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The Assemblage: A Framework for Anthropological Research in Multispecies Studies

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Abstract

This article examines the concept of "assemblage" in anthropological research on multispecies relations. The contribution begins by situating "the multispecies assemblage" within the theoretical legacy of Deleuze and Guattari. Then, it delves into three case studies of multispecies research in southern Africa, first to highlight their use of the assemblage as an analytical framework, and second to discuss methodological implications. Overall, we argue that the assemblage concept provides an open-ended analytical and methodological framework in terms of spaces, actors and times. These three trajectories take multispecies research to be multi-sited rather than site-bound, to encompass a heterogeneity of actors, and to trace linkages between actors historically.

Keywords: assemblage, multispecies, methodology, ethnography, anthropology

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1. Introduction

The assemblage concept has had considerable influence across the disciplines of the social sciences ever since its introduction by Deleuze and Guattari in *A Thousand Plateaus* (Deleuze and Guattari 1987). It has been used, albeit inconsistently, in the study of interlinked groups of heterogenous elements – humans, other living beings and things (see e. g. Jacques 2021 for environmental anthropology, Bogard 1998 for sociology, Anderson and McFarlane 2011 for geography). Our key interest is the application of the assemblage concept as a framework in which to design, conduct and analyse multispecies research. The "multispecies assemblage" has been used by several studies for investigating the entanglements of human and nonhuman entities and their respective agencies (Tsing 2015; du Plessis 2022; Jost Robinson and Remis 2018; Hewitson and Sullivan 2023; Kubes and Reinhardt 2022). However, the disparate and imprecise uses of the assemblage concept in the social sciences (Phillips 2006), coupled with the lack of a common theoretical foundation and the methodological implications for its application in multispecies studies, call for reflection and clarification. Anderson and McFarlane (2011) pointed out that the use of assemblage goes broadly in three directions: as a descriptor, to describe heterogeneous elements collected or gathered together; as a concept, to analyse processes in which these elements organise, interact and transform; and as an ethos through which the researcher attends to a heterogeneous world. We use assemblage here as an analytical and methodological framework, that is, as a concept to analyse the interactions of beings, things and processes that shape specific situations, and as a methodology that defines the contours of our empirical research and the way we conduct it through particular methods. Our key question then is: what exactly are the analytical and methodological implications of the assemblage framework for multispecies ethnography?

The article is based on the work of a team of seven anthropologists: Léa Lacan, Paula Alexiou, Julia Brekl, Emilie Köhler, Wisse Van Engelen, Hauke-Peter Vehrs, and Michael Bollig. Our studies focus on multispecies assemblages connected to the Kavango-Zambezi Transfrontier Conservation Area (KAZA TFCA), one of the world's largest transboundary conservation areas, spanning Angola, Botswana, Namibia, Zambia and Zimbabwe. In this conservation context, as wildlife moves closer to people and their livestock, and as people navigate changing patterns of access and use of natural resources, our studies examine changing multispecies relations. Our reflections on the assemblage as an analytical and methodological framework draw on the experience and experimentations from each of us regarding our individual empirical research and team discussions. For the purpose of this article, however, we have selected only three ethnographic case studies.

The first case study is based on Emilie Köhler's research in Botswana and Namibia on the interplay of humans, technologies and elephants and their agencies in shaping the KAZA's conservation strategies and landscape. The second case study is Léa Lacan's historical research on a more-than-tsetse assemblage in colonial Zambia. Here, she follows the emergence and transformations of "the problem" of the tsetse fly (and the trypanosomiasis disease it transmits) as a moving target between different fields of expertise, in and out of different domains of action, and its co-constitution with nature conservation policies. In the third case study, Paula Alexiou examines the changing values of the indigenous rosewood tree among diverse actors in southwestern Zambia. Investigating the tree species as multiple and relational, she tracks the transforming and coexisting attributions of meaning to rosewood by various actors over time. Drawing on these three case studies, and against the backdrop of the assemblage literature, the article discusses and refines the application of the assemblage as an analytical framework and a methodological means that offers an alternative to the "field" for multispecies research (for a discussion on the use of the "field" in multispecies studies, see Swanson 2022).

2. The Multispecies Assemblage: Contextualising a Loose Concept

The use of the assemblage concept has been inconsistent and ambiguous. In the following, we illustrate some examples of its application in multispecies ethnography, and outline the different bodies of literature that various authors draw from. Our aim here is twofold: first, to contextualise the multispecies assemblage concept in the diverse scholarship dealing with the assemblage concept; second, to highlight key aspects of the multispecies assemblage that we find particularly useful as an analytical framework.

The term *assemblage* originates from the translation of the French word "agencement" developed by Deleuze and Guattari in their book *A Thousand Plateaus* (Phillips 2006). The assemblage highlights the interdependencies, interactions and recombinations between heterogeneous entities of different kinds – material contents (bodies, actions, things) and discourses/performances (words, affects, ideas) – working together in rhizomes comprised of horizontal and non-hierarchical relations (Buchanan 2015, 390). Deleuze and Guattari emphasise the multiplicities that form assemblages: "an assemblage is precisely this increase in the dimensions of a multiplicity that necessarily changes in nature as it expands its connections" (Deleuze and Guattari 1987, 8). In their second chapter, they develop the example of the wolf as a multiplicity. A wolf cannot be separated from the pack; and a wolf, wolves or a pack of wolves are intensities, temperatures, speed and distances folded together in multiplicities. Therefore, for Deleuze and Guattari, rather than being defined by fundamental characteristics, the wolf is always a "wolfing" or a becoming-wolf (Deleuze and Guattari

1987, Chapter 2), that unfolds through its positioning in the pack and in relation to multiplicities. What becomes clear is that the assemblage concept in Deleuze and Guattari's theory allows the analysis of things, situations or organisms as material-semiotic and processual bundles of rhizomatic relations rather than as static unitary wholes.

Ogden, Hall and Tanita recognise the legacy of the relational philosophy of Haraway, Latour and Deleuze and Guattari when they define multispecies assemblages as relations of becoming between humans and nonhumans (Ogden, Hall, and Tanita 2013, 7). However, the very term "multispecies assemblage" does not only refer to Deleuze and Guattari's concept, but is also a keyword in community ecology (where it is used, however, with variable and overlapping meanings: Stroud et al. 2015). By reinventing a term derived from ecology, the multispecies assemblage in the social sciences and humanities sheds new light on ecologies by highlighting the social lives of humans, nonhumans and non-living things that compose them, and, at the same time, it situates humans in the complex and dynamic ecologies that comprise their relations with agentic nonhumans.

One prominent application of the assemblage concept in multispecies research is in Tsing's *The Mushroom at the End of the World*. Here, Tsing studies the "open-ended assemblages of entangled ways of life" (Tsing 2015, 4) that make up the trade and ecology of the matsutake mushroom, from the Japanese peasant forests to the US American Oregon industrial forests where mushroom pickers and traders work to harvest and commercialise the matsutake. Anna Tsing defines assemblages as "open-ended gatherings" (ibid., 23), where human and nonhuman lifeways emerge and entangle: "Assemblages don't just gather lifeways; they make them" (ibid., 23). While she only shortly refers to Deleuze and Guattari, her version of the assemblage builds on their concept as it highlights ever-changing horizontal relations between multiplicities of heterogeneous actants, human and nonhuman, and focuses on becoming (processes) rather than being (essences). In their wake, Tsing's multispecies assemblage emphasises heterogeneity, connections, multiplicities and emergence (Deleuze and Guattari 1987).

However, Tsing's work does not say much about what comprises the organising principle of assemblages, or whether they have one at all. In fact, this aspect of the assemblage concept is subject to conflicting interpretations. In his book *Assemblage Theory*, philosopher Manuel DeLanda revisits and complements Deleuze and Guattari's concept. For him, the properties of an assemblage are not given, but emerge in the interactions between its parts. Nevertheless, these properties are not reducible to the sum of its parts, and the assemblage has a top-down influence on its components (DeLanda 2016, 21). However, philosopher Ian Buchanan, one of the main theorists of Deleuze and Guattari's concept, crit-

icises DeLanda for misunderstanding the assemblage as a "part-whole relation" and defining it as an aggregative "system of things" that grows in complexity and in scale with the addition of more elements (Buchanan 2015, 388). For Buchanan (2021, 62, 115), assemblages are not organised by their material components but by human desire. He argues that Deleuze and Guattari understand desire as the basis of all behaviour, human and nonhuman, and that "it is desire that selects materials and gives them the properties that they have in the assemblage" (ibid., 56). This centrality of desire is not reflected in Tsing's multispecies assemblage.

For Buchanan, Deleuze and Guattari's assemblage bridges the gap between the human and the nonhuman: it shows that societies are made of more-than-human forms and institutions that emerge from the interactions between material things and bodies and forms of expression that reach beyond the human (Buchanan 2021, 114). DeLanda's neo-materialist approach to the assemblage concept explicitly includes a "materiality possessing its own active power" (DeLanda 2016, 143). Jane Bennett emphasises even further the role of nonhuman agency. She understands the assemblage concept of Deleuze and Guattari as "ad hoc groupings of diverse elements of vibrant materials of all sorts" (Bennett 2010, 23). Her approach decentres the human by highlighting nonhuman elements as actants, and agency as distributed in human-nonhuman assemblages – what she calls "distributive agency". It highlights the vital role of matter – beyond an instrumental one – in the ways that politics and societies come into being. Her approach aligns well with multispecies ethnography, which Ogden, Hall, and Tanita define as "ethnographic research and writing that is attuned to life's emergence within a shifting assemblage of agentive beings" (Ogden, Hall, and Tanita 2013, 6; also van Dooren, Kirksey, and Münster 2016).

Actor-Network Theory (ANT), like the multispecies assemblage, also emphasises the heterogeneity of "the social", the role of nonhuman actants, the relational nature of agency and a focus on processes (Law 2009; Müller and Schurr 2016). According to Gan and Tsing, however, while Latour's ANT flattens spatial and temporal scales, replacing distinctions of geographical distance and historicity with factors and causes in the network (see Latour 1990), the assemblage allows a stronger emphasis on contexts and temporalities, enabling a "richer conceptualization of encounter" (Gan and Tsing 2018, 116). Methodologically, Swanson (2017) criticises ANT for focusing on nonhumans as represented and enacted by humans,[1] and prefers a deeper immersion in nonhuman perspectives with multispecies ethnography. For example, as Tsing follows the matsutake through time and space, she is thinking *with* the mushroom as a lively subject, rather than an object. This "fungal perspective" helps her question human exceptionalism and highlight the nonhuman protagonists of her forest stories

[1] For a discussion on nonhuman actors and actors-enacted in ANT see: Law and Mol (2008).

(Tsing 2015). The multispecies assemblage thus emphasises the liveliness of non-human actants.

In the assemblage in multispecies studies, beings and things are not delimited and fixed bounded entities, but are co-constituted in entanglement[2] (Tsing 2015; Haraway 2008). For example, the ethnoprimatologists Jost Robinson and Remis (2018) looked at primate hunting in the Central African Republic as a multispecies assemblage. They showed that human and alloprimate behaviours are co-produced in the assemblage, and endure as habitual behaviours beyond the moment of encounters between individuals. In north-eastern Namibia, in the Kwandu conservancy, Hewitson and Sullivan (2023) investigated the trophy hunting of elephants as an assemblage produced by the work and social practices of humans and non-humans. Starting with the practices of community game guards, who make the elephants present in their event books, the assembling of the trophy elephant also involves NGO reports, compensation payments, and the elephant's ethology, as well as temporal patterns of rain and harvest. Their analysis shows how value has been co-produced and performed in relational practices that connect humans with non-humans. In these cases, the use of the assemblage emphasises multispecies processes of becoming with each other (Haraway 2008).

Lastly, the multispecies assemblage interrogates how material processes interact and work together with semiotic processes. For example, by immersing himself in San tracking practices in the Kalahari Desert in Botswana, Pierre du Plessis (2022) highlights how the "assemblages" or "gatherings"[3] (he uses both terms) of more-than-human relations contribute to the making of landscapes. He shows that Kalahari truffles are "material-semiotic entanglements" (2022, 66) that emerge from ecological assemblages as San truffle gatherers notice, collect, interpret and respond to specific signs in the landscape. Applied in this way, the multispecies assemblage echoes Deleuze and Guattari's assemblage as a framework that precisely interrogates how material things and bodies are working together with semiotic processes like discourses, ideas or affects (according to Buchanan 2021).

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[2] Entanglement was defined by Ian Hodder (2012) as the dialectic of dependency between humans and things beyond the dualism between the material world and culture, and agency and structure. Although multispecies studies use similar definitions of entanglement, they are not restricted to humans and things and include other nonhuman beings as well.

[3] Ingold proposes the term "gathering" instead of "assemblage". He criticises the latter for featuring a fossilised material world where elements are arranged in juxtaposition to each other (Ingold 2020). In "a world in continuous flux" (Ingold 2020, 269), "gatherings" of things and beings grow and become together – a process he terms "concrescence". He admits, however, that Tsing's "multispecies assemblage" conflates assemblage and gathering, and also emphasises entangled transformations.

The studies mentioned so far in this review do not provide in-depth discussion of the theoretical underpinnings of the multispecies assemblage, but rather use it loosely to emphasise multiplicity and entanglement, emergence and indeterminacy (Anderson and McFarlane 2011; Marcus and Saka 2006). Nevertheless, this looseness allows us to select and focus on three key aspects of the multispecies assemblage that we find particularly generative to work with. First, the multispecies assemblage concept bridges the human/nonhuman divide by considering nonhuman actants. Second, it emphasises processes rather than essences by focusing on the ways in which people, things, beings are becoming with each other. Finally, it highlights how material contents work together with semiotic processes. In the next sections, we discuss the analytical and methodological implications of these three aspects in our ethnographic case studies. First, we consider how the assemblage as an analytical framework allows for analysing the role of nonhuman actants (case study 1), and the emergence of situations and things or beings in entangled material-semiotic processes (case studies 2 and 3). Then, by combining the three case studies, we reflect on how the assemblage framework guided, conditioned and enabled our methodological choices.

2.1 Case Study 1 – the More-than-Elephant Assemblage: Studying Conservation in the Making

The first case study focuses on the relational coming together of elephants, people and technologies in large-scale conservation efforts. Elephants have the ability to connect spaces – physically through their movements and socially through their affective capacities (Barua 2014, 560). The KAZA TFCA currently hosts about 230,000 elephants – about half of Africa's elephant population. Due to concerted conservation efforts, particularly in Botswana, Zimbabwe and Namibia, numbers have been increasing over the past decades, with the result that landscapes that did not have elephants have become elephant ranges once again. Facing an increase of human and elephant numbers in a shared landscape, the five KAZA member states agreed to manage the contiguous elephant population as a whole and to allow redistributions from densely populated areas to less populated ones in Zambia and Angola (KAZA TFCA Secretariat 2019). This management involves monitoring elephant movements, numbers and distributions in order to define wildlife dispersal areas and the locations of movement corridors between protected areas and across international borders. The results acquired through such monitoring are translated into policies, which must be aligned among the five states before being implemented at local levels.

In order to gain information about elephants, scientists, non-governmental organisations and governments track and count elephants with increasingly sophisticated technologies and methods. Monitoring techniques, such as the use of

GPS collars, camera traps or aerial surveys connect elephants, humans and objects in complex webs across vast landscapes, both physically and virtually. Here, the assemblage framework provides a useful analytical tool not only to trace the agentive capacity of elephants or the political strategies and technoscientific practices of humans in relation with technologies, but also to analyse how diverse elements group together to "make something happen" (Bennett 2010, 25).

Aerial surveys provide an important tool for monitoring elephants as aerially conducted counts of wildlife provide data on population numbers and distributions over a wide area. The results can be mobilised by different interest groups to develop policies (e. g., for the protection of elephants, or conversely, the relaxation of trade regulations) and have direct impacts on management strategies. The numbers inform decision makers when setting hunting-quotas, determining protected areas or other boundaries and are also used to observe population dynamics and to document mobility patterns (Norton-Griffiths 1978, 1). A KAZA wide aerial survey was conducted in 2022 to produce information for the management of KAZA's elephant population (Bussière and Potgieter 2023). In this process, elephant mobilities shaped the interactions of heterogeneous actors. First, the survey managers and biologists adapted the survey design, which maps the flight pattern of the planes in strata and transects, to elephant densities that were known from previous surveys. Moreover, to count elephants, a range of heterogeneous actors such as humans with different agentic capacities, technologies, fuel, electricity, wind and sun had to enter into a set of relations. Step by step, elephant presence was translated into data, travelling through different minds and devices and later shared by numerous actors. Up to three planes in one area were synchronised and coordinated to count connected elephant groups. A laser altimeter as well as a GPS device helped the pilots to fly exact transects. The observers, sitting in the back of the plane, communicated their observations to the front seat observer through an aviation radio and used a camera to document larger groups of animals. The observer in the front immediately noted the sightings on a data sheet and an exact GPS position on a handheld GPS device. After the flights, data managers compiled and checked the observation and flight data on their computers, which was then sent to the main office for final analysis. The counts resulted in the first estimate of the KAZA elephant population. This estimate in turn reified the idea of one shared transnational elephant population and made it more tangible. In order to find out about how such data is produced, the ethnographer joined the flying team, observed their scientific practices both on the plane and on the ground. Numerous interviews with those generating the data, those compiling it, and also with scientists and administrators making use of the data shed further light on the role of such data in shaping conservation ideas, strategies and landscapes.

The survey results were supplemented with the *Policy Brief of Elephant Movements and Connectivity*, a document that provided the analysis of the movement

data from 291 GPS-collared elephants across the KAZA landscape (KAZA TFCA Secretariat 2023). The preservation of wildlife corridors which maintain and increase the mobility of wildlife across the huge KAZA landscape is one of KAZA's key goals. In the document, elephant movements across space and time are drawn in clearly defined lines on the landscape and heavily used pathways are marked as corridors. In this process, the elephant's complex and far-ranging movements are translated into radio signals and coordinates and thus enter into relations with satellites, humans and computers. As these different elements come together, a distributive agency (Bennett 2010) emerges from this more-than-elephant assemblage that makes things happen. For example, the inscription of movement trajectories on maps and policy briefs turns peripheral regions into areas of high conservation concern. Similarly, objects restricting elephant connectivity, for instance fences and roads, become the target of conservationists' attention (Naidoo et al. 2022). Through the big data that is created from these research projects, elephant mobilities inform policy recommendations, management and land-use plans, and drive the re-creation of multispecies landscapes.

The concept of a distributive agency that "always depends on the collaboration, cooperation, or interactive interference of many bodies and forces" (Bennett 2010, 21) enables a move away from a top-down approach that prioritises human actions in order to understand agency as "distributed along a continuum" of actants (ibid., 28). In this case study, thinking with distributive agency in KAZA is a useful way to analyse how conservation practices and coexistence landscapes are shaped not only in the relations between humans and elephants (Hewitson and Sullivan 2023), but also by the increasing use of technologies in conservation. Digital technologies foster new relations and shape conservation discourses and practices (Arts et al. 2015). As the given examples show, this is not a linear process but rather a multiplicity of processual connections of diverse human and more-than-human actors coming together in different spaces and at different scales – from the local rural villages and conservation areas to the KAZA level, and the national and international conservation agendas. As open-ended collectives, assemblages are nested within each other (DeLanda 2016), which enables an empirical study of these large-scale phenomena on different levels by zooming into some of the connections, processes and their emergent properties. The more-than-elephant assemblage in this case serves not so much as a descriptor to present elephants, conservationists, and technologies as interacting elements, but first and foremost as an analytical framework to analyse these interactions and to highlight how conservation happens and emerges from agency distributed across scales.

2.2 Case Study 2 – *Tsetseing*: Analysing a Shifting Problem in a More-than-Tsetse Assemblage

The second case study focuses on the historical transformations of a more-than-tsetse assemblage in historical Zambia (for more details on this case study, see Lacan 2024). The tsetse fly is the vector of trypanosomes, protozoan parasites that can infect human and nonhuman animals and cause the trypanosomiasis disease. African trypanosomiasis has been commonly named "sleeping sickness" when it affects humans, and *nagana*, when it affects livestock. There are several species of trypanosomes that can cause the disease, and which differ in their infectiousness for different animal species. There are also several tsetse fly species that are associated to particular trypanosome species and ecosystems. In Zambia, Glossina morsitans has long been targeted as the vector of nagana and (more rarely) sleeping sickness. *G. morsitans* is known to follow animals, including cattle and humans and even their vehicles, as well as wild animals, which are often resistant to trypanosomes but act as a reservoir by keeping them in their blood (Anderson et al. 2011). Colonial powers in Africa have expended tremendous resources to support tsetse and trypanosomiasis research and control to contain what was seen as the biggest "scourge" of the continent (Ford 1971; Scoones 2014).

The tsetse problem is a moving target, shifting between different fields of expertise, in and out of different domains of action. The tsetse was problematized in interlinked material and semiotic processes. Indeed, the tsetse fly and wildlife species are harmless if they are not bearing the pathogenic agent trypanosome, a unicellular parasitic flagellate protozoon. However, from the 19th century in southern Africa, the tsetse fly, wildlife and their association became problematized as the causes of the disease spread, and became the main target of colonial disease control measures. Hunters and explorers travelling in the region in the 19th century had observed the fly-wildlife association, which was confirmed by the regional disappearance of the tsetse fly as a result of the decimation of large herbivore herds following the great rinderpest epidemic in the 1890s (Mavhunga 2018; Bollig and Vehrs 2021). This event coincided with the experiments of microbiologist David Bruce in the 1890s that proved the tsetse fly to be the vector of trypanosomes, and wildlife as reservoir hosts for the parasite (Bruce 1896). These observations, made against the background of colonial aspirations for economic development in the region, drove the British South Africa Company, as well as settlers and missionaries, to push for energetic tsetse control measures, including the creation of wildlife free areas and buffer zones which would be achieved through the elimination of wildlife species (Mavhunga 2018; MacKenzie 1988). On the other hand, the lobbying of imperial wildlife preservationists to protect iconic African wildlife and expertise from East Africa (MacKenzie 1988) pushed tsetse control research in another direction, towards localised tar-

geting of vegetation habitat and the destruction of tsetse-friendly vegetation (Swynnerton 1925; Lacan 2024). The tsetse fly problem re-centred (at least in certain circles and geographical locations) on fly-vegetation relations. Hence, the tsetse is not *just* a fly, a bounded organism that exists in isolation: it is rather a *tsetseing*, a process of becoming-tsetse, as different species of tsetse fly are branded "tsetse" and identified by different people in different times and contexts as the scourge of the African continent, as the "savannah fly" or "hunter's fly". Like the wolf is always a *wolfing* for Deleuze and Guattari (1987), the tsetse is a *tsetseing* or more-than-tsetse assemblage shaped by the fears of settlers, the lobbying of preservationists, the aspirations of colonial bureaucracies for economic development, the affinities of the fly for certain mammals as a mode of survival, and so on.

Tsetse control and wildlife conservation became strongly integrated in Northern Rhodesia in the 1940s with the creation of the Department of Game and Tsetse Control. The Department developed game management together with tsetse control, following a regional approach that laid the foundations of modern Zambia's conservation system. This system distinguished conservation zones, like national parks or game reserves, from zones of settlement, separated by buffer zones in between. In the conservation zones, completely separated from human activities, the tsetse would live with wildlife, whereas people and their cattle would stay in the zones of settlement – therefore an attempt was made to free these zones from tsetse. So, it was in the buffer zones where humans, cattle and wildlife could meet that tsetse control activities would be most strongly concentrated (Lacan 2024).

Rather than being a descriptor of aggregated interacting components, the more-than-tsetse assemblage is used here as an analytical framework to highlight the entanglements of two processes – tsetse control and wildlife conservation – based on the encounters between expertise, aspirations and interests which were at certain times conflicting and at other times synergising. The more-than-tsetse assemblage shows what is produced in this encounter, namely a conservation and tsetse control landscape, divided into various zones, ranging from sanitised human-settled ones to areas left wild. The latter persist in Zambia's current conservation landscape. These are not only ideas, knowledge and practices that influence each other: hunting reserves, and later on, National Parks emerged as material entities in the landscape. They provided space for large herbivores, carnivores and numerous processes that interlinked these with insects and vegetation.

The analytical framework of assemblage is useful here for investigating not only how heterogenous material and semiotic processes encounter and work with each other, but also for scrutinising what emerges from this encounter. Tsing highlights that lifeways are not only gathered but also emerge in entangle-

ment in assemblages (Tsing 2015). The more-than-tsetse assemblage follows this lead as it shows the co-production of the tsetse as a threat, wildlife as a resource to be preserved and controlled, and the landscape as fragmented into manageable zones of human settlements and wilderness. The assemblage framework allows us to highlight the material-semiotic processes (as suggested by Buchanan) at play in the dynamic re-figurations of the tsetse problem – this *tsetseing*.

2.3 Case Study 3 – Becoming Rosewood/*muzauli*: Exploring Material-Semiotic Assemblages

The third case study examines the changing values of rosewood trees in southwestern Zambia. Rosewood – locally known as *muzauli* (in the Lozi language) – is a tree species indigenous to the forests in southwestern Zambia which has increasingly been targeted by foreign logging companies in recent years. What makes rosewood a valuable tree species, and more importantly, what makes it valuable for whom, why and when? Thinking about these questions through the assemblage framework allows us to analyse the processes through which rosewood is allocated value. It enables an understanding of the tree species that is multiple and relational, and highlights changing as well as coexisting attributions of meaning.

In East Asian markets, rosewood is a hardwood species valued for its red colour and mainly used in luxury furniture production. The cultural significance of rosewood furniture stems from its extensive use by imperial families during the late Ming and early Qing dynasties. This history made it highly sought-after by China's elite and middle class, and since 2010 has led to the exploitation of Zambia's forests to meet rising demand. The processes through which rosewood is allocated value are embedded in the global history of the use of rosewood-timber and the historical meanings of rosewood furniture in China (Zhu 2022). In contrast, *muzauli* in western Zambia is locally recognised as a fruit-bearing tree rather than a timber species. The forest laws of the historical Barotse kingdom have protected it as a valuable food source and medicine. Today, most big *muzauli* trees are found in the yards of village headmen. Households usually keep a bag of *muzauli* seeds which they prepare when there is not enough meat or maize. The wood of the tree is often used to make cooking sticks, while roots and leaves of *muzauli* are used to prepare medicine. Since the increase of logging activities in western Zambia, big *muzauli* trees have vanished from the forests and some farmers have started selling the trees in their yards to timber-dealers for a small profit, often without knowing what they will be used for in the later process.

The tree species is enacted in two different but overlapping versions that can be analysed as the "rosewood assemblage" and the "*muzauli* assemblage". The

purpose of these labels is not so much to describe or reify these two versions. Rather, we want to emphasise that both versions are produced and maintained through the entangled roles of heterogenous actors (such as timber traders, forest officers, sawmill owners), logs, tools and infrastructure, laws and policies, that articulate and shape the meanings and enactments of the tree in different ways. While many of these components are part of both the *muzauli*- and the rosewood-assemblages, the two differ from each other in terms of knowledge systems, people using the tree, and the history of laws and policies. Like the wolf in Deleuze and Guattari's *A Thousand Plateaus*, the tree is a bundle of relations, a multiplicity that unfolds in different directions (albeit in overlapping ways) through the rosewood and the *muzauli* assemblages. The tree is a becoming-*muzauli* or becoming-rosewood: it is a process that mobilises different meanings and enactments by diverse actors.

The assemblage as an analytical framework does not simply help identify heterogenous components of a specific thing or situation, but challenges us to rethink the ontology of a thing or situation by questioning its material as well as symbolic limitations and the underlying principle of selection. In line with Buchanan, it allows us to study the interactions between material components, such as animal bodies, trees, things, and semiotic elements, such as ideas, policies, and discourses. Studying rosewood with the assemblage lens therefore includes asking: how are specific timber species determined to be the proper material for rosewood-furniture as opposed to other tree species (material components) and how, and by whom, is it decided that those specific species are appropriate for this particular kind of furniture (discourses and policy)? Due to a newfound appreciation of China's history, which has led to a resurgence of the Ming and Qing dynasties' aesthetics in household decoration – and thus a surge in rosewood imports in the last two decades – China established a National *Hongmu* (redwood) Standard, listing 33 species that are classified and traded as "rosewood" (Wenbin and Xiufang 2013). It is China's national policy and its consideration of history that is shaping what can and cannot become the proper material of rosewood-furniture and thus affecting the material aspects of the rosewood-assemblage.

The assemblage framework does not ask "What is?"; rather, it works with the questions "How? Where? When? From what viewpoint?" in order to investigate something that is bound in social and historical processes (Nail 2017, 23). Hence, the task is to trace back the historical processes that gave rise to a specific assemblage (Buchanan 2021). Building on Deleuze and Guattari, DeLanda also emphasises that each assemblage has a "fully contingent historical identity" (DeLanda 2016, 19). This case study follows a genealogical approach that reveals the lively biographies of *muzauli* and rosewood between two distinct (but overlapping) assemblages. As in Tsing's *Mushroom at the End of the World*, the assemblage framework makes it possible to follow the ramifications of the rose-

wood assemblage beyond the local scale of southwestern Zambian forests and into the global connections of timber trade and export routes to China. In that regard, it highlights the articulation between local ecological changes and transformation of the meanings of rosewood, and the Chinese-Zambian economic relations and globalised timber trade. These features challenge us to rethink the ontology of the tree itself and consider the ontology of the rosewood policy. It also allows a deeper investigation of social-ecological processes of change around the rosewood tree by highlighting its material-semiotic mechanisms.

3. Lessons for Empirical Research: An Open-Ended Framework

So far, we have discussed the use of the assemblage as a concept and an analytical framework in our three multispecies case studies. In this section, we discuss the methodological implications of the assemblage framework for these case studies. Overall, on a methodological level, we will show that the assemblage framework enables a redefinition of "the field" within anthropological research. Instead of focusing on a single bounded location, time, or group of actors, the assemblage framework prompts us to explore and follow multispecies relations across spaces, actors, and times.

First, elephants, tsetse flies, or rosewood are mobile, across geographic boundaries. They are connected to other mobile actors (human and nonhuman) across scales. The "open-endedness" of multispecies assemblages put forward by Tsing (2015) and others leads us to reconsider the spatial contours of our research. Following the more-than-elephant assemblage especially implied an extremely mobile ethnographic research approach. In such a setting, the assemblage framework requires an innovative fieldwork design that goes beyond one bounded location, adapting to the mobility of elephants, technologies, and experts. To study the interconnections between elephant mobilities, their monitoring through notes, camera traps, aerial surveys and GPS trackers, the enormous amounts of data produced feeding into national and regional plans and policies, and the practices of game guards and local livelihoods in the rural communities living with these elephants, the research spans across different places in Botswana and Namibia and follows elephants, humans (game rangers, scientists, tourists, elephant activists, community development staff, local farmers etc.), technologies and data alike. This led to a multi-sited ethnography involving different sites, different epistemic communities and, of course, elephants. Although multi-sited ethnography has long been practiced (Marcus 1995), as well as approaches designed to "follow-the-thing" (Appadurai 1988), the multispecies assemblage does not only allow following nonhuman things and beings, but also highlights their active roles and their transformations across space and time. Methodologically, this included joining an aerial-survey team from the ground to the air

and into the office where the data was analysed, as well as accompanying game guards on patrol on well-known elephant pathways. It also involved learning more about the specifics of different technologies and elephant behaviour, talking to farmers in their fields, and interviewing decision-makers and developers of artificial-intelligence programmes in universities and ministries.

Second, the assemblage's empirical framework implies the need for historicising our research fields. This becomes evident in the genealogical study of different value assemblages around rosewood/*muzuali* in southwestern Zambia. It is also visible in the case of the more-than-tsetse assemblage and its historical transformations in colonial Zambia. Moreover, studying elephant conservation and monitoring in Namibia and Botswana also implies situating this more-than-elephant assemblage in the regional history of elephant management and the use of tracking technologies to understand how current more-than-human and high-tech practices draw from experimentations and strategies of the past. In fact, all our research on multispecies assemblages in the KAZA TFCA involves a historical aspect to a certain extent. Methodologically, all three case studies rely extensively on archival research and/or oral testimonies. Assemblage research is not bound in time, but endeavours to situate processes in a long-term perspective. We follow historical processes along the genealogies and interlinkages of different actors in an opportunistic way: we trace this history as far as the specific linkage and the specific record takes us. Working with the assemblage framework, we do not tie our historiographical aspirations to any time horizon, or to a specific event, or any historically continuous political unit (a colony, a state, a village community).

Finally, our case studies illustrate the requirement for a patchwork methodology in assemblage research, as the study of heterogeneous actors and processes requires the combination of different modes of knowledge. In her *Mushroom at the End of the World*, Tsing does not only follow the matsutake in the assemblage of global and local connections between forests of distant places of the world. She also adopts an assemblage-like approach in the ways she conducts and writes about her research: a patchwork ethnography, sewing together local ethnographic patches from mushroom picking in Oregon (US) to the revitalisation of rural Satoyama landscapes in Japan (and many others). She highlights that her book itself is an "open-ended assemblage" (Tsing 2015: viii). Similarly, our studies proceed in patches, at different sites and with different interlocutors, but also through diverse research methods and in reference to diverse bodies of literature, far exceeding the anthropological discipline.

For example, exploring the more-than-tsetse assemblage implies pursuing an assemblage way of working – assembling diverse modes of knowledge. First, the study involves diverse research participants, including the director of the tsetse-control unit, veterinary officers responsible for ensuring animal health and

carrying out tsetse control in the Western Province of Zambia, and local farmers who had experienced or are still experiencing the presence of the fly and/or its control. Second, working methodologically with the assemblage concept requires the combination of diverse research methods to capture different sources of information. In addition to interviews, the study relies on grey literature and diverse archival materials from the colonial and postcolonial period in Zambia, including online archives, 19th century literature by missionaries and travellers, and documents from the Zambian National Archive and the archive of the current Tsetse Control Unit of the Veterinary Department. Third, the assemblage framework encourages us to work with scientific disciplines we are not familiar with. For example, the research on the more-than-tsetse assemblage requires immersion in ways of knowing including the physiology of the tsetse fly, the detailed descriptions of its behaviours, or the biology of the tsetse's gut symbiont. The study also spanned the scientific literature from diverse disciplines, including ecology, entomology, veterinary sciences, parasitology, and human health. Similarly, research on the rosewood/*muzauli* or the more-than-elephant assemblages involved interacting with a wide range of knowledge-holders – conservationists, scientists, loggers, or local farmers, to name a few – and grappling with the knowledges of vegetation and conservation science, the workings of diverse technologies, local medicinal or ethological knowledge, and so on. Anthropology has long been interested in combining the perspectives of various actors and knowledge together, including across disciplines (Strathern 2005). Consistent with recent efforts in multispecies studies to work with knowledge and methods from the natural sciences (Swanson 2017; Bubandt et al. 2022; Tsing et al. 2017), assemblage ways of working build on this aspiration and encourage us to deepen interdisciplinary collaborations.

4. Conclusion: Working with Open-ended Frameworks

Perhaps because of the complexity of the rich concept formulated by Deleuze and Guattari, the assemblage has given rise to diverse interpretations and applications. Referring to the multispecies assemblage and trying to work with this concept therefore first required theoretical clarifications. This was the aim of the first part of this contribution. Despite divergent terminologies and overlapping meanings and implications of the assemblage concept, we identified three key characteristics: the consideration of nonhuman actants; the focus on processes of becoming-with; the emphasis on the ways in which material and semiotic processes work together. As we show in our case studies, these three aspects guided, conditioned, and enabled our analytical as well as methodological approaches.

On the analytical level, the assemblage framework allows us to shift research from a focus solely centred on human agency to consider other-than-human

agencies (vested in nonhuman actors) or more-than-human agencies (made of human and nonhuman intertwined capacities for action). Moreover, the assemblage as analytical framework allows us in our case studies – and especially in the case of the more-than-tsetse assemblage and the rosewood/*muzauli* assemblages – to trace the emergence and transformations of ideas (such as the tsetse problem), values (such as overlapping values of the rosewood/*muzauli*), as well as policies or landscapes arising from the encounter between mutually constitutive material and semiotic processes. Therefore, the multispecies assemblage as analytical framework helps us to understand the complexities of social-ecological change, including the political roots of multispecies relations and their implications.

On the methodological level, the assemblage concept requires an open-ended framework that is well suited to follow changes-in-the-making, across space, social groups and time. First, it allows us to follow research subjects across spaces and scales. This is particularly useful to study mobile elephant and human actors and virtually connected technologies beyond specific locations, in a multi-sited manner. Overall, the assemblage framework prompts us to adopt an innovative take on methodologies in order to grapple with the complexity and heterogeneity of the situations and processes we want to study. Across our research projects, we all tried to come up with new ideas on how to capture diverse and dynamic more-than-human relations methodologically. Rather than developing radically new methods, the assemblage framework led us to combine methods from anthropology and related disciplines in innovative ways. These included archival research and/or oral histories, both of which were instrumental in investigating the historical depth of the assemblages we study. We also reached out to knowledge beyond our discipline, such as from the natural sciences, thereby bringing different modes of knowing together, akin to Tsing and colleagues' research approach to studying a "patchy Anthropocene" (Tsing, Mathews, and Bubandt 2019).

An open-ended framework for ethnographic research entails many challenges. The questions one has to grapple with include: where to start? Which ramifications of the assemblage to follow? What to include and what to exclude (Strathern 1996)? Beyond budgetary constraints and time limits, our projects focus variously on a species, an infrastructure, a problem: we frame their respective linkages to different sets of human actors, diverse technologies, knowledges and landscapes. An assemblage framework encourages us to trace storylines and to follow human and nonhuman actors along these lines – as suggested by Tsing (2015).

Does such an open-ended framework result in diminished analytical force? Do we lose the capacity to account for power asymmetries (as suggested by Büscher 2021 and Hornborg 2017)? Our three case studies have highlighted how

values, policies and landscapes emerge in complex assemblages, including through power asymmetries not only between humans but also involving nonhumans. The first one shows for example how nonhuman actors like technologies contribute to reinforce the power of some conservationists and decision-makers in KAZA. The second one highlights the problematization of a nonhuman being, the tsetse fly, that results from as well as shapes the power dynamics between colonial experts and administrators. The third one shows that different human actors benefit or lose from the rosewood-assemblage, as the value of rosewood on Chinese markets strengthens the grip of the extractive timber industry on Zambian forests. The assemblage framework provides an inductive and context-sensitive approach designed to account for the complexity and dynamisms of phenomena that are essentially impossible to comprehend and delineate in a clear-cut manner. It is therefore committed to grappling with complexity, including complex power relations.

Thus, we contend that the multispecies assemblage has considerable potential for multispecies studies. We believe that it represents a chance for multispecies ethnographers to conduct analyses at wider scales, without losing a local anchorage. In fact, in-depth ethnographic approaches are particularly well-equipped to flesh out the more-than-human relations that constitute assemblages and thereby connect local ethnographic "patches" (Tsing, Mathews, and Bubandt 2019) to wider histories and processes extending far beyond the local, across heterogeneous spaces, actors and times.

References

Anderson, Ben, and Colin McFarlane. 2011. "Assemblage and Geography." *Area* 43 (2): 124 – 127.

Anderson, Neil E., Joseph Mubanga, Eric M. Fevre, Kim Picozzi, Mark C. Eisler, Robert Thomas, and Susan C. Welburn. 2011. "Characterisation of the Wildlife Reservoir Community for Human and Animal Trypanosomiasis in the Luangwa Valley, Zambia." *PLoS Neglected Tropical Diseases* 5 (6): e1211.

Appadurai, Arjun, ed. 1988. *The Social Life of Things: Commodities in Cultural Perspective*. Cambridge: Cambridge University Press.

Arts, Koen, Rene van der Wal, and William Adams. 2015. "Digital Technology and the Conservation of Nature." *Ambio* 44: 661 – 673.

Barua, Maan. 2014. "Circulating Elephants: Unpacking the Geographies of a Cosmopolitan Animal." *Transactions of the Institute of British Geographers* 39 (4): 559 – 573.

Bennett, Jane. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham, NC: Duke University Press.

Bogard, William. 1998. "Sense and Segmentarity: Some Markers of a Deleuzian-Guattarian Sociology." *Sociological Theory* 16 (1): 52 – 74.

Bollig, Michael, and Hauke-Peter Vehrs. 2021. "The Making of a Conservation Landscape: The Emergence of a Conservationist Environmental Infrastructure along the Kwando River in Namibia's Zambezi Region." *Africa* 91 (2): 270 – 295.

Bruce, David. 1896. *Further Report on the Tsetse Fly Disease or Nagana in Zululand*. London: Harrison & Sons.

Bubandt, Nils, Astrid O. Andersen, and Rachel Cypher, eds. 2022. *Rubber Boots Methods for the Anthropocene: Doing Fieldwork in Multispecies Worlds*. Minneapolis, MN: University of Minnesota Press.

Buchanan, Ian. 2015. "Assemblage Theory and its Discontents." *Deleuze Studies* 9 (3): 382 – 392.

Buchanan, Ian. 2021. *Assemblage Theory and Method*. London: Bloomsbury.

Büscher, Bram. 2021. "The Nonhuman Turn: Critical Reflections on Alienation, Entanglement and Nature under Capitalism." *Dialogues in Human Geography* 12 (1): 54 – 73.

Bussière, Elsa, and Darren Potgieter. 2023. *KAZA Elephant Survey 2022, Volume I: Results and Technical Report*. Kasane: KAZA TFCA Secretariat.

DeLanda, Manuel. 2016. *Assemblage Theory*. Edinburgh: Edinburgh University Press.

Deleuze, Gilles, and Félix Guattari. 1987. *A Thousand Plateaus: Capitalism and Schizophrenia.* Minneapolis, MN: University of Minnesota Press.

du Plessis, Pierre. 2022. "Tracking Meat of the Sand: Noticing Multispecies Landscapes in the Kalahari." *Environmental Humanities* 14 (1): 49 – 70.

Ford, John 1971. *The Role of the Trypanosomiases in African Ecology. A Study of the Tsetse Fly Problem.* Oxford: At the Clarendon Press.

Gan, Elaine, and Anna L. Tsing. 2018. "How Things Hold: A Diagram of Coordination in a Satoyama Forest." *Social Analysis* 62 (4): 102 – 145.

Haraway, Donna J. 2008. *When Species Meet*. Minneapolis, MN: University of Minnesota Press.

Hewitson, Lee J., and Sian Sullivan 2023. "Producing Elephant Commodities for 'Conservation Hunting' in Namibian Communal-Area Conservancies." In *Conservation, Markets and the Environment in Southern and Eastern Africa, Commodifying the 'Wild'*, edited by Michael Bollig et al., 277 – 304. Oxford: James Currey.

Hodder, Ian. 2012. *Entangled. An Archaeology of the Relationships between Humans and Things.* Oxford: Wiley Blackwell.

Hornborg, Alf. 2017. "Dithering While the Planet Burns: Anthropologists' Approaches to the Anthropocene." *Reviews in anthropology* 46 (2 – 3): 61 – 77.

Ingold, Tim. 2020. "In the Gathering Shadows of Material Things." In *Exploring Materiality and Connectivity*, edited by Philipp Schorch et al., 256 – 272. London: UCL Press.

Jacques, Vincent. 2021. "Deleuze and Guattari: Transcending Nature/Culture in Anthropology?". *Journal of the CIPH* 99: 27 – 38.

Jost Robinson, Carolyn, and Melissa J. Remis. 2018. "Engaging Holism: Exploring Multispecies Approaches in Ethnoprimatology." *International Journal of Primatology* 39: 776 – 796.

KAZA TFCA Secretariat. 2019. *Strategic Planning Framework for the Conservation and Management of Elephants in the Kavango Zambezi Transfrontier Conservation Area*. Kasane: KAZA TFCA Secretariat.

KAZA TFCA Secretariat. 2023. *Elephant Movements and Connectivity in the Kavango Zambezi Transfrontier Area.* Kasane: KAZA TFCA Secretariat.

Kubes, Tanja, and Thomas Reinhardt. 2022. "Techno-species in the Becoming: Towards a Relational Ontology of Multi-species Assemblages (ROMA)." *NanoEthics* 16: 95 – 105.

Lacan, Léa. 2024. "Killing Tsetse and/or Saving Wildlife? A Multispecies Assemblage in Colonial Zambia (1895 – 1959)." *Anthropology Southern Africa* 47 (2): 133 – 152.

Latour, Bruno. 1990. "On Actor-Network Theory. A Few Clarifications plus More than a Few Complications." *Philosophia* 25 (3): 47 – 64.

Law, John. 2009. "Actor-Network Theory and Material Semiotics." *The New Blackwell Companion To Social Theory* 3: 141 – 158.

Law, John, and Annemarie Mol. 2008. "The Actor-Enacted: Cumbrian Sheep in 2001." In *Material Agency: Towards a Non-Anthropocentric Approach*, edited by Carl Knappett and Lambros Malafouris, 57 – 77. Boston, MA: Springer US.

MacKenzie, John M. 1988. *The Empire of Nature: Hunting Conservation and British Imperialism*. Manchester: Manchester University Press.

Marcus, George E. 1995. "Ethnography in/of the World System: The Emergence of Multi-sited Ethnography." *Annual Review of Anthropology* 24: 95 – 117.

Marcus, George E. and Erkan Saka. 2006. "Assemblage." *Theory, Culture and Society* 23 (2 – 3): 101 – 109.

Mavhunga, Clapperton C. 2018. *The Mobile Workshop: The Tsetse Fly and African Knowledge Production.* Cambridge, MA: MIT Press.

Müller, Martin, and Carolin Schurr. 2016. "The Mobile Workshop: The Tsetse Fly and African Knowledge Production." *Transactions of the Institute of British Geographers* 41 (3): 217 – 229.

Naidoo, Robin, Piet Beytell, Angela Brennan, Werner Kilian, Graham McCulloch, Amanda Stronza, Russell Taylor, Chief Tsholofelo, and Anna Songhurst. 2022. "Challenges to Elephant Connectivity From Border Fences in the World's Largest Transfrontier Conservation Area." *Frontiers in Conservation Science* 3: 1 – 7.

Nail, Tomas. 2017. "What is an Assemblage?" *SubStance* 46: 21 – 37.

Norton-Griffiths, M. 1978. *Counting Animals.* 2nd ed. Nairobi: African Wildlife Leadership Foundation.

Ogden, Laura A., Billy Hall, and Kimiko Tanita. 2013. "Animals, Plants, People, and Things: A Review of Multispecies Ethnography." *Environment and Society* 4: 5 – 24.

Phillips, John W. P. 2006. "Agencement/Assemblage." *Theory, Culture and Society* 23 (2 – 3): 108 – 109.

Scoones, Ian. 2014. *The Politics of Trypanosomiasis control in Africa.* Brighton: STEPS Centre.

Strathern, Marilyn. 1996. "Cutting the Network." *The Journal of the Royal Anthropological Institute* 2 (3): 517 – 35.

Strathern, Marilyn. 2005. "Anthropology and Interdisciplinarity." *Arts and Humanities in Higher Education* 4: 125 – 135.

Stroud, James T., Michael R. Bush, Mark C. Ladd, Robert J. Nowicki, Andrew A. Shantz, and Jennifer Sweatman. 2015. "Is a Community Still a Community? Reviewing Definitions of Key Terms in Community Ecology." *Ecology and Evolution* 5 (21): 4757 – 4765.

Swanson, Heather A. 2017. "Methods for Multispecies Anthropology: Thinking with Salmon Otoliths and Scales." *Social Analysis* 61 (2): 81 – 99.

Swanson, Heather A. 2022. "Rubber Boots Methods beyond the Field: Transformative Possibilities and Institutional Barriers in University Contexts." In *Rubber Boots Methods for the Anthropocene: Doing Fieldwork in Multispecies Worlds*, edited by Nils Bubandt 348 – 370. Minneapolis, MN: University of Minnesota Press.

Swynnerton, Charles. 1925. "The Control of the Tsetse Fly Menace." *Nature* 115 (2888): 338 – 339.

Tsing, Anna L. 2015. *The Mushroom at the End of the World. On the Possibility of Life in Capitalist Ruins.* Princeton, Oxford: Princeton University Press.

Tsing, Anna L., Nils Bubandt, Elaine Gan, and Heather A. Swanson, eds. 2017. *Arts of Living on a Damaged Planet: Ghosts and Monsters of the Anthropocene*. Minneapolis, MN: University of Minnesota Press.

Tsing, Anna L., Andrew S. Mathews, and Nils Bubandt. 2019. "Patchy Anthropocene: Landscape Structure, Multispecies History, and the Retooling of Anthropology: An Introduction to Supplement 20." *Current Anthropology* 60 (S20): S186–S197.

van Dooren, Thom, Eben Kirksey, and Ursula Münster. 2016. "Multispecies Studies. Cultivating Arts of Attentiveness." *Environmental Humanities* 8 (1): 1 – 23.

Wenbin, Huang, and Sun Xiufang. 2013. *Tropical Hardwood Flows in China: Case Studies of Rosewood and Okoumé.* Washington, DC: Forest Trends.

Zhu, Anna Lake. 2022. *Rosewood: Endangered Species Conservation and the Rise of Global China*. Cambridge, MA: Harvard University Press.