# 2. The Svalbard Global Seed Vault and Agrobiodiversity Conservation in Social-Scientific Research

The empirical research underlying this study, as the book's subtitle states, is an inquiry into the world of agrobiodiversity conservation *through* the Svalbard Global Seed Vault. This means that the Seed Vault is not the object so much as the starting point and nodal point – or the seed – of my research. As unfolded in the previous chapter, it is the product of historical and ongoing political, economic, technological, and material-discursive struggles and processes. Throughout the chapters that follow, I show that since its establishment in 2008 it has become a new agro-political actor and arena assembling other actors participating in shaping how agrobiodiversity loss and conservation is known, imagined, performed, and transformed. Put differently: like the seeds it assembles, the Seed Vault comes from and comes with a world that has created it while also becoming what it is with the world(s) it assembles and intervenes in. It is on these world(s) and world-making processes, in which the Seed Vault is entangled, that I focus my attention in the ensuing discussions of what the Seed Vault is and does. In a first step, this chapter develops this analytical perspective as a desideratum in social-scientific and humanities research on the Seed Vault and *ex situ* agrobiodiversity conservation. In a second step, it elaborates the empirical-analytical research process of my study, which is guided by the methodology of Situational Analysis.

## 2.1 The Current State of an Emergent Field of Research

In the period of less than two decades since the Svalbard Global Seed Vault first opened, it has attracted a notable amount of public attention in the form

of countless international press reports, documentary films (e.g. *Seed Warriors* [2009]; *Seeds of Time* [2013]; *Seed: The Untold Story* [2016]) as well as in fiction (e.g. Maja Lunde's *The Dream of a Tree*[1]) and on TV (e.g. *Seed: Deadly Power*[2]). Academic interest in the Seed Vault has so far remained scarce outside of plant genetics, conservation biology, and related fields of scientific research actively involved in *ex situ* agrobiodiversity conservation efforts. One can relatively quickly gain an overview of the existing English-language accounts of the Seed Vault in the social sciences and humanities.

This limited interest is somewhat surprising considering that different, currently thriving areas of research actually intersect in the Seed Vault and a comprehensive analysis of its operations could make a meaningful contribution to all of these fields. In the large and growing body of research on *biobanking and cryo-conservation*, attention to the banking and cold storage of seeds is rather marginal. Similarly, in the multi-disciplinary research environment critically engaging with *conservation efforts* in a more general sense, which often focus on the conservation of animal species and ecosystems, much more attention has been paid to *in situ* than to *ex situ* conservation strategies. Finally, although there has been a surge of academic interest in *agrobiodiversity conservation in genebanks* in recent years, few of the research projects in this field focus on the Seed Vault. Among those that do, only one is grounded in an in-depth empirical study comparable to the one I have conducted (see Harrison 2017; Harrison et al. 2020: 51–152). This kind of empirical research is essential insofar as it considerably differentiates the insights one can gain based on publications, online material, and media accounts.

Against this background, my study expands the existing research on the Svalbard Global Seed Vault and contributes to the various intersecting bodies of research by bringing into focus aspects, questions, connections, and perspectives that have not hitherto been addressed or have been considered marginal. Let me start by providing a brief overview of the current state of research on the Svalbard Global Seed Vault and on *ex situ* agrobiodiversity conservation efforts more generally.

1 Originally published in Norwegian as *Drømmen om et tre* in 2022.

2 A German TV series first broadcast in 2023 and originally titled *Die Saat: Tödliche Macht*.

## Research on the Svalbard Global Seed Vault

The first account of the Svalbard Global Seed Vault from within the broad field of cultural studies appeared no more than a year after the Vault had opened. The environmental humanities and extinction studies scholar Thom van Dooren interrogated the Seed Vault's (self-)conception as an insurance policy for the world's endangered agrobiodiversity, observing that "[i]n the current 'climate of loss', in which biological diversity of all kinds is disappearing [...] how we do conservation has taken on a new level of importance" (2009b: 103). Van Dooren criticises the *ex situ* approach underlying the Seed Vault (and the International Seed Treaty's provisions for international agrobiodiversity conservation efforts more generally) for reducing biodiversity to genetic material or (plant) genetic resources. He argues that this not only deprioritises the ecological, biocultural, and biosocial life of seeds and plants, but also concentrates the means of adaptation to changing environmental conditions in the hands of technoscientific actors rather than farmers and agricultural communities (see also van Dooren 2009a). Without denying that banking "proxies" (van Dooren 2009b: 105; see also Breithoff 2020) of lifeforms on the brink of extinction can be valuable for mitigating ecological risks and adapting to environmental change, van Dooren argues that "no matter how dire the situation, the need to conserve diversity cannot be allowed to cover over more critical discussions about how and for whom this 'conservation' work is to be done" (2009b: 109). The questions raised at this early stage by van Dooren about the Seed Vault's insurance logic, genetic reductionism, and about what it does and for whom foreshadow the key aspects of the current state of discussion about the Seed Vault in the social sciences and humanities. In the relatively small body of multi-disciplinary research on the Seed Vault two concerns can be identified. All accounts discuss *what* it is that the Seed Vault conserves by conserving seeds, on the one hand, and/or *what for*, on the other hand, meaning what it promises to achieve through the conservation of seeds.

Since the material conserved inside the vault consists of seeds, the conservation goal is evidently defined according to a molecular understanding of life and a geneticised conservation paradigm. Fern Wickson (2016) draws attention to the fact that genetically modified crop seeds are excluded from entering the Seed Vault. Exploring the reasons for and implications of this exclusion, she develops an intriguing philosophical and socio-political discussion of "the moral status and conservation value of all the mutants and monsters

we are engaged in producing" (Wickson 2016: 807). Looking at the fact that the vault's collection of biomaterial isolated from its ecological entanglements is complemented by an online Seed Portal, collecting and organising digitalised bioinformation isolated from its material substrate, Suzana Alpsancar (2016) extends the focus of analysis to the role of the information paradigm and how it shapes the Seed Vault's conservation efforts. Alpsancar argues that the creation of "copies" of certain seeds and their transformation into "digital things" alters their ontological status in a way that "their materiality is only virtually effective as an insurance policy for the originals" (Alpsancar 2016: 62). The work of heritage studies scholars Esther Breithoff and Rodney Harrison (2020; see also Harrison 2015, 2017; Harrison et al. 2020) adds to this argument about the ontological politics of conservation. Breithoff and Harrison argue that the collection of agrobiodiversity in the Seed Vault and "datadiversity" (Bowker 2000) in the Seed Portal is a practice of accumulating and generating "latent forms of biocapital" (Breithoff/Harrison 2020: 102) primarily oriented towards the future realisation of economic value. The authors point out the sad irony of this speculative form of biocapital accumulation in seed banks, namely that it "requires direct speculation upon the extinction and biodiversity loss that it is created to secure the present against" (Breithoff/Harrison 2020: 119). Annukka Paajanen develops a similar argument conceiving the Seed Vault "as a site of *salvage accumulation*, where the loss of crop diversity is translated into capitalist value" (Paajanen 2024: 22–23, emph. in orig.).

The environmental anthropologist Can Dalyan investigates the promises of such an economically oriented and selective type of conservation based on a similar understanding of *ex situ* conservation as a practice of accumulating latent capital "built squarely upon the promise and premise of continued, worldwide environmental devastation" (Dalyan 2021: 182). Dalyan argues that seed banks are technoscientific tools for bio- and geopolitics. Crucially, he contends that whereas national genebanks bank on the "(re)productive capacities and latent potentialities of seeds" (Dalyan 2021: 190) as means of nation-making, international seed conservation facilities such as the Svalbard Global Seed Vault, as well as the Millennium Seed Bank Partnership (MSBP) at the United Kingdom's Royal Botanic Gardens in Kew, deploy a universalist rhetoric that elevates them to saviours of nature and humanity at large. This rhetoric, however, glosses over "imperial histories of bioprospecting that facilitated the emergence of institutions like the MSB [sic] and their vast, global collections in the

first place" (Dalyan 2021: 184).[3] The sociologist of science Tahani Nadim (2018) argues that by failing to account not only for the ecological devastations of the present but also for the imperial and colonial histories "haunting" these international seed conservation facilities, "a project such as the Doomsday Vault […] perpetuates a logic of ruination" (Nadim 2018: 245) outside the genebank that has led to the establishment of genebanks in the first place.

Although the Seed Vault was not built to be the monolithic solution for agrobiodiversity that the narrative of the 'doomsday vault' suggests it is,[4] the technoscientific *ex situ* conservation approach it embodies is rooted in a logic of "disaster preparedness" (Grigoli 2024: 118) that deprioritises the destruction of (agro)biodiversity outside the genebank. The bio-reductionist notion of biodiversity underlying *ex situ* conservation efforts, which considers (frozen) seeds as archives of (latent) "life itself" (Dalyan 2021: 189) or of a crop's biosocial evolutionary history (Peres 2016; Breithoff/Harrison 2020: 108), is the ontological foundation for the promise to adapt to changing ecological environments through selective breeding. It is this promise, and the objective of gaining "control of evolution" (Fava 2013: 146–149), that makes seed banks accumulating the largest possible diversity of plant genetic resources for future breeding *ex situ* much more promising than efforts to conserve agrobiodiversity *in situ*, where it is subject to ongoing change and erosion due to "continuing processes of natural and cultural selection" (Breithoff/Harrison 2020: 109; see also Wolff 2020: 6).

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3 The colonial legacies of the Royal Botanic Gardens, Kew and the MSBP are the subject of careful analysis in the works of Anna-Katharina Laboissière (2019), Xan S. Chacko (2019b, 2022b), and Marleen Boschen (2022: 154–199). Kew Gardens is one of the oldest botanical gardens in the world, and its history is deeply entangled with the British Empire's colonial expansion and colonial botany (see also Crosby 1972; Brockway 2002; Schiebinger 2004; Schiebinger/Swan 2005). The seed bank at Kew Gardens, first set up in 1980, was turned into the Millennium Seed Bank (MSB) in 2000 with the aim of establishing a collection of samples of the United Kingdom's entire flora. Under the name Millennium Seed Bank Partnership (MSBP), the project's scope was soon broadened to encompass the flora of today around 100 partnering countries around the world. Boschen and Chacko interpret this process as a "postcolonial reframing" (Boschen 2022: 159) or "rebranding" (Chacko 2019b: 2) of Kew Gardens in the depoliticised spirit of global biodiversity conservation for universal human benefit, which ultimately "strengthened ties between Kew and gardens around the world […] that had been loosening since their colonial binds were no longer controlling the flow of plants" (Chacko 2022b: 16).

4 I elaborate this argument in chapter 3.2.

Against the background of this geneticised and technoscientific approach to agrobiodiversity conservation, a last group of accounts of the Seed Vault by and large situated in sociological and cultural STS analyse it as an allegedly politically neutral means of "salvation" from the challenges climate change poses to agricultural production (Fava 2013: 118–149); as a "security technology" that secures and thus extends the present by making the threats of agrobiodiversity loss and food insecurity reversible through seed banking (Wolff 2020; see also 2024); and as a salvationist promise of "becoming-safe" through practices of "global care" for agrobiodiversity informed by imaginaries of securitisation, fortification, and mastery (Boschen 2022: 112–153). That these heroic sociotechnical imaginaries, as Elaine Gan (2015) calls them, are entrenched in gendered power relations becomes palpable in Charlotte Kroløkke's (2019) intriguing feminist cultural analysis of the documentary *Seeds of Time* (2013), in which the Seed Vault features as a womb with a birth canal through which seeds enter to be harboured and eventually leave as promissory carriers of future life.

What all accounts of the Seed Vault summarised here illustrate are the various ways in which the "specific forms of hope and security generated through practices of banking genetic diversity" (Breithoff/Harrison 2020: 119) are entangled in economic, political, and epistemic power relations. I share the conviction that it is crucial – analytically as well as politically – to attend to the ways in which the Seed Vault is caught up in these power relations and reproduces them. At the same time, I propose and pursue an analytical approach that equally attends to cracks in these power relations, that is, to the ways in which the Seed Vault and its effects in the world are not determined by them. This approach resonates with the analytical perspective the political scientist Sheryl Breen (2015) develops in her noteworthy comparative study of Native American seed saving practices and *in situ* conservation projects, on the one hand, and the Seed Vault's contribution to *ex situ* conservation efforts, on the other hand. Foregrounding how political struggles around different approaches to agrobiodiversity conservation pivot on "divergent understandings of 'seedness' and seed ownership" (Breen 2015: 39), Breen emphasises that the Seed Vault is unique, compared to other genebanks, "in its potential ability to cross the political and cultural divide over the ownership and conservation of seeds and thereby promote the vital ecological need for both *ex situ* and *in situ* seed preservation" (ibid.).

My study foregrounds this uniqueness of the Seed Vault within the larger system of genebanks it is part of, discusses its entanglement in existing power

relations with a particular focus on their hitherto underexplored onto-epistemic dimensions, and explores its potential to be(come) more than what the accounts delineated above show that it currently is. I develop an understanding of the Seed Vault as a technology that is materially and discursively entangled in, but not determined by, the world it has emerged from. Its performativity and effectiveness do not arise from the design of the Seed Vault itself, but depend on the world(s) it serves and whose conservation it facilitates. This requires extending the focus from the What and What-for or How of the Seed Vault's approach to conservation – which the existing research has carefully and compellingly scrutinised – to the world(s) it is situated in and which it serves to conserve and cultivate by way of its promise to conserve futurity. This perspective is to some extent informed by a body of research engaging with the history, politics, and practices of *ex situ* agrobiodiversity conservation beyond the Svalbard Global Seed Vault, which I briefly delineate in the following.

## Research on the History and Political Economy of Seed Conservation

The most comprehensive and most widely read historical account of the political economy of *ex situ* agrobiodiversity conservation is Jack R. Kloppenburg's seminal study *First the Seed: The Political Economy of Plant Biotechnology, 1492–2000* ([1988] 2004). Kloppenburg traces the history of seed banking as an entangled history of capitalism, science, and agriculture from the commodification of seeds, through the emergence of genetics and plant biotechnology and the ways in which they facilitated the modernisation and globalisation of agriculture, up to the political struggles around plant genetic resources in the twentieth century (see also Kloppenburg 1988).[5] In the German-language academic context, Michael Flitner (1995) has presented a similarly comprehensive study of plant genetics, biopolitics, and agricultural modernisation in Germany and in the international agro-political context as they emerged in the twentieth century, but only goes back as far as the late nineteenth century (see also Flitner/Görg/Heins 1998 as well as English: Flitner/Heins 2002; Flitner 2003). Tiago Saraiva (2013) makes an intriguing contribution to this historical-political research by discussing the history of European integration in the aftermath of World War II as a history of transforming crop diversity into a technoscientific "cosmopolitan commons" through coordinated genebanks.

5 The second edition, published in 2004, contains an additional chapter on the dis/continuities of these developments in the early twenty-first century.

He exposes the continuities of this mode of imperialism with "how Nazi and Soviet continental ambitions depended on controlling plant genetic resources" (Saraiva 2013: 186).[6]

Other historians complement these broad historical-political accounts of the role of seed banks and seed conservation for the emergence and consolidation of nation-states and empires with analyses that focus on the underlying imaginaries and historically changing discourses around seed diversity loss and conservation. In an article unfolding a "semantic history of the 'resource' idiom", Christophe Bonneuil (2019: 1) traces "the emergence of a genocentric and resource-centric ontology of the planet's biological diversity" since the seventeenth century. This paper provides a deep historical background to an earlier publication co-authored with Marianna Fenzi that discusses how the politicisation of genetic erosion and seed banking in the second half of the twentieth century gave rise to the biodiversity paradigm, which rebranded *ex situ* conservation efforts without substantially challenging the resourcist view of biological diversity (Fenzi/Bonneuil 2016; see also section 1.4). Sara Peres (2016) contributes to this discourse-analytical historical contextualisation of the emergence of *ex situ* conservation by investigating scientists' imaginaries of seed banking as a solution to genetic erosion. She argues that the idea that frozen seed archives make "the evolutionary history of crops" (Peres 2016: 96) accessible as a future (re)source of knowledge and action is a "memory practice" (Peres 2016: 103, quoting Bowker 2005) that organises the past based on anticipating forms of use in the future. In a subsequent publication, Peres (2019) describes this performative mode of anticipatory future-making through the freezing of seed diversity as an enactment of "cryopower", which refers to the control of biological and associated socio-historical processes through the use of cold temperatures (see also Friedrich 2017; Kowal/Radin 2017).

An interest in the ontological performativity of cultural narratives related to agrobiodiversity loss and conservation also informs the historical research on *ex situ* agrobiodiversity conservation conducted by Helen A. Curry. Her early research focuses on the role of the Rockefeller Foundation in the Green Revolution and in the subsequent establishment of large-scale and long-term crop diversity collections (Curry 2017b), as well as on twentieth century plant genetic

6 According to Curry (2022a: 5), "German, Soviet, and US institutions developed especially ambitious programs of collecting and disseminating crop diversity [in the early twentieth century; FV]" – a history she unfolds in the first and second chapter of the book quoted here.

resource conservation in other contexts (Curry 2017a, 2019a, 2019b). Building on this research, a recent article of particular interest to this study scrutinises the historical context in which the logic of backup emerged and superseded the logic of banking as the dominant conception of future seed and food security (Curry 2022b). In a book synthesising her research, Curry unfolds a history of agrobiodiversity endangerment and conservation through the story of maize cultivation in the United States and Mexico (Curry 2022a). She is critical of the technoscientific overdetermination of the international discourse on agrobiodiversity loss and conservation, and shifts the focus from stories about the nature, loss, and conservation of plants in general to stories about farmers, communities, and ways of life connected to the existence, endangerment, and disappearance of specific plants. The aim of this endeavour is to "tell a history of ideas about people and the consequences of those ideas for the seeds we save, the crops we grow, and ultimately the foods we eat" (Curry 2022a: 6–7).

What all these historical accounts of the role and performativity of seed banks and *ex situ* agrobiodiversity conservation have in common is that they show how ecological and societal realities are emergent and deeply entangled. Speaking with Donna Haraway (2003, 2008), they all – although in various, sometimes more, sometimes less explicit ways – attend to the ways in which history is a process of naturalcultural becoming and doing.[7] The question of how naturalcultural becoming is enacted guides a last body of research I wish to mention here.

## Research on Seed Conservation as More-Than-Human Care

A small number of cultural studies scholars have recently focused empirical attention on the labour and specific practices of seed conservation. Building on recent discussions around relations of care in technoscientific and more-than-human contexts (e.g. Hartigan 2017; Puig de la Bellacasa 2017), Xan S. Chacko (2019a, 2022a) and Marleen Boschen (2022) analyse the preparation of seeds for medium- and long-term conservation in *ex situ* environments as a work of

7 The notion of "naturecultures" encapsulates the inextricable relatedness of nature and culture and the relational ontology that characterises Haraway's thinking. For Haraway, being is always becoming with others in "co-constitutive relationships in which none of the partners pre-exist their relating, and the relating is never done once and for all. Historical specificity and contingent mutability rule all the way down, into nature and culture, into naturecultures." (Haraway 2003: 12)

care for naturalcultural futures. Aware of the bio- and cryopolitical entanglements and colonial continuities of global-scale *ex situ* agrobiodiversity conservation endeavours in particular, Chacko engages with the "creative agencies" (2019a: 98) of the scientists "whose labor and decisions will shape that future natureculture" (2019a: 105). Similarly, Boschen questions what she calls the "anthropocentric image of cryopolitical control" (2022: 20) by exploring the radically transformative if precarious potential of seed banks to become means of post-anthropocentric, anti-colonial, and community-based social change. Foregrounding the links between such specific practices, processes, and stories of biodiversity conservation, on the one hand, and conceptions of species, ecosystems, and the (future) earth, on the other hand, Anna-Katharina Laboissière explores how "biodiversity repositories [are] an active intervention into the shaping of natures both inside and outside [the seed bank]" (2019: 65). She therefore proposes to understand seed banks as "world-making devices" (2019: 71–73). However, Laboissière emphasises, as does my study, that neither the practice of conserving plant genetic diversity in *ex situ* repositories nor those repositories themselves determine which of the multiple "possible world-making projects banked along with the collection of seeds" (Laboissière 2019: 76) is eventually going to be realised.

## Studying Agrobiodiversity Conservation as a Mode of World-Making

The analysis of the Svalbard Global Seed Vault and its agrobiodiversity conservation efforts that I develop in this book joins the ranks of these approaches that conceive seed banking as a mode of world-making. In contrast to the aforementioned empirical studies of other seed banks, however, my focus lies not on practices of world-making through seed banking – at least not the kind of hands-on conservation practices that handle seeds pre- and post-cold storage. Conducting an empirical investigation of the Seed Vault means studying a seed bank that differs considerably from other seed banks insofar as it is a repository for the latter to securely store duplicates of their collections for the long term, while leaving the preparation and postprocessing of the seeds to the depositor. This means studying an *ex situ* conservation environment where "conservation practices" are not only restricted to depositing sealed boxes of packaged seeds inside storage rooms and monitoring the functioning of the

facility, but one that also restricts access to the facility for reasons of security.[8] My research experience illustrates that while this closes the door (in a very literal sense) to "what happens within the apparatus of these repositories" (Laboissière 2019: 65), at the same time, it opens a window to the worlds the Seed Vault is situated in. The latter refers, on the one hand, to the globally extending *ex situ* conservation environment the Seed Vault is part of and backup for. On the other hand, it also refers to the plurality of worlds within what the dominant modern cosmology conceives as *the* (one) world – a claim that I unfold throughout the chapters that follow. Following Haraway's emphatic argument that "[it] matters what worlds world worlds" (2016: 35), the focus of my study is on the worlds participating in the world-making endeavour that the Seed Vault embodies as well as the worlds it makes, makes possible, and could make possible.

Almost three decades ago, Haraway first argued that "[n]othing comes without its world, so trying to know those worlds is crucial" (1997: 37). At that time, this was an exercise in breaking down the scientistic "wall between the political and the technical" (ibid.) and developing a type of knowledge about technoscientific projects that claims objectivity based not on stripping these projects from their worlds but rather on acknowledging those worlds and their epistemological and ontological politics. Following this approach to the study of technoscientific projects, I concentrate my attention on the worlds involved in the Svalbard Global Seed Vault and the worlds that come with the seeds collected inside the vault. This analytical approach is based on the conviction that the Seed Vault is a conservation facility that cannot be understood in itself, because it is a nodal point of an agrobiodiversity conservation environment that extends across space and time. This means that the Seed Vault cannot be understood without an appreciation of its relations to the many national, subnational, and transnational genebanks involved as depositors, each of which comes with its world, meaning a specific entanglement in and emergence from the history of agrobiodiversity conservation unfolded in the previous chapter, and situated relations with the more-than-human ecologies

8 Accounts of the Seed Vault based on visits made before October 2016, such as Heatherington and Perley's "Fieldnotes from Svalbard" (2017), show that access to the Seed Vault was granted in the first few years after it opened. This changed after a water intrusion in October 2016 and subsequent technical reconstruction of the facility, as I elaborate in chapter 3.1.

its conservation efforts co-produce.[9] Paying attention to these worlds that come with the (human and nonhuman) agencies involved in the Seed Vault shows that it is also a nodal point of various discourses, imaginaries, and doings each playing their part in the worlding the Seed Vault is engaged in.

With the proposed mode of investigation – exploring the Seed Vault not in itself but through its relational entanglement in multiple worlds and worldings – comes an understanding of seed banking that I share with some of the abovementioned authors, namely as an indeterminate mode of world-making. In other words, I argue that the Seed Vault's worlding is not determined by the fact that it is a technoscientific project but depends on the worlds it is used to supply and sustain. In this indeterminacy lies a potential for seed banking to be more than a "technological fix" for problems that are actually political, as critics often characterise technoscientific developments in the modern agro-industrial system (e.g. Ribeiro/Shand 2008; Fowler/Mooney 1990: 59; Subramaniam 2024: 165). Transformative potential is usually ascribed to local farmers' and community seed banks, whereas inter- and transnational genebanking projects such as the Svalbard Global Seed Vault are typically associated with techno-salvationism (see also Breen 2015). In contrast to such a perspective, I argue that this juxtaposition harbours the danger of a simplistic romanticisation of peasant farming, on the one hand, and aversion to technoscience, on the other hand. This dualistic understanding suggests that practices, technologies, and their performative effects are inseparably linked with the worlds from which they emerge. While this might be true for some technoscientific projects, I argue that the Seed Vault harbours a potential to be an important tool of social-ecological transformation in light of agrobiodiversity loss and destruction precisely because it assembles not only a diversity of seeds but also a diversity of worlds.

Certainly, this does not mean dismissing the critical analyses summarised above and succumbing to an interpretation of the Seed Vault that is simplistic and romanticising in a different way, namely by seeing it as an innocent

9 The *ecological* entanglements and relationalities of the seeds conserved in the Seed Vault lie outside the scope of my research for two main reasons. First, in the Seed Vault, which is the empirical starting point and heart of my inquiry into the relationalities within which it exists, seeds are as far away from their ecological entanglements as they get in the process of conservation. Second, the ethnographic research I had planned to conduct in seed conservation environments handling seeds within their ecological entanglements was thwarted by the COVID-19 pandemic, as elaborated in the following chapter.

technoscientific means of multilateral future-making. On the contrary, I follow the existing research in attending to the ways in which the Seed Vault is a technoscientific promise of security in the face of a multiplicity of social-ecological threats (3.2), of extending a threatened present (4.1), and of salvation in the face of eco-apocalyptic expectations (5.1). As others have done for other seed banks, I discuss continuities of extractivist colonial histories that come to matter in the Seed Vault, albeit by tracing them not in its (rather short) institutional history so much as in the history of the more-than-human relations materialising in the Seed Vault (3.1). In addition, I complement these analyses by also attending to unexpected worlds and worldings the Seed Vault assembles and the transformative potential which arises from encounters and collaborations of different worlds that emerge in the context of the Seed Vault's efforts to assemble the world's agrobiodiversity in Svalbard (3.3 and 4.2).

## 2.2 Research Design

The analysis I develop throughout this book conceives of the Svalbard Global Seed Vault not merely as a technoscientific conservation facility assembling a diversity of seeds, but as an arena assembling a diversity of worlds and modes of worlding. My main interest is in how these world(ing)s shape – each in their own way as well as collectively in their historical and ongoing interplay – how agrobiodiversity, as well as its loss and conservation, come to matter in various ways, and what promises and problems these entail. The empirical foundation of my inquiry comprises ethnographic field research, qualitative expert interviews, and document and video analysis. The empirical-analytical process was conducted following the methodology of Situational Analysis (Clarke 2005; Clarke/Friese/Washburn 2018). In the following pages, I delineate the methodological principles as well as the empirical process and data underlying the research presented in the chapters that follow.

### The Methodology of Situational Analysis

The empirical and analytical-interpretive process was guided by the qualitative-interpretive methodology of Situational Analysis. First developed by Adele E. Clarke (2005) and later in cooperation with Carrie Friese and Rachel Washburn (Clarke/Friese/Washburn 2015c; 2018; 2022), Situational Analysis is an extension of Grounded Theory in the tradition of Anselm Strauss (1987;

Strauss/Corbin 1990). Whereas the latter is rooted in symbolic interactionism and pragmatism (and inseparably so, according to Clarke), in developing Situational Analysis, Clarke aspired to "push grounded theory around the postmodern turn" (Clarke 2015: 91; 2005) and the interpretive turn (Clarke/Friese/Washburn 2018). While Situational Analysis shares some of the theoretical and methodological assumptions of Straussian Grounded Theory as well as of the post-Straussian Constructivist Grounded Theory of Kathy Charmaz (2006, 2014), it also embraces theoretical approaches such as Michel Foucault's theory of discourses and their "conditions of possibility", the attention to the more-than-human advanced by STS, and theorisations of the situatedness of knowledge and research such as formulated by C. Wright Mills and Haraway (see Clarke/Friese/Washburn 2015a: 12–13, 43–47). These influences converge in the conceptualisation of the *situation of inquiry*, which is the fundamental unit of any Situational Analysis – rather than individual subjects or collective actors, for instance (Clarke/Friese/Washburn 2015a: 12). This makes it possible to bring four facets into focus that often remain peripheral if not impalpable in traditional Grounded Theory and that are crucial to my inquiry into the world(ing)s of agrobiodiversity loss and conservation. Situational Analysis shifts the focus of analysis (a) from social action to *social ecologies* and the relations that make them and (b) from knowing subjects to *discourses*. It further extends the analytical focus to (c) *nonhuman agencies* as well as (d) *implicated actors* and actants, i.e. those that are silenced or physically excluded in a situation of inquiry.

The first shift is articulated through an extension of Strauss's social worlds/arenas theory and informs the particular analytical approach to the Seed Vault and the world(s) of agrobiodiversity conservation this book unfolds. In Situational Analysis, social wholes are not conceived as bounded groups (e.g. geographically) or as the sum of their parts (e.g. individuals). Rather, they are "ecolog[ies] of relations" (Clarke/Friese/Washburn 2015a: 45, referencing Star 1995) meaning "emergent and fluid entities" (Clarke/Friese/Washburn 2018: 148) held together by shared interests or concerns addressed through shared discourses, technologies, and collective action. *Social worlds*, then, denote ecologies of relations that comprise various individual and collective actors, who, in turn, can be part of various social worlds. *Arenas*, in contrast, are areas of sustained interest that assemble different social worlds whose actions and discursive engagements co-construct the respective arena and its participants. Insofar as the perspectives, concerns, and interests of the actors involved diverge, arenas are sites of dispute and thus serve to analyse

the workings of power relations. Accordingly, the empirical and analytical focus lies less on individual knowing subjects than on discursive formations and social realities as they come to matter in the arenas under investigation (Clarke 2015: 88–91; Clarke/Friese/Washburn 2015b: 174–176).

This conceptual matrix informs the approach to the Seed Vault I propose, namely seeing it not primarily as a particular technology or set of technoscientific practices that is part of a particular social world, but as an arena assembling a diversity of (social) worlds that come with a diversity of technologies, practices, actors, concerns, discourses, disputes, etcetera. This makes it possible to foreground ambiguities, unanticipated partners and relations, and spaces of transformative possibility in the biopolitics of the Svalbard Global Seed Vault and thus expand the scope of previous analyses.

Identifying cracks in "master discourses" (Clarke/Friese/Washburn 2015a: 21) and promoting "epistemic diversity" (ibid.) is one of the explicit goals of Situational Analysis. In this sense, it particularly "lends itself to critical, feminist, anti-racist, and related projects in several important and very intentional ways" (Clarke/Friese/Washburn 2015a: 20). Developed out of an effort to abandon residual tendencies of the methodology of Grounded Theory towards othering and representation and to overcome oversimplifications that aim to purify the research outcome (Clarke 2005: 11–18), Situational Analysis cultivates attention to "difference(s), power, contingency, and multiplicity" (2005: 11). In an attempt to avoid unwittingly reproducing tacit "hierarchies of importance" (Clarke/Friese/Washburn 2015a: 21) through the design of a research project, the methodology of Situational Analysis is designed to map "*all* elements, *all* positions, *all* voices" (ibid., emph. in orig.) that are part of an arena or a situation of inquiry.

Firstly, this means attending to *nonhuman actors and elements* – both discursively and materially – based on the premise that their presence or absence in a situation matters in the sense that they co-constitute a situation and the conditions of possibility for action and interaction it entails (ibid.; Clarke 2015: 91–93). Crucially, this involves not only organic beings such as (in the case of this research project, most obviously) seeds, but also infrastructures, technical entities, symbols, and suchlike. Further, comprehensive mapping involves lending visibility to *implicated actors*, that is, human and nonhuman agencies who are either physically present but silent or silenced or only discursively made present (in one way or another) in the situation of inquiry. Finally, it also includes a critical reflexion of the *researcher's own situatedness* in terms of both their implication in the situation of inquiry and their more general social

positionality. The double aim of this is to increase the researcher's accountability, on the one hand, and to reposition the researcher as a situated expert for a particular and partial perspective on the situation of inquiry and hence a learner vis-à-vis the subjects of research, on the other.

These methodological premises have two main methodical implications that have guided the research process underlying my study. The first is that Situational Analysis is a "*multi-site or multi-modal* research [approach]" (Clarke/Friese/Washburn 2015a: 16, emph. added). Unlike in multi-sited ethnography (Marcus 1995, 1998), multi-sitedness, here, does not necessarily imply that research is conducted throughout multiple geographical sites. Instead, it refers to a multiplicity of data sources (which can correspond to different geographical sites of research), levels of research, and perspectives. Situational Analysis encourages adducing multiple types of perspectives and data including interview, ethnographic, and other discursive material as in the empirical basis of this study, based on the assumption that a situation is a messy and complex web of various elements and relations entangled in discourses and structures that exceed and at the same time enable the situation of inquiry. The goal is to explore the relations between the various elements present in and constituting a situation, such as "human and nonhuman actors and actants, institutions and organizations, discourses and symbols, political economies and sociocultural landscapes, and the like" (Clarke/Friese/Washburn 2015b: 172). This makes it possible to reveal the conditions of possibility of a situation, which Situational Analysis, unlike traditional Grounded Theory, assumes to be *in* the situation rather than any sort of external context of the situation: "Regardless of whether some actors might construe them as local or global, internal or external, close-in or far away, or whatever, the fundamental question is: '*How do these conditions appear – make themselves felt as consequential – as integral parts of the empirical situation under examination?*'" (Clarke 2015: 98, emph. in orig.)

To bring the various elements, relations, and conditions that constitute a situation of inquiry into view and analyse them, the second methodical proposition of Situational Analysis is *mapping* them. The method and process of mapping is the heart of any Situational Analysis. It differs significantly from the coding process of Grounded Theory insofar as the latter operates through a consecutive analytical process that condenses codes into categories, categories into concepts, and concepts into an empirically grounded theory. The mapping process in Situational Analysis, in contrast, aims to develop a multi-faceted and broad understanding of the situation of inquiry and the relevant elements and actors, relations, and discourses. Unlike traditional

Grounded Theory, then, it is not a linear, inductive method but a helical or iterative and generatively messy, *abductive* process of reflexively moving "back and forth between the nitty-gritty specificities of *empirical* data and more *abstract conceptual* ways of thinking about them" (Clarke/Friese/Washburn 2018: 28, emph. in orig.). By integrating rather than separating empirical research, analysis, and theorising, Situational Analysis grounds decisions about what to examine more closely in the situation. It is thus a cognitive as well as an experiential process of curiously and carefully getting to know an object or field of research, making room for surprises and generative doubt, embracing rather than prematurely simplifying heterogeneities, ambiguities, and incoherencies, and thus arriving at situated, accountable, and theoretically grounded useful explanations (see Clarke/Friese/Washburn 2018: 28–32).

## The Empirical-Analytical Process

The findings presented in this book are the result of such a curiously open and abductive research process inspired for one by Situational Analysis but also borne by an ethnographic ethos that does not predetermine the paths and goals of the research in advance but rather allows them to emerge throughout the research process. Such an open approach is particularly conducive to cultivating attentiveness to the "polyphony" (Tsing 2015: 23) of heterogeneous yet entangled world-making efforts in a given research situation. The process of compiling empirical data can be roughly divided into a first, explorative phase of research in 2019, a second, immersive phase ranging from 2020 to early 2021, and a third, conversational phase after that. While the first two phases comprised all modes of research, the core of the last phase were two interviews. One is my interview with Cary Fowler, the founder of the Seed Vault, whom I approached not to hear his well-documented story in oral form so much as to discuss my insights and questions with him. The other is an interview with an engineer from Statsbygg, the company responsible for Norwegian government estates and hence the Svalbard Global Seed vault, the opportunity for which presented itself spontaneously in March 2023.

### Document Analysis

At the beginning of the research process, I entered the field through an extensive engagement with online information material, news reports, documentaries, and prior academic research about the Svalbard Global Seed Vault, as well as historical documents about agrobiodiversity loss and conservation such

as books, reports, and treaties. Rather than conducting a systematic document analysis, I collected this data following a snowball principle to map the situation of inquiry and all the relevant actors, entities, and discourses as comprehensively as possible, in order to allow for a grounded decision on what to focus on more closely. Throughout the later phases of the research process, I collected text and film documents that gave me deeper insights than those gained through other sources of empirical data or field access that was otherwise obstructed.

## Ethnographic Research

The ethnographic research conducted for this study comprised two field trips to Svalbard, one of ten days in June 2019 and one of seven days in February 2020, as well as a one-day visit to the Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) in Gatersleben, Germany, in December 2019. Whereas the purpose of the two research trips in 2019 was mainly exploratory, the occasion of the second trip to Svalbard was an international seed summit and anniversary event at the Seed Vault. All three ethnographic episodes provided me with valuable insights into the workings, networks, and rationalities of the *ex situ* world of conservation, allowed me to explore the situatedness of the Svalbard Global Seed Vault within this world as well as in its home, Svalbard, and enabled me to make important contacts, acquire interview partners, and engage in further informal exchange with members of the *ex situ* world.

Guiding my ethnographic research was a special attentiveness to the human and more-than-human relations constituting the world of agrobiodiversity conservation, inspired by relational approaches to ethnography in which encounters and processes of becoming are of particular interest (Desmond 2014; Faier/Rofel 2014; van Dooren/Kirksey/Münster 2016). Since the circumstances did not allow for a multispecies ethnography (Kirksey/Helmreich 2010; Kirksey/Schuetze/Helmreich 2014) attending to more-than-human relations as they come to matter in seed conservation facilities, which I had originally planned to carry out, more-than-human relationality became a "sensitising concept" (Clarke/Friese/Washburn 2018: 54, quoting Blumer 1969: 147–148) more than a core focus of my research.

Generally, ethnographic research was complicated by the high costs of travelling to Svalbard as well as by the scattering of the relevant actors connected to the Seed Vault across the whole world. Additionally, further ethnographic research I had planned to conduct (for instance, at the IPK) was thwarted by

the national and international travel restrictions imposed in response to the COVID-19 pandemic shortly after my second journey to Svalbard. When the restrictions were lifted, I had adjusted the research plan in a way that additional ethnographic research would have complicated more than benefitted the process. The book at hand, therefore, is not an ethnography in the narrower sense, but rather comprises elements of ethnographic research and data. These approaches inform my basic understanding of the field under investigation. They are also included in the text in the form of vignettes, which function as testimonies of my ethnographic experiences synthesised from field notes and my ethnographic diary, with the aim of taking the reader into the situation discussed in the respective chapter (on vignettes, see Gullion 2016: 89–90). These text passages are italicised. Where they contain direct speech by informants I encountered in my ethnographic research, these passages paraphrase conversations reconstructed from field notes. Hence, the respective informants are anonymised and not quoted in the same way as the interviewed experts.

## Expert interviews

The third empirical pillar of this study consists of fourteen semi-structured qualitative expert interviews conducted between May 2019 and March 2021, with one exception in March 2023. The interviewees are members of the institutions directly involved with the Seed Vault, other relevant institutions and organisations involved in *ex situ* conservation practices and politics, and representatives of the non-governmental and civil society sector (see table 1). While some essential informants were easily identifiable from the outset, in other cases it only became clear during the research process who might be an interesting interviewee. Following the abductive logic of Situational Analysis, I therefore selected my interview partners in an open and continuously evolving process of theoretical and empirical engagement with the world of agrobiodiversity conservation.

*Table 1: List of Expert Interviews (the author, 2025)*

| No. | Date | Name | Institution | Profession |
|---|---|---|---|---|
| 01 | 28 May 2019 | Anonymous[i] | Crop Trust (Bonn, Germany) | Communications |
| 02 | 28 May 2019 | Hannes Dempewolf | Crop Trust (Bonn, Germany) | Scientist, background: (agricultural) botany |
| 03 | 6 Jun 2019 | Anonymous[i,ii] | Norwegian Polar Institute (Longyearbyen, Svalbard) | Scientist, background: climate science |
| 04 | 6 Jun 2019 | Åsmund Asdal[ii] | NordGen (Alnarp, Sweden) | Seed Vault Coordinator, background: horticulture, scientific management |
| 05 | 6 Mar 2020 | Anonymous | FAO (Rome, Italy) | Scientist, background: conservation genetics |
| 06 | 12 Mar 2020 | Godfrey Mwila | Various | Founder of the national genebank of Zambia; representative of the African Group in the negotiations of the Seed Treaty; collaborations with Bioversity International and the Crop Trust |
| 07 | 26 Mar 2020 | Kent Nnadozie | Governing Body of the ITPGRFA, UN/FAO (Rome, Italy) | Secretary, background: environmental law |
| 08 | 1 May 2020 | Henk Hobbelink | GRAIN (Barcelona, Spain) | Agronomist, co-founder of GRAIN |
| 09 | 26 Mar 2020 | Pat R. Mooney | ETC Group (formerly RAFI) (Montréal, Canada) | Agrobiodiversity expert, co-founder of the ETC Group |
| 10 | 26 Mar 2020 | Anonymous | AHTEG, Seed Treaty, UN/FAO (Rome, Italy) | CSO representative |

| No. | Date | Name | Institution | Profession |
|---|---|---|---|---|
| 11 | 5 Nov 2020 | Alejandro Argumedo | Potato Park / Asociación ANDES (Cusco, Peru) | Indigenous activist, inhabitant of the Potato Park, co-founder of the Asociación ANDES |
| 12 | 20 Jan 2021 | Anonymous | Bioversity International (formerly IBPGR/IPGRI) (Rome, Italy) | Scientist, background: plant science and conservation genetics |
| 13 | 19/20 Mar 2021 | Cary Fowler | Various | Founder of the Svalbard Global Seed Vault (see ch. 1 for further positions) |
| 14 | 26 Mar 2023 | Anonymous[ii] | Statsbygg (Oslo, Norway) | Engineer |

[i] interview partners not quoted in the text

[ii] interviews conducted in person

The expert interview as the method of choice is rooted in the understanding of expert knowledge within the qualitative research paradigm. It is targeted as a specific type of knowledge offering specific kinds of insights and access into a field of research rather than as a source of objective knowledge about a field being studied. Alexander Bogner and Wolfgang Menz (2009: 46–48) distinguish three types of expert interviews that serve different purposes in the research process, all of which informed the expert interviews conducted as part of this study. First, *exploratory interviews* allow the researcher to gain an overview of a field of research and possibly access to further sources, as well as to structure and elaborate their interest. This type of interview targets experts as sources of contextual knowledge about the field being studied and as "crystallization points" (Bogner/Menz/Littig 2009: 2). Second, *systematising interviews* aim for deeper and more systematic access to the technical, processual, and experiential knowledge of the expert who takes on the role of a guide. Third, *theory-generating interviews* communicatively target and serve to analytically reconstruct the interpretive and "subjective dimension of expert knowledge" (Bogner/Menz 2009: 48). The typical method for expert interviews, which also structured the interviews conducted for this study, is the semi-structured

interview. This is based on a prepared compendium of open questions guiding the interview while at the same time leaving room for the interviewee to expand on issues and perspectives beyond the questions explicitly posed (Flick 2014: 197).

While the first couple of interviews, which I conducted in 2019, had an exploratory character, they were pre-structured by the initial document analysis. The interviews that followed were by and large systematising expert interviews, however, with open questions aiming to prompt narrative passages expanding on the interviewees' interpretive and subjective knowledge. Except for three in-person interviews, all others were conducted via video call, in some cases due to geographical distance, in others because of travel restrictions due to the COVID-19 pandemic. The questions and themes guiding the semi-structured expert interviews were generally orientated in the same direction, but tailored to the respective interview partner as well as continuously developed in response to the data already collected. The interview guides, therefore, differ in content although they resemble each other in structure. By and large, all interview partners were interrogated about their own background and involvement in the world of agrobiodiversity conservation, about key actors, developments, challenges, and conflicts in the history and present state of agrobiodiversity conservation, as well as about the Svalbard Global Seed Vault.

Throughout the book, readers will find that some interviewees are quoted by name whereas others are not. This has to do with the unique role or position some of the interviewees have in the field, in which case an anonymisation would either be a major loss of information or hardly feasible at all. Those interviewees who remain anonymous are either members of important but large institutions which they do not represent as a whole, or do not wish to be quoted by name. Two interview partners are not directly quoted at all throughout the book and remain background informants. All interview passages that appear throughout the text are quoted from written transcripts of the interviews. At the request of some of my interview partners and on the grounds that the analysis focuses on content rather than being depth-hermeneutical, the quoted passages are copyedited so that they no longer contain pauses, um's, stuttering, grammatical errors, and suchlike. Since I have been careful not to distort any of the content of the interview passages, they are still clearly recognisable as spoken language. Citations of interview transcripts throughout the text indicate the speaker (by name and/or job description), the institution they speak for, the date of the interview, as well as the line numbers of the respective passage in the transcript.

## The Analytical Mapping Process

Throughout the research process, I visualised, organised, analysed, and reflected the empirical data and research findings through the creation of the various types of maps developed by Clarke and colleagues to digest the empirical data, get "a grasp of the big picture" (Clarke/Friese/Washburn 2018: 150), and come to grounded decisions about which key arenas, worlds, actors, technologies, discourses, etcetera to focus on. First, *situational maps* (Clarke/Friese/Washburn 2018: 127ff.) allowed me to assemble all the elements making up the situation of inquiry – from individual and institutional actors to technological, discursive, and other nonhuman elements and so forth – and trace the relations between them.

*Social worlds/arenas maps* (Clarke/Friese/Washburn 2018: 147ff.) served to identify the key arenas in the situation of inquiry and the various social worlds they assemble. It was through this type of mapping that the Seed Vault became evident to me as not only a technology or set of technologies but an arena. This, in turn, led me to shift attention from the diversity of seeds assembled inside the vault to the diversity of worlds that come with those seeds or with other material-discursive elements in the arena that is the Seed Vault (see chapter 3.2). Thus crystallised, for instance, what I have come to call the *ex situ* world of conservation (see chapter 4.1) but also the situatedness of the Seed Vault within a world and mode of world-making that has a much deeper history than the Seed Vault itself (see sections 3.1 and 5.1). I use the term "world" instead of "social world" in order to avoid the anthropocentric tone and organisational bias of the latter, and – as unfolded in the introduction to this book – in reference to academic discourses about the plurality and performativity of worlds (see esp. Law 2015; Haraway 2016; de la Cadena/Blaser 2018a).

Finally, through *positional maps* (Clarke/Friese/Washburn 2018: 165ff.) that concentrate on how "[s]ocial worlds are 'universes of discourse'" (Clarke/Friese/Washburn 2018: 16, quoting Strauss 1978), I was able to identify key discursive issues in the arena that is the Seed Vault as well as the range of discursive positions on these issues including less powerful or marginalised ones. Positional maps are explicitly designed to help researchers avoid reproducing the dominance of certain voices and positions as well as the epistemic power relations within the situation of inquiry. The result of my work with these maps is reflected in the structure of chapters 4 and 5, which contrast divergent positions on what it means to *conserve* agrobiodiversity (see chapter 4) and how to deal with the *loss* of agrobiodiversity (see chapter 5), and illustrate how they are

rooted in and enact different worlds and modes of knowing and being in the world.