The Refiguration of Conservation: Introducing the Concept of 'Staging Nature' in the Case of Botanical Gardens

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Abstract

Botanical gardens have constructed their identity historically as sites for storing and displaying plants from all over the world, as well as producing and disseminating botanical knowledge. In the wake of the refiguration of the conservation regime, botanical gardens have begun to re-position themselves, shifting from Humboldtian collector of nature to protector of biodiversity. Though a mapping-based sociospatial investigation of the Botanical Garden (Bo) in Berlin, we deployed the concept of 'staging nature' to grasp the spatiality of conservation at Bo: this revealed the peculiar relationship between Bo's drive to create artificial biomes in glasshouses in Europe through the theatrical staging of tropical spaces from the South under the logic of ex-situ conservation. In this process of socio-spatial change, we considered how a process of decolonization was restricted by the current stratified organisation of knowledge and space. We then discussed how on the one hand the technology of botanical glasshouses is significant in Bo's ex-situ conservation mission to protect biodiversity in the face of climate change, while on the other hand have long contributed to Berlin's carbon footprint.

Introduction

> So this is a collection, and there is a scientific curator. So like in an art museum also, we have curators because these are objects. So in our case, the plant is an object, it's not there by chance - it's not nature, although it's very natural […] So it's scientific, it's an artefact, it's a scientific and artistic artefact, and the conceptualization is done by both scientific curators and horticulturalists…[1]

Botanical gardens have constructed their identity historically as sites for storing and displaying plants from all over the world, as well as producing and disseminating botanical knowledge. Guardians of living collections of plants, botanical gardens are repositories of knowledge relating to biodiversity. This knowledge is eminently relevant given the threats of mass extinction and the loss of biodiversity created by human-induced climate change.[2] However, like many modern institutions with collections made on the back of colonial networks (Kaiser 2016; Kaiser 2022),[3] botanical gardens are increasingly under pressure to confront their colonial histories and undergo a process of decolonization (Sander et al. 2018; McAlvay et al. 2021).[4] In response to these wider transformative processes, botanical gardens have begun to re-position themselves, a posturing that can be characterized as a shift from Humboldtian *collector* of nature to *protector* of biodiversity, or to use a biblical metaphor, a shift from 'Eden' to 'ark'. This characterization is symptomatic of a deeper process of change that has taken place the modern 'conservation regime' (Adams 2004). This is a regime that consists of politics, practices, and power relations, all of which structure conservation as it cuts across multiple scales, spaces, and times. As such, modern botanical garden institutions not only become the object of research in this paper, as in the case of the Botanical Garden Berlin (Bo), but they also act as a lens through which to look at deeper changes taking place in the modern conservation regime itself. Pursuing these two forms of analysis, we firstly explore the ways in which the Bo is adapting to, or is indeed struggling with, a shifting conservation

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mission, looking to the tensions that arise in this process of socio-spatial change. Secondly, we explore the ways in which these tensions and conflicts indicate a destabilization of the conservation regime's modern underpinnings. This second question is more speculative and abstract in nature, and points to the untenability of the naturalistic modern concept of nature (Descola 2005). This concept, we argue, instead requires a more complex and relational understanding of the material, historical, and social construction of 'nature' and its inseparability from 'culture' (Büscher and Fletcher 2020). To accommodate these specific nature-culture relations in the formation of spaces of conservation, in this paper we introduce and unpack the concept of *staging nature*. Together, these analytics make an important conceptual link between the empirical and situated object of the Bo and the wider global transformative processes described above.

To grasp the transformation of spaces of conservation taking place at the Bo empirically, we employ a socio-spatial theory of the 'refiguration of spaces' (Knoblauch and Löw 2020; Knoblauch and Löw 2022). This is explored in more detail later in the paper. Using a mixed-method research design, which includes spatial drawings, ethnographic observations, interviews with the main protagonists of the garden, and quantitative data on plant collections, we produced 'hybrid mappings' (Baxter et al. 2021), a socio-spatial method grounded in refiguration theory that identifies the spatialized conflicts shaping the staging of nature at the botanical garden.

In this article we begin by delineating the modern conservation regime and discussing some of the shifting perspectives and practices shaping it. Taking a socio-spatial perspective, we present our research design, before addressing an empirical perspective that situates Bo in the conservation regime and exploring the concept of 'staging nature'. We conclude the paper by speculating about the relevance of staging nature in a nature-culture conservation regime.

1. Controversies in conservation

A conservation regime for the protection of nature consists of the "development of the international institutional structure of conservation" and organisations created that regulate, govern, and legitimize the conservation of global biodiversity (Adams 2004; Adams 2013; Braverman 2023; Thompson 1970). This regime builds upon historical developments linked with colonial history, unfolds within a global constellation of public and private actors, and operates through technologies and spaces of conservation such as botanical gardens. While regimes are continually shaped by struggles for power, arguably their instability can be seen as major challenges or changes to power occur. In the case of the modern conservation regime, the contemporary struggle over fundamental questions about nature conservation (Mace 2014), how it should be carried out, and what constitutes 'nature' during an epoch of biodiversity extinction, is resulting in profound transformations. As they reposition and revaluate themselves against these planetary changes, botanical gardens provide excellent examples with which to take stock and chart the specific conditions and dynamics at play in the refiguration of the modern conservation regime.

1.1 The development of modern conservation regime

An historical account of the emergence of the current conservation regime has been provided by William Adams, who tracks the development and global spread of nature conservation back to the British empire of the late nineteenth-century, which sought to "preserve wildlife throughout the British Empire" (Uriel Orlow, cited in Adams 2004: 44). The foundation of the Provisional International Union for the Protection of Nature (IUPN) by UNESCO in 1948, with the purpose of promoting the preservation of wildlife and the environment, as well as furthering public knowledge, education and research about this conservation strategy, marked a significant milestone in the global development of the conservation regime. The decolonization of parts of Africa and Asia during the 1950s and 1960s led to another shift in conservation ideas, governance, and practices, as conservationists became concerned about the impact that independence would have on nature in newly decolonized states: national parks were expanded, and the number of non-governmental conservation organisations (NGOs) multiplied. From the 1960s onwards, with the rise of environmental awareness within industrialized countries – in which the World Wildlife Fund played an important role (Adams

2004: 44) – conservation has developed on the one hand within the regulations created by national governments, and on the other hand through a cacophony of transnationally networked NGOs that had the power to influence international discourse and exert pressure on national policy and practices. Like William Adams and Irus Braverman,[5] we believe that nature conservation has a capacity for biopolitical regulation and racial violence. This is a view that Henrik Ernstson (2020) and Katja Kaiser (2016, 2022) also outline within a botanical context. Although often depoliticized through campaigns, for example, conservation is a deeply political matter with a colonial history, as the field of political ecology has repeatedly shown. In this way, the modern conservation regime as it has developed and spread over the last century has been as much about geopolitical influence from the global Northern over the global South, imperial resource and land-use control, as it has been about protecting and preserving nonhuman species. From the 1960s onwards, highly networked transnational actors continued to promote a specific Eurocentric vision of biodiversity protection built upon a modern, binary understanding of nature and humanity.[6] According to our understanding, the modern conservation regime has been formed out of a globalized constellation of public and private actors that share a set of rules, norms, and beliefs about the regulation of cultures of nature, and the ongoing renegotiating and struggle over them. Regime technologies are operationalized through specific spaces of conservation (for example: international charters; legislative texts on supranational, national, regional or local levels; project-based initiatives from NGOs anchored in an environment; infrastructures of the regime; spatialization and materialization of the actions of the diverse actors; planning and development policy and law) that can be empirically investigated. The modern conservation regime must be understood as an historical process that has stabilized overtime, but also under the constant pressure of more recent changes associated with transformative processes such as climate change, decolonization, and digitization. There is an ontological and epistemic struggle taking place over what constitutes nature within the regime, which is a consequence of a lack of consensus about how to do conservation.

1.2 From nature to nature-culture conservation

In light of accelerated biodiversity loss, the battle over what constitutes conservation, or indeed what conservation should achieve is a heated one. As Chris Sandbrook points out, the Oxford English Dictionary defines conservation as the "action of conserving something", where *to conserve* means to "protect from harm or destruction" and to "prevent the wasteful overuse of a resource" (2015: 565). The subtle difference in these two meanings of the verb, so Sandbrook argues, encapsulates divergences in conversation discourse, which are marked by an imperative to preserve and enclose nature on one side, and the efficient *use* of nature on the other. We currently witness a profound challenge to this traditional binary understanding of nature conservation, which we argue indicates a shift in the conservation regime. This lack of consensus about what biodiversity conservation is (see Mace 2014), comes from the destabilization of the concept of nature itself (Descola 2005; Escobar 1999; Latour 2018). In a simplification of how capitalism and the nature-culture binary structure biodiversity conservation, Bram Büscher and Robert Fletcher (2020) identify four co-existing understandings of conservation today:

a) *Mainstream conservation.* The purpose here is to protect "nature for its own sake" (Sandbrook, 2015: 565) in protected areas connected to stakeholder and community concerns, interests, and management models (Duret 2022; Ernstson 2020; Sarkar 1999; Soulé 2013).[7]

b) *New conservation*. Ideas of wilderness associated with pristine nature are by contrast rejected; instead, a form of conservation that requires a "new vision of a planet in which nature […] exists amid a wide variety of modern, human landscapes" (Lalasz et al. 2011) is advocated, whose regulation is assured by the capitalist market.

c) *Neo-protectionist conservation.* The commercialization of conservation is specifically rejected and pleas are made for the return to strong barriers between human and nonhuman

natures, through their defence of the 'half-half' paradigm (Wilson 2016). This has raised numerous criticisms (Kopnina 2016; Pimm 2016; Ellis and Mehrabi 2019).

d) *Convivial conservation* calls for a move towards the "promotion of nature for, to and by humans" (Büscher and Fletcher 2020: 163). From spectacular images of nature to everyday environmentalism, this form of conservation advocates for a caring and respectful cohabitation among species (Lachmund 2013).

What differentiates these types of conservation is the relationship, or rather, the division between nature and culture, as well as the varying influences of capitalism. This differentiation in approaches towards doing conservation and the pronounced lack of agreement between them indicates a deeper shift the conservation regime, from one underpinned by a modern worldview defined by a strict divide between nature and culture, towards a refigured conservation regime that is characterized by a conflicting plurality of understandings ranging from nature to nature-culture.

2. A Socio-spatial investigation of conservation

To empirically investigate the ongoing refiguration of conservation, we focus here on modern botanical garden institutions as examples of spaces of conservation in which the struggles described above play out. We maintain these spaces offer an excellent case study to analyse the complex contradictions that are shaping a changing conservation regime.

2.1 Spaces of conservation: the Botanical Garden Berlin

The Botanical Garden Berlin is the most prestigious garden of the 75 Botanical Gardens present in Germany (Schmidt 1997). Constructed between 1897 and 1910 under the guidance of the German botanist Adolf Engler, it is located in the lively residential area of the privileged neighbourhood of Steglitz-Zehlendorf in south-west of Berlin. The garden covers a total surface area of 43 hectares and forms a green enclave in the middle of a dense urban environment. Botanic Gardens are currently experiencing a crucial moment of change. Started as the Royal Garden for medicinal plants and horticulture, the 'mission driven institution' became increasingly scientific over time and stands nowadays for the protection of biodiversity.[8] In this mission shift from Humboldtian collector to biodiversity activist, conversation practices have been diversifying: historically, the institution relies *firstly* upon the scientific task of producing, distributing and storing botanical knowledge. The pursuit of this exhaustive cartography of the living world is justified by the idea that "you can only protect what you know".[9] Indeed, discovering new species is "absolutely current cutting-edge research" for the reason that there are still so many unknown species, "especially smaller ones".[10] Archiving knowledge about species diversity in the herbarium of the botanical garden allows changes to biodiversity to be tracked. These traditional conservation practices taking place at the Bo have been shifting over the past decades as a result of what we have called the refiguration of spaces. The plant conservation practised by the Bo relies *secondly* on ex situ conservation (Guerrant et al. 2004), for which the spectacular glasshouses play a significant role. By artificially reproducing atmospheric conditions from other climatic zones, it is possible for Bo to safeguard species that might already be extinct from tropical and subtropical regions. *Thirdly*, conservation practice at the botanical garden takes place according to its educational mission: in the course of the climate crisis, the botanical garden is reforming its institutional identity from an exotic tourist attraction towards a centre for education on the biodiversity crisis created by climate change. Exhibitions and guided tours are intended to strengthen the dialogue on species conservation and biological diversity in the sense of creating a "re-alphabetisation about biodiversity".[11] *Fourthly*, Bo's reformulated conservation mission is traced through the ongoing establishment of globalized data platforms on plants, including via extended metadata (namely, taxonomic classification, provenience, gatherer and gathering context, stations through other gardens, place of location in the Bo, but also data on DNA and other biomolecular information), plants get registered into infrastructures of biodiversity informatics. These digital infrastructures –including the World Flora Online[12] or

Gardens4Science[13] – which connect the datafied collections of a growing number of botanical gardens in the world to form a global biodiversity information system – a key resource in the defence of biodiversity. Indeed, Bo is keen on distributing this knowledge into decisive arenas in the conservation debate, like the UN context of the global Convention on Biological Diversity. Through these different tasks it clearly appears that the botanical garden sees its actualized role in the changing conservation regime as a biodiversity activist, closer to an 'ark' of species saved for re-making nature after an impending crisis than to its historical position as an exotic garden at the periphery of the contemporary city. We argue that botanic gardens represent a pertinent case for studying the refiguration of the conservation regime, as the diversification of their conservation mission implies a certain destabilization of the concept of nature as traditionally promoted by the Bo. Historically, botanical gardens can trace not only their foundation, role, and mission back to a modern set of values and principles, but also their societal relevance. A product of the enlightenment, botany emerged as a discipline tasked with collecting, categorizing, and classifying plants in one unique epistemic taxonomist system. For this reason, we assume that the very core idea of nature conservation in the botanical garden originally referred historically to what has been termed "mainstream conservation" (Büscher and Fletscher 2020), underpinned by the understanding of a dichotomy between nature and society that has been common in Western Europe since the Renaissance – a "naturalist epistemic syntax" as Philippe Descola (2005) puts it. Now, in light of the shifting conservation regime, we can observe a more pluralistic way of thinking about 'nature' at Bo. As the epigraph at the opening of this article points out, the gardens' protagonists are very much aware of how plants are 'cultivated' under their care: plants become scientific objects and used for educational purposes. They grow in artificially reproduced biomes with the intention of being put back into a 'cultivated wild' after an environment crisis. In summary, even if the mission of the botanical garden is to 'save nature' (as something externalized), the intention is also to create a closer engagement of nature and the city dwellers as a way to face the climatic urgency.

2.2 Socio-spatial approach: refiguration of spaces

One of the aims of this paper is to unravel and analyse the challenges botanic gardens are facing as they adapt to and process a shifting conservation mission in relation to a deeper refiguration of the conservation regime. We propose to adopt a socio-spatial perspective (Baxter et al. 2021; Marguin and Pelger 2022; Christmann and Ibert 2012; Jessop et al. 2008) because we argue that a focus on space can enable a complex and accurate analysis of the social changes at work, given that conservation is a socially constructed regime that controls and manages nature and its relationship to societies. Following Löw's theory of relational space, we understand spaces as relational arrangements of objects (including plants) and people in places (cf. Löw 2001: 159 f.). However, it is not only a question of topographical relations (*spacing*), but also of people's meaningful understanding of them (*synthesis*) (Löw 2001: 159). The spatial arrangement of the botanical garden is the result of practices related to a specific type of knowledge (historically constructed and constantly adapting). The case of living plant collections and laboratory spaces provides an example of this. Drawing on refiguration theory, we focus on the materiality, processuality and transcalarity of the spatial arrangements in the Bo, in order to reveal the transformation of the social ordering prevalent in botanical gardens (Knoblauch and Löw 2019, 2020). We are interested in decrypting the complexity of spatialization at the Bo, and the spatial conflicts resulting from spatial changes. Conservation at Bo is indeed performed across multiple scales, reaching from the micromolecular to the plant, and from the glasshouses to regional, national and global levels. To understand these performances, we engage the heuristic of 'spatial figures' (Löw 2020), a central analytic in refiguration theory. Bo can be analysed as an enclaved *territory* within the city, and at the same time a form of knowledge and a museal global *network*. However, it can also be understood as a multi-layered *place* of culture, science, and greenery, and a unidirectional *trajectory* from the global South to the global North. Transformative processes, especially decolonization and climate change – central to our analysis here – are putting pressure upon the epistemologies, technologies, governance, and everyday practices of conservation. These

pressures materialize in specific tensions and conflicts within conservation spaces, which can be analysed through the competing spatial figures of networks, territories, and places.

2.3 Site-based hybrid mapping approach

To empirically operationalize this ambitious theoretical framework, we followed a hybrid mapping approach (Baxter et al. 2021; Baxter and Sommer 2022; Marguin 2022). This interpretive approach for mixed-methods research allows for visual, multiscalar, and processual research on space (Pelger et al. 2021). Following a case studies protocol, we constructed our investigation around four sites within the Bo: the garden, the glasshouse, the herbarium, and the laboratories. This site-based approach can be understood as a form of topographical sampling. We selected the sites as four places, understood as distinct geographical locations, with multiple overlapping modes of reference to conservation practices. In these four distinct sites we examined firstly how, by whom, and for what purpose, conservation is performed and arranged spatially. We could rely upon a rich set of data since we collected multimodal (textual, visual and numeric) and mixed (qualitative and quantitative) data at Bo. This consisted of: a) ethnographic observations recorded in different media (text, photos and sketches); b) interviews with key protagonists at the Bo – including the director, head curator of the living collection, head gardener, and a scientist – and with affiliated experts such as the architect in charge of the renovation; and c) use of a data bank serving as an inventory of all the plants at the Bo, which contains information about the geographical and institutional provenience of the plants, as well as information about their location within the Bo. This data was analytically integrated into several synthesis mapping – understood as a Joint Spatial Display (Marguin et al. 2021), following a grounded theory methodology (Glaser and Strauss 1967). We will mostly rely in this paper on the interview material and on the one mapping about the glasshouse (see Ill. 1).

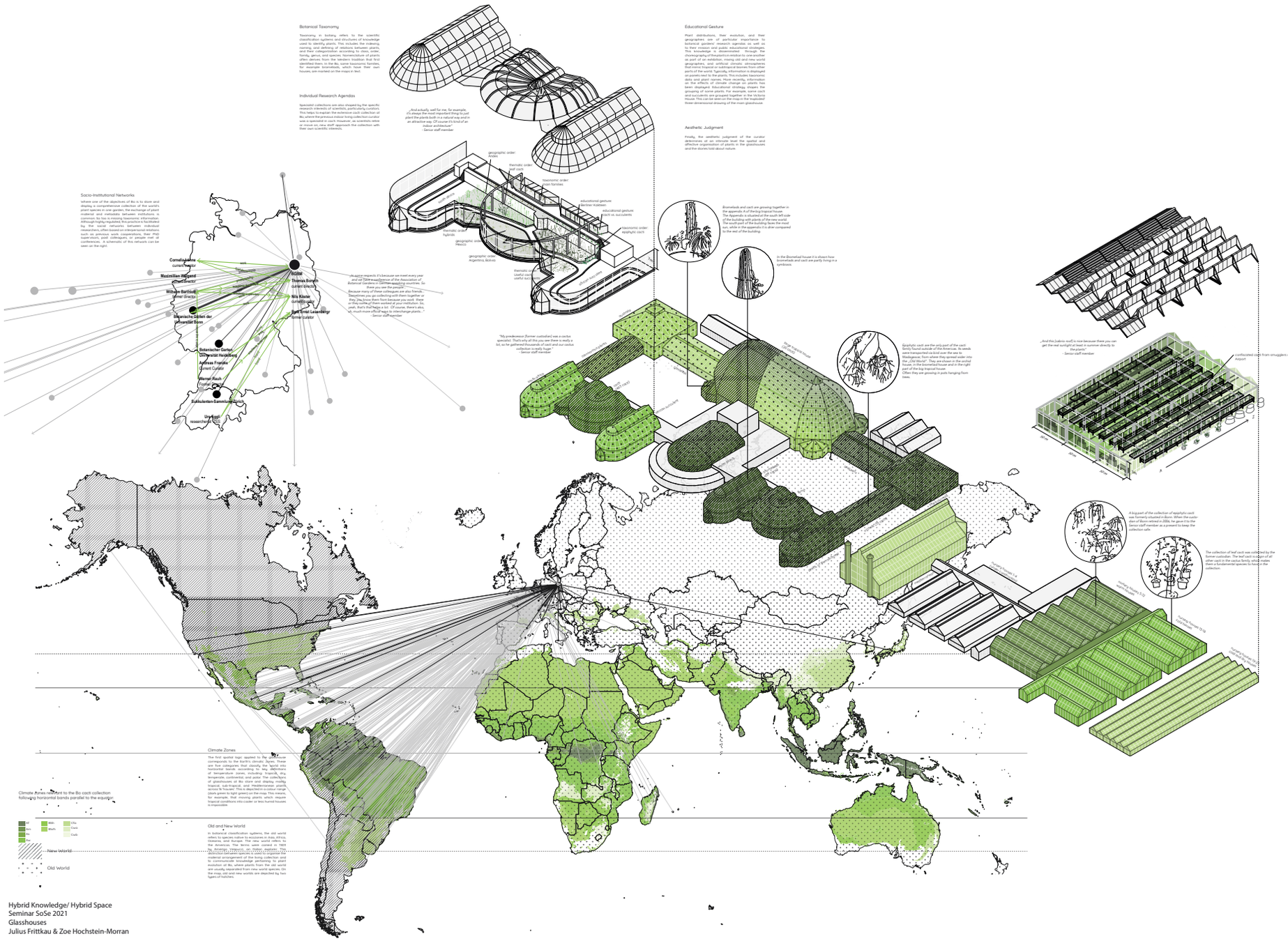

Figure 1: Hybrid Mapping of the glasshouse of the Botanical Garden in Berlin. Map drawn by Julius Frittkau & Zoe Hochstein-Morran.

3. Analysing conflicts in conservation at Bo

> So, basically every individual is an object, like an object in a collection. So therefore, it's put in a place. Plants do not freely reproduce, or spread in the botanic garden, because this is often what you also have to see […] what is now a very nice, the steppes area [of Kazakhstan] is basically a model, or an arrangement of central Asia.[14]

In this section of the article we present the results of our investigation. Through hybrid mapping we deconstructed the site of the glasshouses to understand the underlying logic and relations that structure this space. Our key finding reveals the ways in which 'nature' is staged at the Bo whereby staging becomes the primary logic of space. As indicated in the words of the director quoted at the beginning of the section, here the staging of nature implies the *practices*, *knowledge,* and *imaginaires* that organise spaces of conservation at the Bo. *Staging nature* is a specific type of spatial arrangement within conservation space. The term allows us to highlight both the social construction of nature, for example as part of a collection and its entanglement with curatorial and scientific practices, as well as ways of knowing on the one hand, and the choreography and performance of nature – often as 'wild' or 'pristine' – on the other hand. Although it is not the primary focus of this article, this framework allows us to see the resistance and material agencies that nature exerts in response to ongoing attempts to stage it, and the possible excessive abundance produced between these more than only human forces in a multispecies perspective. In this way, staging nature must be understood as a processual concept able to overcome the binary between nature and culture. Through this discussion we want to consider what staging nature means for the space of biodiversity conservation as set out above, and more specifically, what the material and discursive practices of staging nature tell us about the refiguration of the modern conservation regime, from the regulation of nature and society to the possibility of a more convivial nature-culture conservation mission.

3.1 Logics of staging nature at the glasshouse

On the basis of a hybrid mapping protocol, we produced an analytical mapping of the glasshouse at the Bo (see Ill. 1). This allowed us to work out the eight interdependent spatial logics that organize the staging of nature at Bo glasshouses. Indeed, nothing is left to chance within the garden: discursive materialities – for example, plants, trees, plaques, vistas, routes etc – are carefully choreographed and together perform a specific version and narrative of 'nature'. As the head curator incisively puts it: "…gardeners […] are designers. They really have an eye to arrange plants in a nice way. And actually, well for me […] it's always the most important thing to just plant the plants both in a natural way and in an attractive way. Of course, it's kind of an indoor architecture".[15] And yet 'indoor architecture' follows not only aesthetic rationales, but is ingrained into a nexus of different spatial ordering logic. Three main logics reflect central elements of western botanical epistemology, including climatic zones, the distinction between old and new world, and botanical taxonomy. Further ordering logic refer to the social-situational production of botanical knowledge, embedded at Bo within very specific German language-specific, social-institutional networks, and revealed through specific academic profiling of a key influence: the social conditions of knowledge production that are fundamentally influenced by the spatial constitution of the living collection. Last but not least, educational and aesthetic strategies function as triggers for the specific spacing of the different material and discursive elements of the stage. In the following table, we describe in more detail these different ordering logics.

Ordering logics	Thick description of the logics
Central elements of western botanical epistemology	
Climate zones	The first spatial logic applied to the glasshouse corresponds to the Earth's climatic zones. These are five categories that classify the world into horizontal bands according to key definitions of temperature zones, including: tropical, dry, temperate, continental, and polar. The collections of glasshouses at BGB store and display mainly tropical, sub-tropical, and Mediterranean plants across 16 'houses'. This is depicted in a colour range (dark green to light green) on the map. This means, for example, that moving plants which require tropical conditions into cooler or less humid houses is impossible.
Old and new world	In botanical classification systems the old world refers to species native to ecozones in Asia, Africa, Oceania, and Europe. The new world refers to the Americas. The terms were coined in 1503 by Amerigo Vespucci, an Italian explorer. This distinction between species is used to organize the material arrangement of the living collection and to communicate knowledge pertaining to plant evolution at Bo, where plants from the old world are usually separated from new world species. On the map, old and new worlds are depicted by two types of hatches.
Botanical taxonomy	Taxonomy in botany refers to the scientific classification systems and structures of knowledge used to identify plants. This includes the indexing, naming, and defining of relations between plants, and their categorization according to class, order, family, genus, and species. Nomenclature of plants often derives from the Western tradition that first identified them. In the Bo, some taxonomic families, for example bromeliads, which have their own houses, are marked on the maps in text.
Social-situational production of botanical knowledge	
Socio-institutional networks	Where one of the objectives of Bo is to store and display a comprehensive collection of the world's plant species in one garden, the exchange of plant material and metadata between institutions is common. So too is missing taxonomic information. Although highly regulated, this practice is facilitated by the social networks between individual researchers, often based on interpersonal relations such as they had previously worked, their PhD supervisors, past colleagues, or people met at conferences.

Individual research agendas	Specialist collections are also shaped by the specific research interests of scientists, particularly curators. This helps to explain the extensive cacti collection at Bo, where the previous indoor living collection curator was a specialist in cacti. However, as scientists retire or move on, new staff approach the collection with their own scientific interests.
Display logics	
Educational gesture	Plant distributions, their evolution, and their geographies are of particular importance to botanical gardens' research agendas as well as to their mission and public educational strategies. This knowledge is disseminated through the choreography of the plants in relation to one another as part of an exhibition, mixing old and new world geographies, and artificial climatic atmospheres that mimic tropical or subtropical biomes from other parts of the world. Typically information is displayed on panels next to the plants. This includes taxonomic data and plant names. More recently, information on the effects of climate change on plants has been displayed. Educational strategy shape the grouping of some plants. For example, some cacti and succulents are grouped together in the Victoria House. This can be seen on the map in the 'exploded' three-dimensional drawing of the main glasshouse.
Aesthetic judgement	Finally, the aesthetic judgement of the curator determines at an intimate level the spatial and affective organisation of plants in the glasshouses and the stories told about nature.

The entanglement of these spatial logics leads to the stratification of the space. The glasshouse is 'frozen-in-time', and as a consequence is very difficult to transform, as each materiality, each object and each actor becomes part of the performance with its particular place on stage. This inertia of spaces of conservation at Bo is challenged by wider transformative processes, including, as we will now examine, climate change and decolonization.

3.2 Staged nature challenged at Bo

Pressure 1: Decolonizing the Botanical Garden

Deconstructing the space of the glasshouse evinces the intricate knowledge and power asymmetries between Europe and its former colonies, which underpin the historic staging of nature at Bo. As we see in the mapping, knowledge inscribed in choreography of nature in the glasshouses pertains to a system of knowledge based on Eurocentric imperialism and the exploitation of the Americas through exploration and settler-colonialism (Kaiser 2016, 2022). This is illustrated for example in the organisation of plants and houses according to 'new' and 'old' worlds. This is problematic insofar as new world implies a world 'discovered' by Europeans, which can be seen as negating history prior to this event, and therefore diminishing the history of indigenous communities. This racialized and colonial position is also present in the practices of naming plants after white Western botanists, which are commonly found in the taxonomic nomenclature of species. Indeed, decolonization is becoming an ever more

powerful force for change in the planetary refiguration of spaces. This political force began in the mid-twentieth century and accelerated over the past decade, and has impacted the museums and knowledge institutions, especially in the global North (Savoy 2018; Förster 2019; von Oswald und Tinius 2020). As is the case for many museums, this force has exerted increased pressure on Bo to address its colonial past and, perhaps more challengingly, decolonize its current collection (Orlow 2018).[16] This touches on fundamental aspects of the ways in which knowledge, collections, and as we argue here, spaces of conservation are organized at botanical gardens. In our interviews, the botanists at Bo recognize the colonial past of the institution, which in order to address in their view, requires the systematic reconstruction of scientific histories related to the institution. However, it is more difficult for them to imagine any change to the current botanical garden: "'Well, what should we do? Give the plants back?!" was often the response,[17] borrowing from the provenience debate in museum studies (Savoy 2018). This ambivalent reaction shows their discomfort with the topic. They are caught between a modern compulsion to collect and protect, and the postcolonial planetary (Chakrabarty 2021) realization that such an impetus is no longer tenable, let alone ethical.

One process of decolonization that took place recently at the Bo was full of this ambivalence. It came from the arts, in the form of the exhibition titled *You Will Go Away One Day But I Will Not*.[18] In 2020, as part of the CTM Festival for Adventurous Music and Art, the Brazilian artist Maria Thereza Alves, in collaboration with the composer Lucrecia Dalt, was invited to make an intervention in the Tropical Glasshouse at the Botanical Gardens Berlin. The work consisted of 26 bright pink new name panels for existing plants displayed in the Atlantic forest section, in combination with an immersive soundscape composed by Dalt. In contrast to existing signage displaying plant names according to Western traditions of taxonomy (Irving 2018), the new panels presented the names of plants as understood by the Guarani people of the Jaguapiru Reservation in Dourados in Mato Grosso do Sul in Brazil. The artist, who has long collaborated with the Guarani people, asked the community to rename 26 plants via a specific ceremonial practice: *Nymphoides humboldtiana* became *Yvoty mboporã pónhuregua*, which translates into English as "five-sided flower of the spirit of the fields and forests: you will go away one day but I will not". The exhibition was a success and the Bo attracted many visitors, much more than is typical.[19] This coincided with a radio series on the well-known cultural channel Deutschlandfunk. This consisted of a panel discussion that included scientists and the resident artist at Bo, and explored themes of decolonization and botany in Germany In response to the popularity of the exhibition, the artist suggested that the botanical garden keep the new panels permanently. The offer was yet rejected by Bo with the justification that the panels "would be confusing to the visitors" with regards to the existing names and taxonomic organization of the collection.[20] A further argument based on the rejection of multiple particularism was invoked, which recognizes that "plants go through different indigenous territories…have different names…could have twenty names, thirty names…[and] it could be difficult [according to the western botanists] to find the *right* name (our emphasis)".[21] The artist, however, sees the by selection of an indigenous denomination of the plant as a chance for reparation towards this specific indigenous community. A third and more pragmatic reason for the rejection of the artists' work was the high costs of maintaining the soundscape in particular.[22]

Such examples point to conflicts between the stratification of spaces of conservation through the historic staging of nature that is built up over time, as well the transformative impetus to decolonize. The mappings reveal that the orderings implicated in the glasshouse space make the possibility of change difficult but not impossible: after all, stages can be reset; performances can be recast. To rearrange the collection, and therefore types of knowledge about nature relating to its staging, would mean seriously addressing fundamental epistemological understandings of botanical science, especially taxonomic classification, and the separation between 'new' and 'old'. The ambiguous position of Bo regarding the centrality of Western science reflects the current cleavages in the modern conservation regime. This destabilization can be seen in debates about Kew's Royal Botanical Gardens' colonization strategy (Royal Botanical Gardens Kew 2021), and the reactionary responses to their statement (Buchan, et al. 2021;[23] and so too a blog contribution about scientific knowledge versus indigenous knowledge posted by the Botanic Gardens Conservation International

(BGCI 2023), which argued that indigenous knowledge should be recognized as legitimate forms of 'belief' but not existing on an equal footing as western scientific knowledge, which remains the universal.[24] This debate is on-going and will continue to have an impact on the constitution of conservation spaces in the future.

Pressure 2: Conflicting modes of conservation: nature, heritage and energy

As mentioned above, glasshouses play a central role in ex-situ conservation strategies as they house tropical and subtropical plants particularly under threat from the climate crisis. *And yet:* glasshouses are notoriously bad at conserving energy, insofar as maintaining tropical atmospheres during Berlin winters requires a tremendous amount of energy to keep internal temperatures constant as heat lost through uninsulated glass and steel. Staging a tropical atmosphere in a historically protected glasshouse in northern Europe for the sake of ex-situ conservation massively contributes to Berlin's carbon footprint. Awareness of this absurd situation led to the decision in the mid of the 2000s to undertake a renovation of the glasshouses. In the analysis carried out in this article we consider how conservation technologies, especially planning laws, policies, and spatial plans, regulate and stabilize spaces of conservation, and thereby decelerate and restrict change.

The renovation plan of the main glasshouse of botanical garden Berlin emerged at the concomitance of various conservation issues. These include: a) the closure of the main glasshouse due to the lack of maintenance during the mid-2000s – the plants were removed as the glasshouse could no longer sustain a tropical atmosphere; b) the reduction of energy expenditure at the Freie Universität Berlin (owner of the Bo), which identified the glasshouses as a source of massive energy costs; c) the Berlin Historic Monuments Commission commissioning in the same year of a Garden Preservation and Management Plan to take stock of the "buildings, facilities, materials, rock formations, infrastructure, plant themes, woody plant populations, architectural woody plants, vistas, meadow areas, faunistic groups" (Berande and Markstein 2009) at the Botanical Gardens Berlin to consider the development of the garden in light of its historical and cultural significance, and its protected heritage status. This led to a project to renovate the glasshouses, supported by €12 million funding from the European Union for the renovation works. This funding decision was made in part as the glasshouses were seen as iconic buildings of historical and aesthetic importance; and it was expected that their renovation would make a significant contribution towards Berlin's collective sustainability agenda, amounting to at least a 50 per cent of energy saving on the glasshouse.[25] It is clear that various frameworks of conservation – monument protection, ex-situ conservation, energy saving, species protection – were at stake in the renovation project.

In 2006 Haas Architects were commissioned to renovate the main tropical glasshouse. The architects proposed three key forms of innovations for energy saving: a new high performance, double-glazed shell hung internally from the existing steel structure; a heating system to be added to the existing steel facade structure to reduce the U-value and prevent internal condensation;[26] and the installation of two heat-recover towers to capture and redistribute excess heat between day and night. To do this, however, it was necessary to observe the requirements imposed by the monument protection authority [*Denkmalschutz*]. The botanical glasshouses, built in 1907 by the royal architect Alfred Koerner and severely damaged during World War II, were reconstructed in 1960. In 1995 the layout and design of the Bo was granted monument protection status on the basis of four criteria: as a monument, having artistic merit, and its historical significance for both science and urban planning. The status controls the conservation and preservation of the glasshouses, the park, architectural and landscape features, specific vistas, scenographic relations, and the cultural and scientific histories embedded in these material and spatial relationships. With the projected renovation in the 2000s emerged a conflict about what should be prioritized in the monument protection: should the glasshouse design return to the initial design from 1907 with 20 glass panels and exposed steel subframe, or to the design from 1960 with nine acrylic panels? The monument protection authority was initially in favour of the authenticity of the original design. However, this requirement would have resulted in a significant increase in the use of steel, affecting both the weight of the subframe and the overall u-value. It would also have significantly increased the amount of internal shading of plants, which the gardeners and curators were strongly

opposed to. In the end, the architect team managed – through "big struggles, really, really big struggles!"[27] – to convince the monument protection authority of the value of the 1960s design as the historic moment to preserve. This eventually resulted in a sophisticated glazing system with a significantly reduced u-value and increased light and UV transmission, which is optimal for the plants. Two years after the building was finally completed, further calculations were made to measure the heat loss of the newly renovated glasshouse, which was shown to be nearly 80 per cent more energy efficient.

Conflicts between the desire for innovative technology and the necessity of monument protection were colliding with the interests of the gardeners. This group of horticultural experts were quite inflexible regarding the required temperature within the glasshouse: "the design of the windows could guarantee 16 degrees inside when minus 14 degrees outside. But the gardeners wanted a guarantee of 20 degrees against minus 14 outside – even if such days are very rare in Berlin. Yet the difference between 16 and 20 degrees would result in much more heating equipment and a higher heating load which would ultimately be less energy efficient."[28] The Berlin animal protection authority [*Tierschutzbehörde*] was worried about the protection of the animals living (more or less incognito) in the glasshouses. As a result, renovation scheduling had to consider the nesting period of the birds living in the glasshouse, following the regulation of the green spaces department [*Grünflächenamt*] and specifically the animal protection authority of the city of Berlin. What becomes clear here is a fairly typical conflict between different regulating bodies concerned with the protection and conservation of botanical spaces. This played out in the case of Bo between: the interests of the gardeners trying to care for and conserve tropical plants, potentially under threat from climate change; the monument protection authority concerned with cultural heritage; the city of Berlin pushing for energy conservation through improvements to thermal efficiency; and the animal protection authority tasked with safeguarding birds in Berlin. As we argue, such contradictions are spatially structured and structuring, understood through the staging of nature. Moreover, this signals a rupture to the existing modern conservation regime, the primary purpose of which until now has been the control and regulation of cultures of nature. The modern logics which have long underpinned biodiversity conservation are becoming less tenable, specifically the distinction between nature and culture materialized in the botanical gardens in the tension between the protection of cultural heritage, the protection plants, the efficient use of resources – for example the conservation of energy (see Sandbrook 2015) – and to a lesser degree, animal conservation. We argue that these different modes of conservation that are operationalized here through planning technologies and the regulation of spaces of conservation have until now been conceived and regulated separately.

4. Refiguration of the modern conservation regime

In this paper we set out to answer two main questions. Firstly, we addressed the empirical object of the Bo by asking: under the refigurative processes of decolonization and climate change, in what ways is it adapting to, or indeed struggling with, a shifting conservation mission, and what tensions arise in this process of socio-spatial change? Through the paper we sought to shed light on this through two illustrative examples that unearthed different contentions in this polyvalent spatial process. Firstly, we considered how a process of decolonization was restricted by the current stratified organisation of knowledge and space. We then discussed how on the one hand the technology of botanical glasshouses is significant in Bo's ex-situ conservation mission to protect biodiversity in the face of climate change, while on the other hand have long contributed to Berlin's carbon footprint. In this example we saw how different modes of conservation, such as monument protection, plant conservation, energy conservation, animal conservation, and the associated planning technologies were often in conflict with each other during the renovation of the glasshouses, as some actors sought to address this dilemma. We deployed the concept of 'staging nature' to grasp the spatiality of conservation at Bo: this revealed the peculiar relationship between Bo's drive to create artificial biomes in glasshouses in Europe through the theatrical staging of tropical spaces from the South under the logic of ex-situ conservation. As we observed, this is no mean feat and requires a significant amount of energy. Indeed, this spatial relation returns to the sites

from which plant samples were initially taken. As species become extinct, Bo's conservation mission extends to replant home-grown plants back in wild nature, what can be understood as a kind of *restaging* of nature. Restaging also takes place in the digital realm, where we saw how plants are being translated into metadata and given new positions on global digital platforms for conservation. Furthermore, we showed how staging nature articulates both the practices and forms of knowledge that shape the spatial organisation of Berlin's botanical gardens. The term highlights both the social construction of nature, that is to say as part of a collection and its entanglement with curatorial and scientific practices and ways of knowing on one hand, and the choreography and performance of nature, often as 'wild' or 'pristine', on the other hand. As a processual concept it retains the capacity to account for the material agency of nature in spaces of conservation, that is, an unruly resistance to being staged**.** Staging nature, we have argued, refers to the materialization of spaces of conservation, a logic which indicates how botanical gardens are not simply a place, territory, or network, but are rather highly curated enclaves which stage a kind of performance of spatial arrangements of objects and knowledge adopted from other locations – a kind of mimetic space. This performance can only ever be incomplete, and it is surely in these dissonances and misalignments where the unique character to this spatial concept lies. Operating differently from abstract nodes in ephemeral networks, staging nature makes us aware of the embedded, contradictory, and polycontextural characteristics of space, allowing us to grasp the hybridity of spaces of conservation as both 'real' and culturally mediated. With this in mind, and returning once again to the case of the Botanical Garden Berlin, we were struck by the crystalline structure of the glasshouses, which unlike a mirror that reflects exact images back, in this mimetic space, light is bent and scattered to create misalignments, overlaps, and new patterns of diffraction.

To address the second question, which is more abstract and speculative, we used the botanical gardens to consider the effect that deeper transformations wrought by wider processes of decolonization and climate change are having on a shifting conservation regime. In response to this destabilization, we suggest that better ways to integrate other types of conservation such as biodiversity preservation and built heritage protection, the conservation of energy and new practices for the acquisition, storage, and circulation of knowledge are now necessary. In this the paper we analysed the multiple overlapping conflicts that inscribe spaces of conservation at these intersections. Bringing to light these conflicting modes of conservation leads us to conclude with a call for an integrated approach to nature-culture conservation. In this way we join Büscher and Fletcher's and others' approach to biodiversity conservation that aims to overcome the nature and culture binary in a post-capitalist mode. However, we also go further, suggesting this it is not only an epistemic boundary which must be overcome, but that the modes of conservation that regulate and govern conservation spaces must also be considered together – as we have shown in this article, they are no longer easily reconciled when thought about separately.

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Notes

1 Senior member of staff at Botanical Garden Berlin, interview by authors, digital recording, May 2021, Berlin.

2 World Wildlife Fund, 'What is the Sixth Mass Extinction and What Can We Do About It?' World Wildlife Fund 2022. https://www.worldwildlife.org/stories/what-is-the-sixth-mass-extinction-and-what-can-we-do-about-it, accessed 23 January 2024

[3] Naomi Gramlich and Lydia Kray, '(Post-)Kolonialismus und der Botanische Garten in Potsdam', Poco.Lit. 2020. https://pocolit.com/2020/07/13/post-kolonialismus-und-der-botanische-garten-in-potsdam/, accessed 13 March 2023.

[4] See also Royal Botanical Gardens Kew, 'Our Manifesto for Change 2021–2030', Royal Botanical Gardens Kew 2021. https://www.kew.org/about-us/press-media/manifesto-for-change-2021, accessed 23 October 2023.

[5] Another interesting contribution is offered by Irus Braverman (2023), who in her forthcoming book describes how nature management is central to the contemporary settler project in Palestine-Israel, specifically with reference to how the protection of land and animals is linked to the Zionist project of Jewish settlement alongside the corresponding dispossession of non-Jews in Israel's conservation regime.

[6] See the discussion on conservation and development in John Oates (1999).

[7] See also Celine Germond-Duret, 'Decolonising Conservation: Towards a Postcolonial Conservation Regime', E-International Relations 2002. https://www.e-ir.info/2022/06/07/decolonising-conservation-towards-a-postcolonial-conservation-regime, accessed 13 March 2023.

[8] Senior member of staff at Botanical Garden Berlin, interview by authors, digital recording, May 2021, Berlin.

[9] Biomolecular scientist at Botanical Garden Berlin, interview by authors, digital recording, June 2021, Berlin.

[10] Biomolecular scientist at Botanical Garden Berlin, interview by authors, digital recording, June 2021, Berlin.

[11] Senior member of staff at Botanical Garden Berlin, interview by authors, digital recording, May 2021, Berlin.

[12] See http://www.worldfloraonline.org

[13] See http://gardens4science.biocase.org

[14] Senior member of staff at Botanical Garden Berlin, interview by authors, digital recording, May 2021, Berlin.

[15] Senior member of staff at Botanical Garden Berlin, interview by authors, digital recording, May 2021, Berlin.

[16] Naomi Gramlich and Lydia Kray, '(Post-)Kolonialismus und der Botanische Garten in Potsdam', Poco.Lit. 2020. https://pocolit.com/2020/07/13/post-kolonialismus-und-der-botanische-garten-in-potsdam/, accessed 13 March 2023.

[17] Senior member of staff at Botanical Garden Berlin, interview by authors, digital recording, May 2021, Berlin.

[18] Interestingly, there exist a series of artistic projects tackling the issues of decolonization in botany (see Coussonnet 2018).

[19] Senior member of staff at Botanical Garden Berlin, interview by authors, digital recording, May 2021, Berlin; Program Director at Deutschlandfunk radio, interview by authors, digital recording, January 2023, Berlin.

[20] Maria Thereza Alves, interview by authors, digital recording, January 2023, Berlin.

[21] Maria Thereza Alves, interview by authors, digital recording, January 2023, Berlin.

[22] Program Director at Deutschlandfunk radio, interview by authors, digital recording, January 2023, Berlin.

[23] Ursula Buchan, 'Has Kew Gardens Really Climbed Down After Criticism over its 'Decolonisation of Science' policy?', History Reclaimed 2022. https://historyreclaimed.co.uk/has-kew-gardens-really-climbed-down-after-criticism-over-its-decolonisation-of-science-policy, accessed 23 January 2024.

[24] Botanic Gardens Conservation International, 'Traditional and Scientific Knowledge', Botanic Gardens Conservation International 2023. https://www.bgci.org/news-events/traditional-and-scientific-knowledge, accessed 23 March 2023.

[25] As an architect involved in the glasshouse renovation observed, the "pressure came actually from the €12 million they could lose if you don't save 50 per cent energy" (interview by authors, digital recording, February 2023, Berlin).

[26] The U-value is the rate of the transfer of heat through matter. The thermal transmittance of a material (such as insulation or concrete) or an assembly (such as a wall or window) is expressed as a U-value. The higher the U-value, the more heat that is transferred between inside and outside.

[27] Architect of glasshouse renovation at Botanical Garden Berlin, interview by authors, digital recording, November 2022, Berlin.

[28] Architect of glasshouse renovation at Botanical Garden Berlin, interview by authors, digital recording, November 2022, Berlin.

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