grapefruits between their dark leaves and twigs and had been distracted by other hanging branches and plants scattered across the floor. I was likely 1.5 metres from these grapefruits, which hung conveniently at eye-level. My head was however encased by the tree's other branches and I could feel the leaves of a bush pushing against my back. Maximilliane had moved on as I was taking the photo. I took four shots in total, but in the rush to keep up I hadn't correctly adjusted the aperture for the levels of darkness.

Photograph 5 – Maximilliane grafts grapefruit stems onto lemon stalks.

I was lucky to have somewhat adjusted the aperture to be able to capture this shot, although it's still on the dark side. Maximilliane was working quickly with stems and I was stood right beside him. There was little time to think about composition or framing as I knew this was the last stem to graft. I didn't feel I could interrupt his speech in any sense, and he usually didn't engage with my questions so I knew I had to be quick and move on, there was no chance he would pause his activity for the camera, even though he was very happy for me to take photos.

Photograph 6 – Budding shoots.

Maximilliane had no list of the names of species in his garden, although I was desperate for some document to explain everything to me. Instead my solution was to take photos of everything I saw and presume that I could categorise it all later. This didn't end very successfully – I took photos of a lot of the wrong things, including plant shoots which generally look quite indistinguishable in their early age. In Chapter 5, I finally learn how to photographically categorise plants, on one of the last trips of my research.

Diary Interlude: Arriving in Sebikhotane, Monday 2nd October 2023

On Sunday, after eating Francois' fish soup, Marion finally explicitly laid out the details of how I may visit Maximilliane, where the town was, how to get there and where I might stay. I called him later that evening, we agreed to meet in the morning on Monday. He had a few things he thought he could show me, although I wasn't entirely sure what. On Monday morning, my bag packed just after 7am, I noticed the curtains flutter violently in the window. By now I knew what this meant, I opened the door to watch the first drops of an immense downpour pound the tiled balcony. I called Maximilliane, today wouldn't work out. It seemed hard enough to get there as it was – I didn't want to also wade through Dakar's flooded streets, arriving with all my clothes already soaked. I agreed to travel later in the afternoon and meet him the next morning, he would show me round as part of a group visit to a field he was working on.

After a taxi to the TER station, then following the train line to its end at Diamniadio, some fellow passengers led me through a flooded mud car park to a surprisingly comfortable bus, where I had my own seat and openable window. The bus left after an hour wait and the twenty minute journey that Google estimated was only delayed by an additional half an hour of grinding petroleum traffic.

I was greeted by Cima, a younger guy, likely not a dissimilar age to me. He showed me around the room, a large square space divided by 3 breezeblock walls. I was overjoyed that it met all the basic requirements, and the bed even came with its own sheets! I put my stuff down and went to walk around the gardens, replete with comically confident ducks, a variety of fruit trees and various communal spaces for the schoolchildren who, while now away on a break, would typically occupy the tables until late at night during term time. This was le Centre TaDjabone, a lively educational community centre, financed by a French charity, with small lodgings for visiting guests or researchers.

Cima lived nearby and volunteered at the centre. He was a charismatic host and showed me round, making a point of the AirGÉO exposition displayed amongst the trees. Marion and Ibrahima had both independently told me about the project but the details were hazy. Through a series of well-curated canvas or polyester sheets, the exposition clearly laid out the impressive extent of the project, drawing both the global connections of international shipping of waste through to the local effects of rising air pollution in Sébikhotane. The volunteers were proud of the project and explained how the work involved both local community members and a team of diverse university technicians from Senegal and France. They detailed what Ibrahima had explained to me on our first meeting. Eucalyptus bark, taken from the trees of Toubab Dialaw, became through the project a low-cost natural technological sensor ('capteur') *of air pollution throughout the town. Ibrahima had shown me photos of how small pieces of bark were suspended in wooden frames and placed in hundreds of locations, largely people's homes, throughout the town. Left in the homes for 6 months, then collected and sent to laboratories in Marseille, the eucalyptus bark would be able to measure the extent of air pollution in the area.*

Later, after a day in the fields with Maximilliane, I walked around the exhibition again. This time taking my camera, hoping to make clear images of all the information so that I could look through it later, and properly understand this AirGÉO project. As I did so, Cheikh Junior approached me. He was the photographer of the project, or one of them, another photographer had since returned to France. For the past few years, he had been working on compiling a photographic archive of the landscape changes within and around the town. He showed me images of Sébikhotane from 7 months ago which showed lush green forests in the backdrop of the town, now non-existent. I was relieved at the ease with which I could speak with Cheikh Junior.

Later, in the build up to the Night of the Prophet, when returning from Maximilliane's house he greeted me in the street, the casual nature of the interaction made me feel at ease in the town. I felt I had found my place.

4. Earth Movements, Plant-Human Displacement

Maximilliane's garden had been a deep-dive into plants, but it was photography and discussion with Cheikh that ultimately became my main means of understanding the wider political-ecological implications of plant-human relations throughout the town. Of the 27 interviews I carried out during my time in Senegal, around 10 involved Cheikh in some capacity. Two or three were interviews of Cheikh, his work and understanding of the changes in Sébikhotane. After these initial interviews, we saw an overlap in our research and agreed on working together. Further interviews sometimes thus involved Cheikh simply being present, having gone on excursions together, but roughly four or five were directly facilitated or brokered by Cheikh. In these settings Cheikh was either the lead interviewer, a co-interviewer, a translator or an observer, although each interview typically involved a bit of each throughout. Many of the interviews may more accurately be understood as loose informal conversations, or unstructured interviews, as we came across people on walks throughout the town, which allowed topics to emerge and from which I would build my questions, encouraging discussion around plant-human relations, recorded on a Dictaphone. Occasionally I would sit down and ask pre-prepared questions but largely questions emerged from walking, from observations, from what the trees and landscape showed us that day.

Before meeting Cheikh, and still sometimes when he wasn't there, some interviews or conversations had felt forced: interviews were sidetracked, interrupted, ignored, my ideas or questions were belittled. Here, I spoke with Cheikh and felt an immediate level of mutual respect and dedication. Cheikh was himself a researcher, a photographic researcher, the same age as me, he had a clear project and was interested in telling people about his work, while also curious how it may be further extended. Working together thus created a more dynamic research environment, where our respective interests could encourage one another to explore different angles or perspectives, while also offering different forms of legitimacy in different settings, where we otherwise may have been dismissed through intergenerational or cultural barriers. Being white in a town that receives few foreign visitors could at times be advantageous to starting conversation, the pride of residents in their local area prompting stories. While Cheikh's local connections at other times helped assure more suspicious residents that our intentions were well-placed, that I was not, for example, a representative of any local international factory. The few connections I had within Senegal, also allowed some wider research trips beyond Sebikhotane, where I could cover Cheikh's travel costs.

Soon after meeting, Cheikh and I maintained regular contact, and when I returned the following week, we sat down to look through his photos. Together with a French photographer, Julien Hazemann, Cheikh had set up *l'Observatoire Photographique des Paysages*[1], hoping across a period of 5 years to trace the changes that occur in Sébikhotane's urban fabric; with Julien focusing on the wider urban poles of Diamniadio and Yoff. Cheikh took photos in the exact same positions, using the same camera settings each time with the exact same composition and frame, roughly once every 4-6 months. When I met him, Cheikh was gearing up for another round of archival landscape photographs. Looking at his tablet, photographs were sutured alongside each other, presented either as a panoramic format or in a before and after style, a reference point for comparison across time. The files he showed me were clearly designed to be shown on the move. The tablet's small, compact screen allowed the stories of the photos to be easily transported to different settings, as interview prompts.

[1] Photographic Observatory of Landscapes

Swiping through photos, Cheikh started to unravel the story of contemporary urban change in Sébikhotane. From varied angles he showed how the construction of the TER, *le Train Express Regional,* connecting Dakar-Plateau's business district to the Blaise Diagne international airport, had displaced hundreds of people by cutting through the centre of town, only offering residents new homes at distant locations on the outskirts of town. In his photos, across time, once could see houses being cleared for patches of dirt, and later the large banks of the train's railway line arriving. Later still the huge traffic jams and pedestrian impasses as the town's arteries of movement are blocked. Other images show the growth of housing in quarries where earth is extracted from the nearby hillsides, to act as the trainline or toll-road's foundations.. Towards the outskirts of town, using panoramas, Cheikh shows how the trainline divides and separates his grandparent's village of Yéba. Its construction clears large tracts of forest, leaving the town settling in large clouds of dust for the lengthy periods of construction. It was a photographic testament to the poor planning practises lamented in the Ministry of Urban Renewal's (2016) report for new future plans, showing that many of the practises of urban design had barely been updated, or gave little consideration for wider societal consultation.

4.1 Agencies of the camera, materialities of photographs

Between Cheikh and I, the photographic medium, the cameras and the images, allowed an ease in conversation. We weren't so much talking as ourselves but were talking through our images or photographic visions. Jennifer Bajorek, author of *'Unfixed: Photography and Decolonial Imagination in West Africa',* who herself carried out research on the history of photography in West Africa, including Senegal, writes that within art research "conversations unfold in a triangulated relation with the art object" (p.77), creating a demand "that both parties account, in their conversation, for multiple and overlapping sites and contexts of that object's (ongoing) production and interpretation" (*ibid*.). Through our photographic interests, the cameras and the images produced, our initial conversations allowed for an easy coming together of shared ideas, a laying out of overlapping (and contrasting) visions, and an understanding of our personal backgrounds, differences, and positions. There was an agency to the camera that shaped our conversation, both between ourselves and the research participants we engaged. This could often remove some of the unease of conversation with a stranger. When conversation died down, we could turn to imagery to discuss other participant's views on trees or urban change. It subtly altered our respective positions. Without a photographic interest, many conversations and informal interviews may have ended earlier.

Bajorek (*ibid.*) herself an American woman who would spend days with families photographing family archives in St. Louis, reflects how photography connects 'researchers' and 'respondents' in complex entanglements of relation:

> *''it is basically impossible to get access to other people's photographs without entering into an infinite web of complex social transactions in which the researcher and the "respondent" talk, and indeed never stop talking, in a dynamic relation with the photograph. Yet every photograph is itself, in the moment of interpretation, liable to catch all those who look at it in another such relation, which is not to say that we are symmetrically caught''*

While Cheikh and I were not 'symmetrically caught' in this web of research relations, it was a set of relations which we both freely entered into and could just as easily have withdrawn from. In a sense, our meeting and conversations were intuitive. Our memories, shared social experiences around photography, the way in which we both understood that the camera encourages an interrogation of the world around you, facilitated our discussion. Photography became more than the pure visuality of

the image, it was the whole embodied, socialised practise around the camera which we were sharing. While Cheikh and I had started our conversations swiping through images on his tablet, it was the walking with the cameras where we really came to look at, engage and experience the town. My focus on vegetation combined with his focus on urban change, we often found they were very much entangled.

4.2 The Hills of Yéba, Histories of the Soil

After looking through the photos, we set off on a walk through the former forest. Expecting a small outing of roughly an hour, we ended up walking for almost four hours, well into darkness, traversing the local hills overlooking the area, and discussing the environmental changes across time as Cheikh remembered them, and as they occurred in their minutiae directly in-front of our eyes. Much of my own knowledge of the changes comes largely from this walk, where Cheikh gave a succinct and thorough description of the key significant changes threatening the area's eco-social future.

I present this walking interview here, with our speech written out as Cheikh and I wind our way slowly up the light gradient out of Sébikhotane. The reader is encouraged to imagine the materiality of this walk, the changes examined as through the photos taken by Cheikh and I. By combining the details of conversational text with images and sounds from the walk, one starts to tease out the extra-sensory details that escape typical textual description, encouraging the reader to trust their own intuition to explore the complex relations between plants and humans as they emerged during this serendipitous encounter. Part of this style of presentation takes inspiration from what Abbott (2021, p.1066) writes:

> *Embodied sensuous research (Stoller 1997) and experiential understanding create a bridge of commonality between researchers and their audiences that facilitates knowledge transfer, and supports [the] research goal of giving audiences a sense of tree ontologies that moves beyond the limitations of theoretical concepts of disembodied knowledge*

It was this slow walking, slow conversation and slow deliberate photography that came to guide Junior and I through the hills of Sébikhotane. I had previously tried to walk the road that I now walked with Cheikh on my own, but quickly felt a sense of aimlessness or uncertainty in the direction. The hills were entirely unfamiliar to me, but now with Cheikh as a guide, almost every aspect of the road, from shops, people or soil, became a point of discussion and an indication of socio-environmental change. My own experience in failing to walk gave me a further sense of appreciation for Junior's knowledge and I rarely interrupted for the majority of our four-hour walk, nodding gently along and taking photos where he guided my lens to important sites.

4.2.1 Land, Infrastructure and Farming: Histories in the soil

Pieter: So we start with the former forest? Or as you think? You know better than me?

Cheikh: Yes we can go like that, this is the route that we will follow. From this area, just 300 metres on, it all used to be fields, mango orchards. These people have all been impacted by the arrival of the Train Express Regional (TER).

P: Are there people from the interior or just Dakar?

C: Mainly Dakar, they come from the centre-ville. If it's not people from Sébikhotane who have bought land to build a house. Most people are from families who no longer fit in their original space. So they've started to expand, find new land, build their own houses. It's an extension of family areas.

There is the quarry. It's a hole, a scar. The quarry has been there for ten years. So they've taken land out to build the roads. First the soil and then the tarmac, soil before tarmacking it over. Even with the TER, they've done similar things, extracting soil from Yéba for the trainline.

When it accelerates like that, there was a certain quality to the soil that could have regenerated in that soil, which has now been moved and can no longer grow. So this quarry used to be forested, it's now dry and bare, and now its empty.

Photograph 7 – Before: Interviewing a farmer in his tomato field. Photograph by Cheikh.

Photograph 8 – After: The foundations for a new TER Station laid out over the previously imaged farmer's tomato field.

Soil, quarried from Yéba and other nearby regions is placed on top of the field. The farmer who worked the field, has shifted his practice a few hundred meters on, his original family orchard now incorporated to corporate agricultural land to the North. In Sébikhotane, whole new districts are built in the holes of former small-scale quarries, the quarries themselves extracting the soil of a former forest. Piles of varying soils from across the region can be seen in the strip below the trees, varying in colour and texture. some more rocky, some made up of clay, chalk, sandstone. Each full of ecological history from different areas. Early January 2024.

Railway development, like in the Baol region, has also reorganized the historical agriculture economies throughout Sébikhotane, yet here the arrival of the TER has further continued the divisive legacy of agricultural exportation, disenfranchising the local community to facilitate a wider international commercialization of the Senegalese economy.

The Saafi, some of the earliest settlers of Sébikhotane, were an adamantly anti-colonial group, refusing to take part in any colonial power's attempts to engage them (Kandji 2013). Since their 11th century arrival, the saafi cultivated the local area's reputation as an idyllic forest-scape combining livestock, gardening and citrus fruit cultivation. Sébikhotane was however likely the first saafi community to be forced into the colonial economies (*ibid.*). Long a passing-point for slave-traders supposedly resting under the enormous, spiritually-charged baobab tree *Guy Sepi,* which still stands at the entrance of town, it was in 1886 that the saafi were finally forced into an established colonial proximity with the arrival of the Dakar-Niger River railway line (*ibid.*).

*Sébi-Escale (*Sébi-Stopover), now a built-up district central to the town's economy, is the former location of the colonial refuelling station. Photographs 7 and 8 are both taken a few hundred metres from Sebi-Escale, at the sight of the yet-to-be-built *TER* station. It was here that multispecies life started to be reorganised within the town, largely off the basis of the same monoculture plantations for the lucrative peanut oil which dominate the Baol's former rail lines. Since the start of the twentieth century Wolof agriculturalists, using the railway to make the journey from largely exhausted Northern territories along the Senegal River, would develop new fields around markets such as *Sébi-Escale* and sell the peanuts to European and Lebanese merchants. The mass cultivation and exportation of peanuts, was a means of stabilising the finances of French empire throughout the early twentieth century. The monoculture regions around *Sébi-Escale* grew, and the new Wolof population expanded into multiple areas in the North of the town (*ibid.*). The became an example of ethnic 'zoning', the geographical separation of different racial groups (Faye 2001), namely Wolof groups in the Northern monoculture farms and Serer groups on the Southern hills. In Sébikhotane, colonial powers viewed the saafi as "too folded into themselves"[2] (Kandji 2013, p.60), and they used the new railway line as a "counterweight… that could tilt the spatial centre of gravity away from the autochthon community towards a new urban centre, populated, this time by allochthon groups". This reorganisation of space was a tool used by the colonial project to allow further insertion of markets and further extraction of resources in saafi areas that were otherwise beyond their immediate reach. Peanuts and their Wolof farmers, were weaponised by colonial powers against the forest practises of the saafi.The results in Sébikhotane were ultimately a subtle shift in the spatial organisation of the town, which opened the space up to new groups and new economies. It is in contemporary times, that these shifts are starting to come to the surface, as the legacies of land control come to be more heavily contested as land's value increases in the rush for space outside of Dakar.

One particular family, the Filifili, who moved to Senegal from Lebanon in the early 20th century came to become particularly present in Sébikhotane from the 1940s onwards, asserting a dominance in the local market which remains today (Boumedouha 1990; Kandji 2013). Finding great commercial success in the peanut-dominated markets of *Sébi-Escale*, the family company continues to dominate farming around Sébikhotane, now focusing increasingly on more water-intensive crops such as salads, tomatoes or aubergines. The family's CDA *(Chaine de Distribution Alimentaire*) group, owns more hectares of land to the North of the town than is even available to build on within the town itself (Seneweb News 2024). Seneweb News (2024) reports that *'Le collectif pour la défense du patrimoine foncier de Sébikhotane'*[2] (CDPFS) in early April 2024 was renewing its struggle against new land claims issued by the agricultural groups of CDA, and Elton, Sagam and Senbus, the last of which are all companies owned by Senegalese millionaire Abdou Rahman Ndiaye. The companies are seemingly continuing to make claims to another 10 hectares of land, already home to roughly 200 people (*ibid.*), all while having had 75 hectares already declassified from area with protected state forest in 2022. The small-scale Wolof farmers who came to farm on the town's Northern side now come to see that

[2] The Collective for the Defence of Sébikhotane's heritage/property.

the systems of land control and leasing with which they could traditionally farm, are sidelined today by processes of land allocation which favor corporate land control.

In 1964, following independence, the Senegalese government introduced a law on the National Domain which "made virtually all rural land state property, which in turn is given in usufruct to the farmers" (Kaag 2005, p. 337). This law was the first post-independence legislation which attempted to address questions of land rights, ownership, property claims and access. At the time of implementation, this meant most people could continue cultivating as before "under the ultimate supervision of the state" (*ibid.*), while one could claim rights if cultivating land for more than three years. If land was left untended, to lie fallow for several years or otherwise under long term-lease, the rural council or temporary tenants could attempt to lay claim to the land (*ibid.*). Kaag, carrying out fieldwork in the late 1990s, suggests that the uncertainty of the Senegalese land systems had the implication that "people invent new ways of claiming control over land… by combining old and new rules, by building new alliances or by revitalising old ones, and by referring to different authorities" (2005, p.335). Largely this means however that small-scale farmers can only ever claim very small pieces of land, and maintaining control of this land becomes ever more complex as issues of land-loaning, fallow periods, or relations with the rural council pose threats to a farmer's presumed authoritative claim to land ownership. A secure claim of land ownership is rare, although networks of exchange or attempts at claims can allow those with no claim to take up a small space.

> *Cheikh: This is the school, the only secondary school of Sébikhotane.*
>
> *You can see around this school. The first big infrastructure here. You can see just newly constructed houses.*
>
> *All of this used to be classified forest. Once the TER came, 60 hectares were declassified for social housing. There were other spaces for private enterprise, like the iron recycling factories. HLM, a construction company, was given some space to build an estate. The biggest demand is housing in the forest.*
>
> *But once this was the classified forest, an uninhabitable place but increasingly more and more its declassified.*
>
> *You can see until that green barrier there [in the distance], its Sébikhotane.*
>
> *There are still fields towards Sébi-Gare. But this biggest space was given to BUT Senegal and Filifil. They export the agriculture, higher up.*
>
> *Many farmers are complaining about the use of the land there. The companies have very big wells and extract all the water there.*

Traditional systems of land-use, sharing or access to land have been historically overlooked as the state claimed its monopoly on land access; ultimately making itself the only arbitrator of land use throughout the country. Attempts at reforms of the 1964 law can largely be seen as a failure, with land and property insecurity widespread amid a lack of government transparency and widespread claims of corruption in systems of land/property allocation. Diallo (2020, p.112) writes that attempts to reform this land law have ''failed to bring definitive solutions to questions of land/property securitisation; this has undermined land ownership security and has sowed the seeds of an eventual privatisation of land.'' Diallo continues highlighting how reform attempts have paid very little attention to localised contexts of land ownership, access and control: "land insecurity and precarious access to other natural resources may be relevant indicators of marginalization of producers in… agriculture and other related activities" (p.113). Mathieu (1996, p.34, *translated from French original*) writes: "the mechanisms of effective land management are torn between the formal claim of the land

monopoly of the State and the very real influences [...] of local public authorities". In the context of Sébikhotane, access to land and rights to agricultural land are presenting a pressing issue for the established population, who on multiple sides are seeing themselves hemmed in by privatized agricultural and heavy-metal industries, modernist State-led (and often foreign financed) flagship infrastructural projects, and wealthier Dakar populations escaping the peninsula's overcrowding. The CDPFS has long been struggling for the regularisation of land contracts for local farmers, while large agricultural groups benefit from close relations to the state and local government, who facilitate land extensions on their behalf.

On another walk, Cheikh and I encountered a tomato farmer working the land by the side of the railway line. He was working land that his dad had been working 60 years before. They had used to own trees, in the areas now corporately farmed. When the corporation (we weren't sure whether it was CDA, Elton, Sagam or Senbus) expanded their claim to land, his father was compensated for the trees, but never for the land itself, which the state claimed as its own. By the time we returned to the field to talk to the farmer again, his field had been covered over by the soils in Photograph X. We saw his hammock in some new trees, a few hundred metres on, but he wasn't there that day, it seemed he had had to move on again. A pattern that had continued throughout his life, farming rich soils which were stuck between a rapid urbanism and an expanding corporate agriculture.

4.2.2 Women's history in Yéba: Plants, Agriculture, Micro-Finance and Markets

> *Cheikh: Theres a tree that is very present in the area, it's the Kinkéliba. You can make a tea with it, it's very well known in the area, its emblematic in a sense. There's a lot of it, it's always here every season.*
>
> *You must dry it in the sun, then you boil it in sugar and then serve it for a tea. There's some at the centre. We can dry it and then you can try it.*
>
> *There are no fruits, just the leaves. It's the most present in this area. That which remains. It is the tree that has managed to survive.*

Behind us a group of women descended the hill. They entered the brush carrying large sacks and later walked past us with heavy loads of wood, presumably for firewood. In this vacant landscape the Kinkéliba shrubs were a last gasp of life, fighting through the weakened life of the soils. The Kinkéliba tea, often used to break the fast during Ramadan, has been recognised for its potential for insulin-resistant diabetes treatment (Welch *et al.* 2017). The Kinkéliba, lauded for its medicinal properties, and for its integration into fasting ceremonies, has in the past century acted as a lifeline to local communities. The readily available shrub, a symbol of the area, could be easily gathered and sold to visiting merchants, who would actively visit the area to obtain the leaves.

In a 1989 study, *La Route de Kinkéliba*¸ Mainet-Delair surveys over 120 urban households in Dakar and Thiès, representing roughly 1,250 people, of which 78% claimed to drink Kinkéliba tea daily, usually alongside breakfast. Even at this time, Kinkéliba was recognised as an important source of income, with the study finding that almost all the (at the time) small villages along la Petite Côte, down to Mbour, including Sebikhotane, saw women selling Kinkéliba on the road sides and in garages, sometimes alongside branches of Kad trees for cattle feed. Sales were typically organised on a communal level, with women gathering the plant, storing them at garages, then gathering and

distributing the income according to the amount gathered, towards the end of the month. These small incomes were fundamental to sustaining village life, yet even at the time of study, the plant was already subject to international commerces of exportation, the medicinal qualities attracting a growing European clientele. Mainet-Delair (1989, p.218) writes “one hopes that a policy of protection is established to prevent an irreversible overexploitation”. Despite the Kinkéliba’s continued presence, it seems that the role of the Kinkéliba is now much reduced, perhaps irreversibly for the near future, although an overexploitation on the part of local women seems unlikely to be the cause. The relation between local women and the plant is under increasing strain. The signs of stress visible in the exposed soil. While the forest is ripped open for globalising train lines, toll roads and airport connections. The very plants that could often a revenue system out of poverty are stripped away from local hands.

Cheikh and I met Aminata Ndoye, founder of Amsukokh Thiokh Ligueye Yéba, a women’s entrepreneurial group, almost by chance, having hoped to speak with the local chefs du quartier of Yéba. After getting lost along the banks of the new TER line, passing through tunnels and trying to climb the trainline’s sandy banks, we ultimately found the two chefs, but they gave very little information. They were old men, with quiet voices who spoke no French, in the heat of the day, worn out from trapsing along the trainline, it felt like any questions I asked fell flat. I mentioned the women gathering wood to one of the chefs and he spoke briefly about a women’s group in the village. After asking for more details, he said we should come back another day to see the group at work. It was my last week, and I knew I wouldn’t have time. He pulled out his phone made a phone call. Within five minutes we were interviewing Aminata, who lived just around the corner. We only spoke for fifteen minutes but the conversation flowed much more easily.

Photograph 9 – Olfactory interactions: the scent of the Kinkéliba.

Aminata started to describe the structure of the organisation she had set up which local women would enter, to alleviate their growing financial insecurity. Starting with the equivalent of a 75-euro investment, Aminata had created an internal market space in Yéba which allowed for the roughly 50 women involved in her association to start producing their own café touba, buying en

masse and then transforming the grains within the village, the women could sell processed grains to other association members at a reduced market price, keeping money and profits localised. From here, as small savings were made, they also started to buy in and develop other products. This occurred in the backdrop of Kinkéliba no longer being worth gathering:

> *Aminata: We pay in credit, instead of cash, we pay by credit with each payment due in two weeks. So two weeks at 75cfa you have saved 25cfa, and with that money you can buy other products. So given we don't have means of financing, we decided to finance ourselves – so instead of selling at 100cfa, the market price, we saved 25cfa. That person has two weeks to return the 75cfa. So there is one moment to buy the product and one moment to reimburse the seller.*
>
> *If you have to payback 75cfa, one week you can pay 50cfa and the next week 25cfa that remains. And we continue like that for months. Through this we have been able to expand and introduce other products, like onion, potatoes. These are all things women would otherwise have to buy at the market.*
>
> *We decided to enter into fields – we buy produce directly from the fields near Thiès. You buy in the fields. Maybe if you pay 50cfa, you resell it at 60cfa – maybe in the market it would be 100cfa, but you save 40cfa per kilo. This allows people to get by. It's like that we start and it's like that that we continue.*
>
> *Pieter: The fields are in Yéba or Sébi?*
>
> *Aminata: No its not Yéba, its mainly at Noto, Do you know Noto?*
>
> *Pieter: No*
>
> *Aminata: Its in the region of Thiès. So we have some members who go to the fields to buy the products directly in the fields. For the café, we go to the marche de Thiaroye. When it comes to Yéba, really there is nothing. So there are lemon trees and mango trees, but we don't have training to develop the trees. But we don't have the means now, but maybe soon inshallah*
>
> *Pieter: So you want do training to cultivate the mangoes and lemon trees?*
>
> *Aminata: We want to do training for horticulture, for market gardening, for carrots. We have asked for this training but it still hasn't come. If we produce the vegetables, people wouldn't be obliged to go to the market. They would be able to buy products here in the fields.*
>
> *Pieter: Before this project, the women primarily sell things?*
>
> *Aminata: Women here generally sell fruits. They take their baskets, fill them with fruit and go to Dakar door to door to sell the fruits. That is what I want to eradicate. I have seen that it's a very difficult thing, 20 kilos on your head to go door to door, it's a very difficult thing. You leave in the morning and come back in the evening, you cannot watch the children. You don't even know if your children went to school or not, so in seeing all these things, I suggested women get involved in this association. I try to eradicate certain jobs in the village, to do the door to door. Some women have lost their children, others have accidents and lose their lives.*

Pieter: What I study is more the disappearance of the forest, but we've seen that many women cut wood and gather wood for burning

Aminata: Its not even for the carbon. We used to have a very rich forest, people would search for the Kinkiliba, and another product, I forget the French name but in Wolof, its Kell.

Pieter: Is it not the same tree we saw then?

Cheikh: Yes it is

Aminata: It's the bark, it's the bark. We went also to find wood to cook, not to create charbon but just to cook. Now it's a very difficult thing. Yandam, this tree there, we would go and look for that in the forest, but now there is barely anything, there is no forest. The Kinkéliba, we went to look for that, you could sell a bag for 2000, 2500 cfa. But nowadays its no longer possible.

Pieter: Kinkéliba it's to make the tea? And the Kell

Aminata: The Kell its for the tiredness and that.

Pieter: Are there other species which were important?

Aminata: Many species have disappeared with time. There were a lot of fruit trees before, we had madd, there was poll, there were baobabs. But even the Kinkéliba now, the women will go a long, long way to try and find it.

Through the precise details on the cost of living and the intricate balancing of women's work in the village, Aminata painted a blistering image of the economic hardship that the women of the village face. Ultimately the women of the local area face a very difficult environmental setting. The increasing disappearance of this forest scape has reduced their access to cheap food and medicinal options, has placed financial strains on their situations and limits their wider futures and lifeworlds. Where previously the Kinkeliba served as a difficult yet stable source of income, women are increasingly pushed to travel further and further with heavy loads, the exhaustion of knocking door to door through the richer streets of Dakar must be brutal, especially while potentially raising young children. The toll of this impoverishment was having fatal effects, with Aminata hinting at death amongst women and children who could not make it. The markets of Thiès, Thiaroye and Dakar are several hours journey away, involving expensive and unnecessary bus journeys on crowded infrastructure and polluted roads. While we had been searching for the village chefs we met other women, resting under a tree, they could barely cover the increased costs of getting to the markets in Sebikhotane, to sell the washing products they had acquired. The cost of sept-place, no more than 30 cents, was too much; they walked when they could, but often they couldn't. While living amongst some of Senegal's most fertile and historically rich soils, the women are unable to tend the land around them, largely due to a lack of resources, but certainly due to a particularly harsh environment. The women here had previously depended on the forest and earnt a living off its biodiverse abundance. The devastation and the disenfranchisement brought about by the TER line, tearing the village up, was on top of the toll-road and airport that had already devasted the wider forested region on the Ndiass geological plain.

This was a multispecies relation, a multispecies death, a multispecies starvation. The Kinkéliba which Mainet-Delair saw in 1989 used to grow in the enormous termite mounds founded on the rich soils of the area. The local area sits on the geological massive of Ndiass, a Maastrichtian era formation which has highly diverse soils including sandy, sandstone and clay based soils (Leprun and Roy-Noel 1976). This geologically intricate mixing of soil types has long strengthened its potential for agriculture and will have fed the former forest for centuries, acting as a home and an archive of a rich ecosystem

of histories of fertility and animals past and present. Leprun and Roy-Noel (1976) highlight the presence of a more sensitive, particular termite, *Macrotermes bellicosus*, which struggles to develop in certain regions but has an effective presence within the specific soils around Sébikhotane. The Macrotermes constantly moved to gather and collect small detritus from the forest floor, including decaying wood, leaf litter, grasses, lichens, or soil, and using these to feed intricate fungal gardens (Farr 2021). It was this act of gathering of minerals across the forest floor that would have made the Kinkéliba so present. The presence of the termite mounds, and in turn the presence, richness and density of the former Kinkeliba plants was a testament to a healthy forest. Trees and plants communicate with fungi through fungal sleeves around root cells, providing roots with hard-to-obtain phosphorous in exchange for the plant's sugars (Mancuso and Viola 2015). Termites and fungal gardens facilitate trees' subsoil decisions on whether to move towards greater moisture, nitrogen or phosphorous, while dodging obstacles of rocks, parasites and aggressive plants. The activities of the soil guide the plant's wider productivity, its ability to produce sugars and other complex nutrients for dependent animals. Darwin suggests that much of the intelligent decision for plants took place below ground, where a root 'acts like the brain of one of the lower animals… receiving impressions from the sense-organs, and directing the several movements' (Darwin in Mancuso and Viola, p. 133). Within all the earth movements, seen in the changes in photographs 7 and 8, and presented by Aminata, one sees that the infrastructure fundamentally upheaves a whole set of healthy rhythms which sustain a wide variety of multispecies life, notably with humans included. Faye (2018, p.93), when studying the disappearance of medicinal plants in urban settings argues "La diversité culturelle est la base de la diversité biologique", although I may argue the inverse: encouraging a variety of plant growth also encourages a variety of different human livelihoods. The Kinkéliba fed off the termites, the termites fed off the forest, the forest fed off the soils, but all that life was flattened in the rush for housing and the push for trainlines, toll-roads, airports. The cheap, raw materials of the forest were no longer available, and the women who most needed support were forced into footing the increased cost of infrastructure, an infrastructure they were never consulted on.

The novel approach that Aminata had started within Amsukokh Thiokh Ligueye Yéba, allowed for a certain alleviation of the duress placed on women. However nonetheless, it feels obvious that the erosion of practises related to the forest is destroying livelihoods in the village. New economic models as envisaged can only go so far to alleviate the damage of increasing distance between plant-human relationships. Cheikh encouraged me into the kitchen of the Centre, we spoke to La Grandée Awa, as she was cooking. She cooked for all the guests whenever well-paying foreigners came to visit. Cheikh introduced me and Awa recounted her life story. Growing up in the sixties in Sébikhotane, she still worked in the town now.

> *I looked after the children every day in Dakar. When I married, I stopped working. My husband left and I was left with children. Then I worked the whole time. I worked for French for 13 years. Every 12 years it changes. Then there was another French lady who came, she was very kind.*
>
> *My daughter got her degree and left for France. She was married with a French guy. The guy looks like you a bit.*
>
> *I continue my work. I was working there for 25 years. The divorced lady has 12 children, she left for Canada. She bought me a house and built the house and left for Canada. 3 rooms, bathroom, lounge. That's how I have my house.*
>
> *It's near the polluting factory. Its near Bargny.*
>
> *My life is like that. Working a bit for Lebanese, a bit for the Centre, a bit for the French. When I finish I go back to Dakar to work there.*
>
> *My daughter has started to work in France.*

[kitchen noises, conversations interrupt]

Before women wouldn't work, you would stay at home, look after the house.

When I was little, my dad was a farmer, he grew millet, peanuts. We peeled the millet with our hands. They sold some millet and kept some. Now the field is under construction in Yéba. My dad had two wives. I have one sister of the same parents.

Me and my sister would go to school. When school closed we would leave for work, to be able to buy books. Before there were lions that came in my dad's fields. He chased the lions out at night. They came in the brush, they came to the side of the house, they would shout and run away.

My dad had bees, we would eat honey. The lions came in the night in 1964.

Before life was good. We didn't need to buy anything, we grew everything ourselves, vegetables, aubergines. We would manage everything year to year, we always had enough food to eat. There were no problems of drought and now we can't grow anything.

Now life is difficult. Before things weren't difficult. We sold broken mangoes to Filifil for 15 or 25 francs, because they made jams. Mangoes, carosols, mandarins, papaya, people came here from Dakar to buy those things.

That's life.

The barren, semi-lunar landscapes of photograph 8 demonstrates how when large infrastructural projects engage in moments of mass-soil movement, whole worlds of carefully constructed relations are disrupted, ecological niches are blown apart. Sébikhotane's proximity to the airport, like its historical proximity to peanut exportation ports, demonstrates its clear connection to globalized capitalist economies. Long a source of extraction, soon, as part of the complete TER line, it will become the first point passed through by Senegal's internationally mobile classes. In a study by Sylla (2021) on the development of the TER, one of the only accessible studies completed, one sees that the central concerns of the infrastructure are the state's ability to control the infrastructure and ensure its effective use. When discussing the social and environmental concerns of the Plan Sénégal Emergent, Sylla (2021, p.49), seemingly a supporter of the plan, given the books dedication to his excellence President Macky Sall, writes 'the environment is a decreasing priority within the PSE'. However he continues that the success of the TER, as supported by Plan National d'Action pour l'Environnement, is a testament to the ways in which the PSE 'integrates the principles of sustainable development into national politics, inverting the noted tendency of the loss of environmental resources' (p.49). I will openly recognise that I was very impressed by the trainline when I first arrived in Diamniadio (then taking the bus to Sébikhotane. The cost of €1.5 euro seemed however likely unpayable for a number of travellers. Yet if the clearing of forest land, uprooting of housing, and the further outpricing of local people on the trainline is the environmental solution, and even openly described as having a conservational effect on the local environment, it seems that the infrastructural promises are failing. The lack of consultation on the train's exact path is reflective of the undemocratic structure of urban design, the poor processes of planning and the subsequent disenfranchisement of local communities and livelihoods. This is a multispecies disenfranchisement. Soils became weaker, fungi-plant relations collapses. Forested hills are eaten away, and soils taken away for roads and rails. The environmental decay initiated by the former colonial railway should not be repeated by its modern successor. The capacity for environmental planning and imagination should extend beyond the reduction of engine

pollution that the train will admittedly alleviate, it should also pay further attention to the lifeworlds of local eco-social communities it currently upends.

P: Did you go to school there?

C: No, no. So, me, my mum was born in Sébikhotane, she was born in the village of Yéba. In her teens she moved to Dakar as a cleaner. There she met my father, they got married there and I was born there with my big brother. When I was three or four we moved to Grand Mbao, because it wasn't good to be in Medina, there was no space. We lived in an estate in Mbao, a Lébou area. Then in 2016 we moved to Sébikhotane. My dad bought an area and built his house here. I was here, finished my school. I went to UCAD for 2 years, studied law, but then stopped, came back here and continued with my community, more volunteering work, like with kids on the streets. Since then I got married one year ago. I have my little girl.

P: Congratulations!

C: Thanks, there's something special about this. My mum is from Yéba, when I was little I came here on holiday. We would spend time here, we would go into orchards, we would walk the sheep through Sébikhotane. There was so much vegetation, it was like a dream to me, I was very small, 10 or 12 years old. Then when school opened we would return to grand Mbao. But during holidays we would come here. They had a lot of fields in Yéba. We would come and cultivate every morning. We would walk with the horses.

In 2013/2014, but now there's nothing like that. This is Sébi-Tangor. This was part of the classified forest. You can feel it a bit. There are the gulleys of water. Theres lots of water in the rainy season

P: Are there floods?

C: Yes sometimes. But this water, will continue to Toubab Dialaw, to the sea.

P: I walked here the other day. There were some guys who shouted some things, I don't know what.

C: Oh!

P: But I was here with my camera, maybe they thought something.

C: During those years, there were sheep at the grandparents. We would take the sheep to the forest, attach them to the trees and come back at 7 or 8pm to bring them back to the house. It was a very very quiet area. You wouldn't have thought that anything bad could ever happen here.

Photograph 10 - *The new plant-animal-soil relations. The trainline's bank of quarried soil clears through the town and fields.*

4.3 Housing Construction: New rhythms of the forest

You will see. The kakairie. Given this is a new area. Now generally the Kinkairie, their main activity is products for construction so you see they will do well here.

This here is a mango field. It's stayed here. And like that, all these fields belonged to families. But now everyone sells and they live however they want.

We used to chase hares here. Now I think it's the only animal that remains. There used to be monkeys, there used to be hyenas, jackals. But all that remains now is hares. That would've been in 2009, that those animals were here. A lot of monkeys, so many monkeys. When you think about monkeys, you need tall big trees, they like the height. So imagine the trees.

P: I've been in Senegal for 2 months. But I haven't seen any large animals.

C: Theres a reserve near here where you can see them. But in this region, you can't see them anymore. In the last 10, 15 years they've almost entirely disappeared.

It all happened so quickly, all the new buildings.

P: The NASA observatory? Where is that?

C: Straight on, 5 kilometres.

For example to me. This house could be interesting. The way this house emerges out of this vegetation there. This new manner of building. It's new. Around here we have the red clay soils, if you go to Yéba, you will see the construction made out of clay. It's a strong building material that keeps well. These bricks are very new to the area.

[camera beeps and clicks, Cheikh takes a photo]

Cheikh paused to take a photo of a semi-constructed building. The vegetation was rising several metres high in front of the building and there were no signs of active construction around the bricks and breezeblocks. It was an interesting composition. Three quick snaps, and that was it, he returned his camera to the bag and never took it out again. They were the only three photographs Junior took on the whole walk, the area having already been documented by him.

Photograph 11 – Cheikh on an archival landscape shoot.

This interview transcript is from our first walk through the landscape. We came to do many more walks. Photograph 11 shows another walk, much later in January. With our backs towards Yéba, here we were at the highest point of the region's small hills, where housing construction and the marking out of land dominated the area. Most land still stood vacant, and I only remember seeing one fully constructed yet unoccupied building. Cheikh had visited this particular building multiple times across the past year, repositioning his tripod on the same spots to be able to take the same photos over and over, showing through time how the forest would change. He didn't seem worried that the building one day might be complete, it had already stood this way for a year, and may spend many years continuing like this. The building reflected the overall pattern of design in the area. Stages would be gradually complete based on the incremental acquiring of finances to allow for the next stage of building, a process which could take years (Kaag *et al.* 2019). This process of construction could likely involve transnational buyers of land or even international migrants sending back finances for construction. The steel rods remained in place to allow the potential for another layer, as is visible in the image.

P: So you are also interested in the composition.

C: Yes the composition is important.

We'll take this route.

The photo recounts the start, a process that is beginning, an urbanization. These trees here also tell a story, something maybe that comes from the past, a story from the past. What happens one thing after the other?

P: It's interesting. I feel like you have an artistic vision, but also the legal approach, you understand what the companies are doing, all the different actors.

C: All these activities interact, one on top of the other, that one will collide with the other, this movement, will create an urban tissue; a demographic, economic, political tissue.

Photograph 12 – Spiritual proximity through reworked images.

Photographic traditions within a West African context, allow for an ideological opening up of photographic practises. Eurocentric histories and understandings of photography are obsessed with "representation, mechanical reproduction, and human or technological progress [which] can seem particularly aberrant when applied to west Africa" (Bajorek 2020, p.20). Walking around Senegal, the

most prolific image found in any context is the trophy photograph of the anticolonial resistance figure and Sufi Saint Cheikh Amadou Bamba. This photo was taken by colonial photographers when Bamba was under semi-permanent house arrest. The colonial violence of the image, a display of the French colonial power over Senegal, is at odds with the image's contemporary ubiquitous circulation as graffiti on buses, walls, or as images on fridges or phone lockscreens. The image is distant from its initial context, it has almost no connection to colonialism, rather invoking a sense of piety and humility into those who enter the image's proximity (Bajorek 2020). Often the image is reworked, images may be images of images such as in Photograph 12. The quality of the depiction becomes less significant, but the power of the image remains, the proximity to spirituality continues. Images in this sense do not represent a moment of fixing, as they may do within Western interpretations. Olu Oguibe encourages understanding photography then as having a "concept of plasticity in west Africa" (201, p.9), its potential remains "manipulable long after its production" (*ibid.*) and are characterized by a radical "open-endedness" (*ibid.).*

The framings of the West African perspective of photography are useful for understanding photography as a methodological tool, practise and fieldwork approach. Recognising the open-endedness of photography, as is possible in West African cultures; recognising photography's potential to affect, for example on a spiritual plane, rather than simply as a visual aesthetic, radically extends the power of photography. Feminist photographers, such as Susan Sontag, have considered the power of photography from a moral, ethical, or ethico-political angle, asking how an image may harm or heal, "emphasizing the embodied nature of image *perception*" (Bajorek 2020, p.27, emphasis added). Yet further to this Bajorek (2020, p.27) highlights how anthropologists, ethnographers and specialists of museum studies, such as Elizabeth Edwards or Christopher Pinney, have pushed to:

> *"theorize the effects of photographs as they unfurl, not in some kind of abstract situation of looking (or touching, or feeling), but in the moment that specific photographs are interpolated by specific actors, situated in specific cultures, as physical or material objects"*.

Looking to photography as an experience, as the setting in which photography unfolds, allows a wider interpretation of an image beyond its visuality, thinking of the embodiment and the moment that a photograph more widely describes, as in the cramped photography of Maximilliane's garden.

[After some silence]

C: This is a family, the first family on the road. If it interests you we could talk to them, ask their impressions of the changes.

P: That would be great. When did they come?

C: It must have been 7 years ago.

P: That's quite old for the region.

C: No not really. Now it has exploded around here. The environment that was here before, how has that changed in 7 years. Such a big upheaval must have been observed.

The last time I was here, was one month. Just one month. It was all green, there were trees, it was beautiful.

[Recording stops]

Photograph 13 – A view of the former forest from Yéba. Photograph by Cheikh.

The top of the hill, left off the ascending road, was entirely clear of vegetation. The sand and dirt was a deep dark red and in the near distance a solitary bulldozer whirred and chugged in jolted movements, moving earth here and there. Tall stick stalks of dead plants dotted the terrain and we moved slowly across the sand. We turned back briefly, here we could see Sébikhotane in all its industrial, panoramic mastery. A blue square on the horizon indicated the iron recycling factory on the other side of town. Change was taking place rapidly in the area, and according to Cheikh the area was almost unrecognisable to just one month before. Construction for housing was accelerating. Directly in front of us a large depression in the landscape indicated a quarry, the sand from the hill had been used to lay the foundations of the Route National 1 through Sébikhotane. The dense mass of housing that had since cropped up in the quarry seemed likely some of the poorest quality in the whole town. All around the town was hemmed in by industrial or agricultural works, a semi-circle squeezing the residents together and forcing them to spill out onto the hill we were now stood on.

As we walked further through the field, we could see a football pitch constructed on the horizon amongst the construction sites. We passed a gully on our left, denser vegetation made it impassable, and we continued along the plateau of the hill, around another half-constructed house and through some scrappy undergrowth which gradually wound down into a small more enclosed valley, its trough sinking maybe forty metres below the peaks either side, themselves less than three hundred metres apart.

We climbed up the remainder of the path, the sun was starting to set and the colours were less bright now. Continuing through the second small valley gifted to the Association we stopped at an intersection of dirt roads. A motorbike or car zoomed past every few minutes but otherwise it was quiet. As the call to prayer rang out just past 7pm we looked at the Service station in the distance, accompanied by the bright lights of the toll booth perhaps a kilometre in the distance and down below our feet. We could at this point turn left and see the village, but it was now too late in the day, straight on led to the toll booths and airport, the floodlights still easily reaching us from the 15 kilometres that stretched between us. After pausing for several minutes, we turned right, for one final small ascent and another view of the toll road before the night descended entirely and we worked our way back to the centre, tracing the edges of dense fields owned by the mayor’s family. Cars sped past us in the dirt of the young night and we lit the way back with our phone torches.

5. Eco-Industrial Futures: Community actions for toxic extraction

The loss and devastation of the forest is fortunately not the end of the story of this patch of the Anthropocene. The valley, which Cheikh and I were walking through, as well as another valley a few hundred metres on, made up a 6-hectare space that has been verbally gifted to the Association G.A.R.A.B by the mayor, as part of a project of species rejuvenation. The association, comprised of hundreds of local members, including Maximilliane and Ibrahima, and many other participants in the wider AirGÉO project, hopes to restore the area. I interviewed the president of the Association G.A.R.A.B, Mayoro Gueye, to ask more about their work. He told me that before he spoke of the association it was necessary to recount the story of his first working with anthropologist, Yann Phillipe-Tastevin:

> *The association was born with a process, a process that started with some surveys that we did with Yann in Sébi. Yann was following the story of scrap metal, of cars, broken fridges. Scrap metal that is collected in the large urban centres of Dakar and the rest of the country. That scrap metal that was collected all over the country would converge in Sébikhotane. Why Sébikhotane? Because it was the place where there was iron recycling factories, giving a thing a second life.*
>
> *So, given this was the study, we contacted the factories, we spoke with the people and from there was born the Projet AirGÉO. Why Projet AirGÉO? Because we realized that all the people were complaining always about the pollution of these factories that transform the scrap. So, this plan emerged, we couldn't do this study, realizing the impact of these factories without doing something. So, from here Yann built the Projet AirGÉO with other scientists and the project in its first phase referred to measuring the quality of air that was breathed in Sébikhotane.*
>
> *So, the population themselves identified the pollution firstly by the smell: the air no longer felt clean, there were toxic smells, that upset them and that they breathed all day. One lady said that when she put a curtain up, after two days it would be black. Because simply the smoke would catch on the fabric. But also the population also observed that there was a growth of diseases which they didn't have before: respiratory problems; asthma; miscarriages. When they spat it would be black, children had lung problems. The factories arrived around 15 years ago. Since then they haven't stopped. There was even a factory that treated lead batteries.*
>
> *Now, I don't live there, but every time I stay in Sébi – I also feel it everytime I arrive there. So, I also feel the connection between this pollution and the other people. So also, talking about this association, everyone said the same thing, the most viable solution is to make the forest come alive again. The forest is a natural space that can absorb this pollution. That is essentially the objective of the group.*

Within the Projet AirGÉO, the rethinking of research relations, the legacies and histories of French-Senegalese research relations were being reconsidered, challenged and reapparoached. Plants and trees were active agents within this redesign. Yann Phillipe-Tastevin, was the primary engine of the project, a French anthropologist of health, society and environment working between Dakar's *Université Cheikh Anta Diop* (UCAD) and France's *Centre National de Recherche Scientifique* (CNRS). When I met him for lunch at the UCAD campus, he explained the projects origins and setup, but I was particularly struck by the organisational structure, where he encouraged individuals to work in pairs

within the project. He wanted to bridge any perceived gaps between distant researchers at the UCAD or in France, and local residents within Sébikhotane and wanted any work to always be done with as much respect for and input from the people of the town as possible. Having already met and started working with Cheikh, I had slotted in easily.

In downtimes within my own research, I participated in the wider studies of the group: typing up notes and photographing events with the *bajenu gox,* a role similar to a local midwife from each part of town who would encourage pregnant women to engage in the AirGÉO's pollution studies, to see how heavy metal industries affected their pregnancy. The processes at every step were important: pregnant women engaged in the project were selected at random through a public meeting where houses were cartographically numbered and marked, the process aimed to avoid any perception of favouritism and was done in full view of social inclusion.

5.1 Eucalyptus Sensing Toxicity

One of the first people that I met in Sébikhotane was the French eco-poet Claire Dutrait. Claire had been working closely with Yann and was carrying out a PhD using interviews and oral histories as a way to elicit '*recits*' of the history of the forest from village elders, discussing the presence of certain vegetation, certain species, certain stories and histories. She organised theatre performances to communicate the changes occurring in Sébikhotane to a wider Senegalese audience. Throughout her work, as Cheikh used photos, Claire used the materiality of damaged environments to stimulate discussion. Lead pollution, plant species or soil may all be used as prompts on histories of change in the area from the perspective of the town's elders. Talking to me about AirGÉO's project with eucalyptus bark sensors, Claire highlighted the imperialist ecologies which facilitated the arrival of eucalyptus trees in Senegal. In *'Voyages en Eucalyptus'*, an article within the book *'Les Migrations des Plantes',* Claire has since published this story.

Dutrait, Duperrex and Verger (2024) trace the movement of the eucalyptus tree from Captain Cook's arrival in Botany Bay in Australia in late 18th century, to their conversion within the projet AirGÉO into cross-species collaborative sensor of pollution. After Cook's naturalists drew up sketches of the beautiful verdure of the eucalyptuses of Australia, it took another century for the first seeds to be sent to Europe; Pontevedra, North-Western Spain specifically (*ibid.*). Around this time, Portugal saw widespread deforestation and 35,000 Eucalyptus trees were planted. Their high-water demand drained areas of stagnant water and reducing the spread of malaria, although the areas are now known for their ravaging summer wildfires (*ibid.*). The beautified colonial image of the Eucalyptus travelled with the French to Senegal (*ibid.*). In the late 19th century General Faidherbe encouraged the decoration of colonial projects, such as trainlines, with Eucalyptus stands (*ibid.*). Later, just West of Sébikhotane, the forest of Mbao, cleared for the growing populations of Dakar, was reforested by the French with Eucalyptus. The local populations however were denied access to live, graze cattle, cultivate, hunt, gather herbs for medicinal or religious uses within the forest (*ibid.*).

The Eucalyptus stands, in this sense play the opening role of what Claire refers to as the historical plant-coloniser, the killer of interspecies interactions, livelihoods and collaborations (*ibid.*). The water exhaustion and weakening of soils, combined with colonial policies of exclusion laid the foundations of destructive environmental policy. Within the projet AirGÉO, the Eucalpytus' position was reimagined: their bark, cut into tiny sections of 2cm by 6cm ultimately served as a cheap sensor for measuring local pollution. Suspended across 200 homes within the town for almost six months, these strips of bark when analysed in laboratories in France and Brazil, were able to demonstrate the extent of poisoning in the town, most notably showing the extent of lead poisoning around a former battery factory, subsequently driving local government policy for a soil clean-up. Dutrait, Duperrex

and Verger (2024) suggest the eucalyptus may not be a good plant-diplomat but may alternately serve as a useful plant-philosopher for the way in which we redirect our thinking of the plants around us, the damage they have done, the livelihoods excluded and how new collaborations may emerge in these pressing environmental times.

Photograph 14 – The trunk of a Eucalyptus planted by Ibrahima in Toubab Dialaw. The bark from this tree, which can be seen to peel, provided the strips used to sense pollution in the Projet AirGÉO.

5.2 New forest time

Mayoro was assisting Yann with much of the research, translating and presenting research plans for communities into Wolof, leading community consultations. Mayoro also encouraged me to get involved, saying there were often many students from international settings involved in rejuvenating the forest. They needed as many people as possible to start planting. I was intrigued by this and felt that assisting with replanting could be an interesting way in becoming more acquainted with the local species and the quality of soil. However, while the association had now been active for over a year, with more than 90 members signed up from the start, I could never quite get around to understanding when and where the rejuvenation would happen. Walking with Cheikh was the first time I encountered the concrete details of the forest, the space that had been allotted to the group. I constantly pressed more involved members of the association to ask when the rejuvenation would take place, when I could help with the planting but responses were vague and after a month of high hopes, I quietly shelved any belief in the idea that the area would ever be planted.

There was perhaps a naivety to my position. Projet AirGÉO was very busy focusing on studies in collaboration with pregnant women and *bajenu gox,* local midwives. Yet I felt the idea of rejuvenating the forest, seemed so easy, but was being sidelined for more easily interpretable research practises, more easily understood to Western funding. Maximilliane was sure it would go

ahead, it just needed time and, he pointed out, it made no sense to plant anything outside the rainy season. Planting would start next year, after I had left:

> *Yann will find the financing we need for the fencing and the enclosure of the land – we must make the well for water, for watering. One also has to put security in the first hand. We will first put species which are solid and not easily threatened and when that is finally done, we will do species which are not easily exposable.*
>
> *Later we will choose species which grow quickly, like the calicédrat (Khaya Senegalensis), but that is threatened by people because they take the bark to make drinks to take care of themselves, but if that is not watched, they will take the bark and the tree will die.*
>
> *But the fromagier, the fromagier is not affected like that. So, we will put species like the fromagier first, it will grow quickly undisturbed. After that, we will see the next steps afterwards. But with our ethnobotanists, we will adjust our programme because we did a study. We did a proposition, but we do not know if people will adopt it.*

The development of the forest was an intricate affair, that had to pay attention to the way the trees relate to the area, and the way in which humans relate to the trees. Much of the early stages of this forest were literally taking place in Maximilliane's back garden. After returning to Europe, I called Maximilliane to ask about the progress of the project. It had finally been signed off, all that needed to happen now was for the area to be fenced off, and for the first fromagiers to be planted. These would be the leading trees to recolonise the soil. Sturdy, strong, predictable and at no risk of being cleared for medicinal shrubs, amongst this base of stable trees, a group of more vulnerable species could be planted and encouraged around them.

5.3 Surveying Species

The ethnobotanical survey Maximillian was referring to was one led by ecology students of the Université Cheikh Anta Diop. As part of the involvement in the AirGÉO project, while unable to get involved in planting or rejuvenation efforts, I was invited by Yann to photograph an ecological survey within the protected monastic space of le Grand Seminaire. The Grand Seminaire was a sliver of protected green within the otherwise private surrounding landscapes of the Filifili plantations and other large corporate farms on the hills North of town. The secluded monastery – a patchwork of grapefruit orchards, looming baobabs and dense tumbling hedgerows, was understood by the leading ecologists of the area to be a small representation of the forest's former species diversity. My task was to photograph the leaves, bark and fruit of every species that the ecology students identified in the forest. By generating a complete log of all species in the classified forest in town, where me and Cheikh had spent many hours walking, and comparing it to the forest in the enclosed monastery, we would be able to clearly demonstrate not only the level of destruction in the classified forest, but also offer a model for future rejuvenation efforts.

Across 3 days I followed the ecology students as they logged and identified as many species as possible within pre-determined transects of the forest. Never being able to register everything, small strips of 30 metres long were selected, with every specie encountered noted by name and photographed. This was an effort to accurately represent the majority of the species in the monastery. The monastery was sizeable but not enormous, so it is likely we logged the majority of significant species. It was also not a perfect representation of the forest, various exotic fruit species had been introduced by gardeners in small hidden away spaces.

Photograph 15 –. Cheikh sits with Professor Sagna under a magnificent Xai (Khaya Senegalensis) in the courtyard of the monastery.

I was offered a small wage for the work and invited Cheikh along, splitting the wage between us. This turned out to be incredibly practical given the students, professor and driver had very little idea where we were actually going. Access to the monastery proved a little difficult, we had to abandon our first day as it seemed the monastery were not expecting us. We opted instead to survey the hills of Yéba to understand all the different species that remained there. Here we found just 18 plant species, largely shrubs and bushes, with no trees beyond any height of three metres or demonstrating any signs of age beyond the last 10 years. Amongst even these 18 species we found four species which Faye (2018) considered otherwise totally unavailable in the area, these include *Cassia Siberiana, Jatropha Gossypilifolia, Piliostigma Reticulatum* and *Strophanthus Sarmentosus*. Our day had been delayed and we were surveying in the midday heat, I found the exposure overwhelming and had to drop out of the afternoon's surveying activities.

Comparatively the monastery's forest was much more approachable, with plenty of shade and cooler areas. Here we found at least 70 plant species, including the 18 already mentioned, which further included 4 species which Faye (2018) considered extinct in the region. Further to this, most of these plants were much more mature, regularly reaching at least forty to fifty metres in height and with trunks over a metre wide in diameter.

An immediately noticeable difference between this forest space and the dying forests of Yeba could be seen in the courtyard of the monastery. A *Khaya Senegalensis* tree was positioned directly in the middle of a courtyard of a chapel and various outbuildings. The *Khaya,* or *Cailcédrat*, as Maximilliane had referred to it, was he had told me, a very sensitive tree, which could not be immediately planted in any future forest rejuvenation. It would immediately suffer from a constant removal of its bark for its medicinal qualities. It was hoped that perhaps after 10 years of planting fromagiers, that a *Khaya* may be safe enough to grow. Yet, here, in the centre of the monastery, stood a stunning, proud *Khaya Senegalensis* in the dominant position in this space. The ecology students had never seen the tree with its bark so perfectly intact. Here in this setting, the tree's medicinal qualities were secondary to its prime decorative position and indicative of the long-running security of this monastic space, in the context of the ensuing environmental upheaval beyond the monastery's fences. Across decades, it had never been considered that this tree should be touched to gather its medicinal properties, while on the other side of the fence, such a specimen would be likely long dead.

The health of individual trees was however too simple a summary of the complexity of this space. On one day we were accompanied by Maximillian. Maximillian spoke of his fathers knowledge of the area, and how the area used to be even denser. A palm-wine harvester, it was formerly possible to simply walk from tree to tree to harvest wine in these forests. Recognising this, Maximilliane gifted the monastery palm trees to encourage their reintegration into the space.

It was no paradise and no panacea to the problems however. The forest was increasingly getting drier, it seemed that the water table was getting lower and lower, although it was not immediately clear why. In a conversation with Professor Mamadou Kandji, a literature professor born in the town, it was clear that even some of the fruits and species he identified from his childhood were no longer available. A yellow fruit known as Dugoor (*Annona Senegalensis*), was one such relic of the past nowhere to be found in either forest, just as Faye (2018) asserts it remaining unavailable across most Northern Senegalese regions. Despite the weaknesses of the forest, it was certainly a powerful space to consider a former forest life and feel encouraged about the need to return such a space within an otherwise aggressive urban setting. It felt worlds away from the discomfort, dust and pollution of the wider town. The trees here had clearly been allowed to grow for decades uninterrupted and the forest was a lively space. The occasional distant crash of undergrowth indicated

that the plant life was also supporting a much broader species base of animals than I hadn't seen anywhere else. troops of monkeys observed us from a distance.

Photograph 16 – Gravita Senegal factory Sign. 'We Recycle to Save the Environment'

On the final day of our excursion, we had a different task on the other side of town. Alongside the pressures of the corporate expansion of agricultural land to the North of Sébikhotane. The town also faced grave issues of pollution to the West, where several international heavy metal factories have cropped up in the last two decades. Fabrimétal Senegal which recycles scrap iron and Gravita Senegal, a highly controversial factory for the recycling of lead torch batteries, both lie within the close vicinity of the town. Gravita has in the past years been forced to shut down and move due to its proximity to residential zones and its direct leaking of lead pollution to surrounding houses. When we went to visit the factory perimeter a local resident told us they still sometimes work in the compound and during heavy rains the polluted soil, which was gathered into a heap higher than the compound wall, would sporadically set fire.

It was throughout the edges of thse various industrial factories that we registered and gathered samples of growing weeds. Professor Moustapha Bassimbé Sagna imagined that once they had identified which species were the best at extracting heavy metals, in particular lead, from the soil, the diverse local actors of Projet AirGÉO could then begin a program of planting these species throughout town to help the decontamination process. Professor Sagna told us how Western industries were now reportedly able to burn collected plants and extract the heavy metals through incineration. Pollution extraction in this way may later be a reality for Sébikhotane and the wider industrial area. Today's excursion was thus a very preliminary investigation. Professor Bassimbé Sagna was also yet to identify a laboratory which would be able to help them with the measurement process – certainly there wouldn't be one in Senegal, but perhaps in Montpelier, France.

On that Sunday morning, I was witnessing pioneering work on how to live with the embedded, inevitable pollution. While this was fascinating and significant, there was no mood of excitement. One of the Masters students quietly admitted she found the work boring, the range of species uninteresting. She would rather be in the Casamance forest, where there was much more diversity, and the forest was more beautiful. I was somewhat taken aback, but it reiterated the almost endemic prevalence of pollution in the region. This was banal, common, and ordinary, this damaged environment was a norm amongst the ever-expanding urban regions around the Cap-Vert peninsular.

5.4 Threatened Species List

Table 3 – List of Species Encountered During Fieldwork Presumed to be Extinct or Highly Threatened in the Region

Medicinal uses come from either fieldnotes or details from the book '*Plantes Medicinales du Sahel*' *(*Fortin *et al.* 2000*).*

Name	**Uses**	**Encountered where**	**Encountered with**
Acacia Siberiana	Treats urinary tract infection, colds, coughs and childhood fever	Grown in CARITAS nurseries	Maximiliiane would grow them in nurseries
Aphania senegalensis	Treat pain, inflammation, asthma, bacterial and fungal infection	Protected monastery forest, Sébikhotane	UCAD Ecology Students
Capparis tomentosa	Roots, leaves and bark can be used to treat coughs, fever, and asthma. Powdered roots can also be applied to wounds, abscesses and snakebites.	Protected monastery forest, Sébikhotane	UCAD Ecology Students
Cassia siberiana	Purgative, diuretic, analgesic, antibiotic, anti-inflammatory agent	Protected monastery forest, Sébikhotane	UCAD Ecology Students
Daniella oliveri	Bark is used in the treatment of tuberculosis, neuralgia, hemiplegia, pneumonia, and jaundice	Protected monastery forest, Sébikhotane	UCAD Ecology Students
Ficus sycomorus	The fruit is sometimes used in traditional medicine to treat gastro-intestinal conditions such as constipation and diarrhoea. The tree's bark is used to treat coughs, throat and chest diseases	Protected monastery forest, Sébikhotane	UCAD Ecology Students
Jatropha gossypilifolia		On the hills of Yéba	A group of foraging local women

Maytenus senegalensis	Anti-malarial qualities	Protected monastery forest, Sébikhotane	UCAD Ecology Students
Phyllanthus reticulatus	Antidiabetic, antiviral, anticancer, antiplasmodial, hepatoprotective, antibacterial and anti-inflammatory activities	Protected monastery forest, Sébikhotane	UCAD Ecology Students
Piliostigma reticulatum	Good for toothache - boil the leaves. To cure scars you can eat the bark and when chewed you can use it as a bandage	Yoga retreat in Toubab Dialaw	Ibrahima, he had brought it there and planted it.
Sarcocephalus Latifolius	Used in the treatment of fevers, indigestion	Personal Garden	Maximilliane
Strophanthus sarmentosus	Treatment of joint pain, head lice, eye conditions and venereal disease	Protected monastery forest, Sébikhotane	UCAD Ecology Students
Tinospora bakis	Alleviate headaches, rheumatism, mycetoma, and diabete	Protected monastery forest, Sébikhotane	UCAD Ecology Students
Ximenia Americana	Treatment for a multitude of diseases such as skin problems, headaches, leprosy, hemorrhoids, sexually transmitted diseases, sleeping sicknesses and guinea worms.	Personal Garden	Maximilliane
Ziziphus Micronata	Roots are used to cure bed wetting	Yoga retreat in Toubab Dialaw	Ibrahima, he had brought it there and planted it.

Table 3 shows the thirteen species I encountered, which Faye's (2018) 132 interviews suggested to be entirely absent from Senegal's most urbanised regions of Dakar, Diourbel, Fatick, Louga, Matam, Saint Louis and Thiès. To be clear, none of these species are deemed to be threatened on a global, or even national, level. Of the thirteen species I encountered, which Faye (2018) labels as regionally threatened or extinct, only three of them return results on the International Union for Conservation of Nature's species red list (*Ficus sycomorus; Phyllanthus reticulatus; Ximenia Americana*), all of which are deemed of 'Least Concern', the lowest level on their extinction barometer. Faye also makes no claim to suggest these species are no longer available in Senegal as a whole.

As can be seen a vast majority of these species were found in a protected monastic forest in Sébikhotane while I worked as a photographer alongside a group of UCAD PhD ecology students. This was an enclosed space, which took several attempts to enter and was done as part of a wider collaborative research project, le Projet AirGÉO, which ultimately came to play a very significant role in my research. Two of the species were encountered in this first fieldwork excursion with Ibrahima in Toubab Dialaw. Of these two, while the *Piliostigma reticulatum* was found both in the forest and the yoga retreat, the Ziziphus Micronata was only found in the yoga retreat and was not identified anywhere in Sébikhotane, demonstrating the intensity of the effort Ibrahima invested into the space to sustain certain species, livelihoods and practises of plant-human collaboration. Other species were found in Maximilliane's personal garden, as the lead agroforester within Projet AirGÉO, hoping to guide the rejuvenation of a small section of heavily urbanised, polluted and otherwise exhausted soils,

Maximilliane was sure to protect some of the most threatened species within the boundaries of his own home garden, with the ultimate aim that they may be introduced into the local forest if it successfully rejuvenates. Finally, one specie was found in a moment of serendipitous happenstance, while walking the hills near Sébikhotane with local photographer Cheikh Junior, we stopped to speak to some women gathering wood amongst the straggling remnants of forest brush. While they were clearing many trees for firewood, they left one specie, the *Jatropha Gossypilifolia,* known for its anti-fertility properties.

Photograph 17 – Collage of species collected at factory verges.

6. Conclusion

At the start of this thesis, I asked two questions:

1. **How does paying attention to plant-human intimacies allow new insights into the eco-social upheaval of Senegalese urban life?**
2. **How can research tending to plant-human relations open up space for different (non-human) values to make-sense in a dramatically changed ecological setting?**

I used the terms 'eco-social' and 'non-human sense-making' as a deliberate provocation of human-centred research ethics and their fundamental oversight of multispecies encounters and the entanglements of human-plant-animal-fungi life.

Throughout this thesis I focused primarily on plant-human relations. In response to the first question, I have drawn persistent attention to the ways in which, phenomena of social upheaval, in particular the mass shift to urban living in Senegal is driving an ecological devastation that affects humans and plants in complex interconnected ways. Recognising in Chapter 5, that many of the plans I encountered were presumed extinct or incredibly threatened by Faye (2018), I was therefore entering into spaces, ecological niches, tender plant-human relations, where only some of the last fringes of life-giving plants could be found. Through centring the knowledge of Senegalese vegetal experts and plant-knowers, I came to encounter groups and activists working in small, challenging conditions to sustain a way of life increasingly absent across Dakar's booming urban poles.

In the small moment around the factories of Sébikhotane new ecological visions were unfolding. Where my previous discussions with farmers, agroforesters, and traditional healers often spoke about the loss of vegetation in contemporary moments, here I was starting to see the potential new trajectories of human-plant relations within the damage of the Senegalese Anthropocene. Amongst heavy pollution of Turkish and Chinese factories, the answer to a process of partial decontamination may lie amongst the scrub and banal weeds of industrial verges. However, untangled from the soil, the weeds became quickly entangled in wider political questions. They may soon have to navigate the complex migration route from Senegal to France. The universities and laboratories of Senegal were incapable of answering localised questions alone and depended on distant French assistance. It was almost a marvel the weeds were gathered at all.

This space was fascinating, the use of local weeds as a tool for decontamination was a creative way to reapproach environmental degradation, potentially offering new localised solutions. However, plants, no matter how many in number, cannot fundamentally undo the existence of the industries; this pollution could not be offset by trees or vegetation. Over the past twenty years the arrival of more and more factories to the area has been incessant and the parallel disappearance of the ancient forestland is no coincidence. The government's Plan for an Emergent Senegal has encouraged an intense turn to neoliberal economics. Deregulation of space has ripped open the town of Sébikhotane and imposed whole new livelihoods.

The different approaches of different plant-knowers each allowed unique insights into the challenges that face a sustainable urban life. In Toubab Dialaw, the new yoga retreats and European holiday centres, which valorise a romanticised *African* connection to nature on the Senegalese tourist coast, offer a, somewhat ironically, protected space for gardeners such as Ibrahima to isolate plants from overexploitation and to propagate and sustain a species base for which he can collect the herbs for his closest neighbours. Yet the encouragement of tourism, the

opening up of Senegal to international markets as former President Wade's envisaged *'atelier de production'* and the drive for infrastructural investment are likewise decimating former ecological centres like the forest of Sébikhotane.

A similar process occurs in the catholic monastery outside Sébikhotane, an enclosed private space, with few visitors and inaccessible to local populations, is the only relic of the former forest. Yet even here, questions of water accessibility threaten the forest's continuation. Spaces like these are sustained by vegetal experts like Ibrahima and Maximilliane, who through long histories of plant tending, develop intimate relations with spaces and will plant and propagate species in the spaces that they trust. Maximilliane planted the palmiers in the monastery, Ibrahima tending to the highly threatened Ngigis in the yoga retreat. By bringing such people together in the Projet AirGÉO, by bringing their knowledges and intuitive embodied understandings of plant care, a hopeful future of tending to plants also returns to Sébikhotane. Yet once again the future for plants and humans is one of separation, the enclosed spaces of an allocated forested space, no longer readily accessible to local populations. It is a space that will require an active protection and a long-term commitment, should it be able to offer a viable life-line to the community in the future.

In recognising the different temporal scales of plant life, and the need for patience for a forest's rejuvenation, there is however an imagined hope that emerges. Building on memories of the former forest, recognising the stories of monkeys in tall trees recounted by Cheikh (chapter 4), or Professor Kandji's recounting of the yellow *Dugoor* fruit (chapter 5), a potential new vision for plant-human relations emerges. An imagined future stimulated by the memories of touch of bark, taste of fruits forgotten, leaves in the breeze, the smells of the Kinkéliba tea and the movements of breakfast rituals, the swinging cups of tea preparation, rituals of breaking of the fast. Perhaps the new forest will not be the same, but an enclosed space, built up first by fromagiers and the N'doun tree, then maybe populated with baobabs, xai and other more sensitive trees and then finally developed with the sensitive shrubs, the Ngigis, whose roots are often cleared, or the elusive Ficus sycomorus, now only found in the monastery. In twenty or thirty years, this may be a truly valuable centre of plant-human relations: a centre for propagation of plants, learning of plant distribution, where revenues from plant-sales or medicinal uses could return into community finances. This model of land control and access may serve as a countermodel to the logics of state-led infrastructural upheavals such as the TER, the corporate plantations, and allow for a reimagining of land access undoing the damage and uncertainty of the 1964 law on the national domain, offering the power of decision to local actors, or at least actors beyond the state.

Beyond thoughts of time and ecological politics, I have shown that plants more broadly require a rethinking of how we engage with the world. As I learnt from plants throughout this research project, I had to challenge and push my own bodily capacities. Sometimes this worked better than others. Engaging with farmers around the Kad, I quickly learnt that a single-species approach to studying trees would not work. I learnt that evenings drinking coffee in a crowd of 15 year olds was more entertaining than tending to weeds in a peanut field. The bodily exertions of the work demonstrating that plants do not always work in our favour, that plants can be exhausting and a challenge to engage with. Despite that, we still keep the plants closest to us that suit the environment, even when its harsh. The Kad's insertion into peanut farming has managed to balance and sustain a historically challenging mode of farming, up until now continuing to mediate the relations of farmers and herders. Such bodily exertions in certain

senses carve generational divides in the way that Senegalese society understands plants, with many younger generations choosing lives distant from traditions of farming and gardening.

Turning to my camera also expanded my understanding of plants, at times in a frustrating manner. Having brought just one fixed 50mm lens with my camera, I was forced to move myself around spaces in inconvenient ways to allow my camera to communicate with certain plants. Photograph 6 for example, of the shoots in Maximilliane's garden had me crawling around in the dirt, while photograph 15 of the striking, venerable Catholic Xai, had me walking for a good few minutes before I could get any appropriate shot, at which point I was almost within a shrub on the other side of the courtyard. Cheikh's style of patient photography integrated the time scales of the plants and urban change into his work. Standing for hours, fine-tuning a shot, his photography was a meticulous act of paying attention to the environment and landscape. I requote him here:

> *The photo recounts the start, a process that is beginning, an urbanization. These trees here also tell a story, something maybe that comes from the past, a story from the past.*

The photography across time allows the story to unfold and Cheikh to act as a witness. I feel that he perhaps mentions the trees for me, knowing that it was my interest, but the natural blending of the tree and the urban in the quote also feels like a testament to the way in which the photography brought our work together. Despite very different backgrounds our concern for, photography uniquely channelled our interest in, concern for and attention to our environs.

The logics of plant-human relations, the uncertainty of ever truly understanding plants, the wonder and marvel of the slow growth and protection of ancient species, may offer new ways of wondering about alternative political-ecological configurations. Maximilliane's views on the protection of plants against viruses, international import-export markets and the overconsumption of oil or gas, offered a way into how plants allow us to rethink these structures. Protecting plants is a protection of human life, and fighting for access to them, in the way that the women of Yéba demanded a better deal on access to fruit and vegetables, is a fierce defence of human life within an eco-social community.

Appendix – Full list of Species Encountered

Table 4 – Full list of species encountered in Sebikhotane's classified forest (left) compared to additional species encountered in Catholic Monastery (right).

All species found in the left hand column were also found in the Grande Seminaire, but are excluded to avoid repetition and confusion. In effect the right hand column is any additional species to the base-line of species found in the left.

There may have been more species, but I excluded them because I could not track their official Latin names through the recordings I had, which were in Wolof and Serer.

Species in Sebikhotane Southern Classified Forest	No.	Additional Species found in Grande Seminaire, Catholic Monastery, Northern Sebikhotane outskirts
Acacia ataxacantha	1	Acacia seyal
Acacia pennata	2	Adenium obesum
Asparagus officinalis	3	Adensonia digitata
Azadirachta indica	4	Albisia lebec
Boscia senegalensis	5	Anacardium occidentale
Cassia siberiana*	6	Antiara africana
Combretum micranthum	7	Balanites aegyptiaca
Comifora africana	8	Bauhenia Monandra
DIxhrostachis cinerea	9	Borassus ekassii
Euphorbia turicali	10	Bouguinvillia glabra
Gueria senegalensins	11	Carica papaya
Jatropha gossypilifolia*	12	Casuarina equisetifolia
Moringa oleifera	13	Celtis integrifolia
Piliostigma reticulatum*	14	Combretum acculeatum
Strophanthus sarmentosus*	15	Cordia sebestana
Ziziphus mauritiana	16	Crateva adansonii
	17	Delonix regia
	18	Eucalyptus camaldinensis
	19	Ficus cordata
	20	Ficus sycomorus*
	21	Ficus thonningii
	22	Gmelina arborea
	23	Gossypium barbadense
	24	Grewia Flavescens
	25	guaiacun officinal
	26	Hibiscus rosa sinensis
	27	Hippocratea africana
	28	Khaya senegalensis
	29	Lantana camara
	30	Leptadenia hastata
	31	Lophira lanceolata
	32	Manilkara zapota

33	Maytenus senegalensis*
34	Melicoccus bijugatus
35	Morinda citrifolia
36	Neocarya macrophylla
37	Polyscias guilfoylei
38	Prosopis juliflora
39	Sarcocephalus latifolia*
40	Syzygium guineense
41	Tapinanthus dodenufolia
42	Terminalia mentali
43	Tinospora bakis*
44	Zanthoxylum zanthoxiloydes

Bibliography

Abbott, S. (2021). Approaching nonhuman ontologies: Trees, communication, and qualitative inquiry. *Qualitative Inquiry,*

Alexander, B. (2017). Be the tree: Breathing meditation guided mediation [Conference]. Tree Spirit Telesummit. https:// guardianspiritsofnature.com/tree-spirit-telesummit/

Barrett, M. J., Hinz, V., Wijngaarden, V., & Lovrod, M. (2021). 'Speaking' with other animals through intuitive interspecies communication: Towards cognitive and interspecies justice. In A. J. Hovorka, S. McCubbin, & L. van Patter (Eds.), A research agenda for animal geographies (pp. 149–165). Edward Elgar Publishing.

Bajorek, J. (2020) *Unfixed: Photography and Decolonial Imagination in West Africa.* Duke University Press: Durham and London.

Boumedouha, S. (1990) Adjustment to West African Realities: The Lebanese in Senegal. *Africa: Journal of the International African Institute*, 60 (4), pp. 538-549.

Diallo, A. (2020) Public action and land dynamics in Senegal: A probative threat of state and private actors. *African Journal of Land Policy and Geospatial Sciences*, 3, pp.108-129.

Diouf, M. (2022) La végétation dans les villes sénégalaises au regard des changements socioenvironnementaux : le cas de l'agglomération dakaroise et des villes de Touba, Ziguinchor et Tambacounda. *Thèse de Doctorat,* Paris : Sorbonne Paris Nord. [Online] Available from: https://theses.hal.science/tel-03937531 [01.07.2024.

Dutrait, C., Duperrex, M. and Verger, C. (2024) Voyages en Eucalyptus. In : M. Grange and B. Louw (*eds*) *Les Migrations des Plantes.* Manuella Editions : Paris, 149-163.

Farr, J. (2021) Islands of fertility: a multispecies ethnography of human-termite interactions and their implications for human ecology and the archaeology of gender in the tropics. *World Archaeology,* 53 (4), pp.667-687.

Faye, O. (2001) Une enquête d'Histoire de la marge : production de la ville et populations africaines à Dakar 1857 – 1960, *Thèse de Doctorat d'Etat*, Dakar : UCAD.

Faye, C. P. M. (2018) *Plants médicinales et savoirs locaux : Un patrimoine économique, social et culturel menacé de disparition au Sénégal.* Harmattan : Sénégal.

Günel, G., Varma, S., and C. Watanabe (2020) A Manifesto for Patchwork Ethnography. *Society for Cultural Anthropology: Curated Content.* [Online] Available from: https://culanth.org/fieldsights/a-manifesto-for-patchwork-ethnography [01.07.24]

Hall, M. (2011). *Plants as persons: A philosophical botany*. State University of New York Press

Hamidou, F., Harou, A., Achirou, B., Halilou, O. and Bakasso, Y. (2018) Fixation de l'azote chez l'arachide et le niébé en conditions de sècheresse pour l'amélioration de la productivité au Sahel. *Tropicultura,* 36, pp.63-79.

Hughes, D. (1983). *American Indian ecology*. Texas : Western Press.

Kaag, M. (2005) Fighting over crumbs? Small Valleys in West Africa as a new locus of land claims. *In:* S. Evers, M. SPierenberg and H. Wels (*eds.*) *Competing Jurisdictions: Settling land claims in Africa.* Brill: Leiden; Boston, pp.333-352.

Kaag, M., Baltissen, G., Steel, G. and A. Lodder (2019) Migration, Youth, and Land in West Africa: Making the Connections Work for Inclusive Development. *Land*, 8, 60, pp.1-11.

Kandji, M. (2013) Sébikhotane: Territoire d'intégration. L'Harmattan : Dakar.

Kortenkamp, K. V., & Moore, C. F. (2001). Ecocentrism and anthropocentrism: Moral reasoning about ecological commons dilemmas. *Journal of Environmental Psychology*, 21, pp.261–272.

Leprun, C. and Roy-Noel, J. (1976) Minéralogie des argiles et répartition des Nids épigés de deux éspeces du genre Macrotermes au Sénégal Occidental (Presqu'ile Du Cap-Vert). *Insecles Sociaux,* 23 (4), pp. 535-547.

Mainet-Delair, N. (1989) La route du Kinkéliba. *In :* G. Lasserre (ed.) *Pauvreté et développement dans les pays tropicaux.* Singaravelou : Pessac, pp.247-258.

Mancuso, S., & Viola, A. (2015). Brilliant green: The surprising history and science of plant intelligence (J. Benham, Trans.). Island Press.

Marder, M. (2017). To hear plants speak. In M. Gagliano, J. C. Ryan, & P. Vieira (Eds.), The language of plants: Science, philosophy, literature (pp. 103–125). University of Minnesota Press.

Mathieu, P. (1996) La sécurisation foncière entre compromis et conflits : un processus politique. In : *Démocratie, enjeux fonciers et pratiques locales en Afrique : Conflits, gouvernance et turbulence en Afrique de l'Ouest et centrale*. L'Harmattan : Paris.

Ministry of Urban Renewal, Housing and Living Environment. Republic of Senegal, and Japan International Cooperation Agency. (2016) *Project for Urban Master Plan of Dakar and Neighboring Area for 2035. Final Report. Volume. I* [Online] Available from: https://openjicareport.jica.go.jp/pdf/12250007_01.pdf [Accessed: 01.07.2024]

Oguibe, O. (2001) The Photographic Experience: Toward an Understanding of Photogrpahy in Africa. *In:* T. Miessgang and B. Schroder. *Flash Afrique! Photography from West Africa.* Kunsthalle Wien: Vienna, pp.9-15.

OpenStreetMap (2024) *OpenStreetMap*. [Online] Available from: https://www.openstreetmap.org/ [01.07.24]

Pheffer, P. E (1975) Railroads and Aspects of Social Change in Senegal, 1878-1933. University of Pennsylvania, Publicly Accessible Penn Dissertations.

Pires (2012) A historical political ecology of land use in the southeastern Peanut Basin of Senegal. African Geographical Review, 31 (2), 95-110

Projet AirGÉO. *Projet AirGÉO exhibition*. September – November 2023. Centre TaDjabone, Sébikhotane, Senegal.

Samb, H. M. (2016) Sénégal: Les Limites du Plan Sénégal Emergent . Harmattan : Paris.

Seneweb News (2024) Litige foncier à la cité Naza de Sébikotane : Plus de 200 familles menacées. [Online] Available from : https://www.seneweb.com/news/Societe/litige-foncier-a-la-cite-naza-de-sebikot_n_438720.html [01.07.24]

Sheldrake, M. (2020) *Entangled Life: How fungi make our worlds, change our minds and shape our futures*. Random House: New York.

Simard, S. (2021). *Finding the mother tree: Uncovering the Wisdom and Intelligence of the Forest.* Penguin Books : London.

Surun, I. (2011) French military officers and the mapping of West Africa: the case of Captain Brosselard-Faidherbe. *Journal of Historical Geography*, 37 (2), 167-177.

Sylla, O. B. (2021) Le Transport de Masse au Sénégal : Cas du Train Express Regional (TER). Harmattan : Dakar.

Tsing, A., Mathews, A. S., N. Bubandt's (2019) Patchy Anthropocene: Landscape Structure, Multispecies History, and the Retooling of Anthropology. *Current Anthropology,* 60 (20), pp.S186-S197.

Welch, C., Zhen, J., Bassène, E., Raskin, I., Simon, J. and Q. Wu. (2017) Bioactive polyphenols in kinkéliba tea (Combretum micranthum) and their glucose-lowering activities. *Journal of Food and Drug Analysis,* 26 (2), pp.487–496.

Wijngaarden, V. (2023) Interviewing Animals Through Animal Communicators Potentials of Intuitive Interspecies Communication for Multispecies Methods. Society and Animals, pp.1–21.