ADAPTATION GOVERNANCE IN RURAL AUSTRIA AND NEW YORK

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NOMENCLATURE / ABBREVIATIONS

AT	Austria
BMLFUW	Bundesministerum Für Landwirtschaft, Forstwirtschaft, Umwelt und Wirtschaft (Federal Ministry for Agriculture, Forestry, Environment and Economy); what is now (2019) the BMNT
BMNT	Austrian Federal Ministry for Sustainability and Tourism
CDC	Center for Disease Control
CEF	Climate and Energy Fund
CES	Corporate Extension Services
ClimAID	Responding to Climate Change in New York State: The ClimAID Integrated Asssessment for Effective Climate Change Adaptation in New York State
CRA	Congressional Review Act
CRRA	Climate Risk And Resiliency Act
CSC	Climate Smart Communities
DoH	Department of Health
DoS	Department of State
EC	European Commission
EEA	European Environmental Agency
ENU	Energy and Environmental Agency of Lower Austria
EO	Executive Order
EPA	Environmental Protection Agency
EU	European Union
GEF	Global Environmental Facility
GHG	Greenhouse Gases
GOP	Grand Old Party, Republican Party
IPCC	Intergovernmental Panel on Climate Change
KLAR!	Klimawandel Anpassungs Regionen (Climate Adaptation Regions)
Mio	Million
NAP	National Adaptation Plan
NAS	National Adaptation Strategy
NCA	National Climate Assessment
NIH	National Institutes of Health
NOAA	National Oceanic and Atmospheric Administration
NY/NYS	New York State
NYFB	New York Farm Bureau
NYSDEC/DEC	Department for Environmental Conservation
NYSERDA	New York State Energy Research and Development Authority
ÖPUL	Österreichischen Programm zur Förderung einer umweltgerechten, extensiven und den natürlichen Lebensraum schützenden Landwirtschaft (Austrian Programm for the Support of an Environmentally Just, Encompassing and Natural Living Space protecting Agriculture)
STS	Science And Technology Studies
UAA	Utilized Agricultural Area
UNFCCC	Unite Nations Framework Convention On Climate Change
USDA	United States Department of Agriculture
USDA NRCS	National Recourses Conservation Service
WHO	World Health Organization

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ABSTRACT

This is a comparative case study of two rural, agricultural communities as they participate in government programs for adaptation localizing. The Unteres Traisental region is one of the Austrian KLAR! adaptation model regions, and Madison County a participating region in the New York State Climate Smart Communities program. **How is adaptation of the agricultural sector governed across scales, and to what consequence?** This research addresses uses a mixed-method case study approach, including policy document analysis, semi-structured expert and participant interviews, and participant ethnographic observations at case-study sites.

The objective of this study is to analyze planned adaptation as it is localized in agricultural communities as "political all the way through." It argues that adaptation is not only shaped by political orders as it is implemented but is itself an inherently political tool for governing social systems. As adaptation policy becomes established and localized across scales and as local actors themselves begin to adapt, key decisions are made about the very foundation of societal order. What deserves protecting and what does not? What is maintained and what is changed? Who is considered vulnerable, and who falls outside consideration? As the climatological basis of life changes on a global scale, adaptation decisions consider (by definition) what should and could weather the changes, what should be maintained — and what not? By making determinations about adaptation — through policy and practice — specific answers to these questions materialize, thus underscoring adaptation governance as inherently political. In other words, I make the argument that adaptation governance is not only the governance *of* adaptation, but the governance *through* adaptation.

We need to not only recognize that adaptation is socially constructed, rather that these constructions and their processes are political, and that this involves different epistemologies and politics (as political economists argue) — but that it is necessary to understand adaptation as a political tool for governance in a double-sense: the governance of what adaptation should be (in its means, ends and subjects) and as a mechanism to govern societal orders.

1. INTRODUCTION

This chapter introduces the topic of study and outlines the research design of this dissertation. I first provide an overview of how adaptation has gained urgency as a policy and practical concern, before raising the key research concern of this project (1. Overview). In section 2 (2. Research Design) I operationalize the research questions which this study addresses and then situate them conceptually before detailing and justifying the investigative-empirical approach of this dissertation research. I conclude this chapter ("3. Conclusions and Chapter Organization") with a general summary of the main findings and arguments and an overview of the chapter organization.

1.1. Overview

One August evening in 2018, Hubert*[1] invites me to join him on a drip to the pasture. His cows — a herd of 50 animals — have been grazing freely on the sloped hillsides overlooking the region since early spring. Hubert* is again trying to determine if it is time to bring them back down and inside, many months earlier than he usually would: "It's just getting dangerously close. I give them another week or so. But if the rain doesn't come, we have to evacuate."

It is a hot August evening and most cows have retreated into the forested areas of the pasture. They seek relief from the unforgiving sun. At 6pm temperatures remain still around 90 degrees Fahrenheit, exacerbating the drought. As Hubert* and I arrive, only some cows emerge from the shade to greet us, seeking pets and perhaps a late afternoon snack. The others curiously observe from the relative comfort of the canopy. In the heat of the last months they became forest dwellers, avoiding the open pasture for most of the day. They all bear the mark of a drought and heat spell that already has lasted months.

[1] This dissertation particularly uses the accounts of a number of key informants. These are referred to by name. Their stories reflect particularly well the broader experiences of local farmers as they were recounted during interviews, at public events and during farm visits. Additional interviewees are continuously quoted throughout the dissertation, to substantiate individual accounts, bring contradictions into perspective where they occur, and broaden the insights that interviewees provided. Less frequently quoted farmers are not identified by name, to further maintain their anonymity. Where names are used, the symbol "*" indicates that a name has been changed; Whenever an interviewee is referred to by name, their name was changed to ensure the anonymity of the participants. Names were assigned randomly. The * indicates a name change.

Beneath lies the landscape of the Austrian Unteres Traisental region; the meandering river Traisen, rolling hills, fields and forests. On top of hills, small villages overlook the fields of the regional, small-scale agriculture. Terraces of wine gardens make for idyllic scenery. The last months have painted this picturesque landscape into an unusual beige. The Traisen — now a small stream — trickles in a seemingly oversized gravelly riverbed. The grasslands and trees and fields all bear the marks of an extraordinary heat and dry spell. 2018 was for many regions in Austria and across Europe the hottest and driest summer since the beginning of modern weather records over 250 years ago. The region has barely seen rain since April, and temperatures remained dangerously high also during nights.

This spell would last for the entire summer. One month later, on October 20th, the Austrian Public Broadcast ORF headlined: “Banges Warten Auf den Regen [“Anxious Waiting For Rain”]” and reported:

> The impacts especially for agriculture are significant. The drought in combination with the heat led to losses in yield and created ideal conditions for pests to spread. Regionally, the drought led to shortages in drinking water[2] (ORF, 2018).

The impacts of this record shattering summer were significant across the country and Europe. For parts of the local Austrian agriculture and forestry sectors it was devastating. In parts of the country, yield losses reached 40%, while a shortage of feed led to the emergency slaughter of livestock. Rapidly spreading pests added to losses, devastating vast forested areas. In the provinces of Lower Austria and Burgenland, a third of sugar beets were lost to pests (cp. Loew, Formayer, & Schwanke, 2019). The losses for the agricultural sector are estimated to exceed at least 230 Million Euros or 260 Million US Dollars (Österreichische Hagelversicherung, 2018).

In the heat, livestock and plants reduce their functions to a minimum as a means to preserve their livelihoods. As Hubert* explains, this becomes a problem for farmers: “What the plant wants and what the farmer wants drift apart.” Plants do not transport pesticides properly, stop growth and drop their fruit to weather the extremes. Livestock stops eating, consumes more water and reduces activities. Milk production is impacted significantly. Plants, many used as food for livestock, dwindle in the heat as well; soon there is not enough available to feed the herds across Europe. Emergency slaughters will become

[2] Translated from the German original

necessary across the continent. For the plants and animals, it is an evolutionary adaptation to survive in extreme conditions. For farmers, it becomes a threat that forces adaption as well.

The devastating impacts of climate change become increasingly explicit globally. The European drought and heatwave of 2018 was explicitly linked to anthropogenic climate change (World Weather Attribution, 2018). That same year, heat waves and droughts severely impacted communities across the globe, and these events become more frequent. Similar record-breaking heat waves have occurred across Europe almost annually for the last decade.

Devastations associated with climate change cause significant disruptions in rural, agricultural communities across the U.S. as well. Climate disasters and disruptions like excessive rains, heatwaves and droughts have become a seasonal occurrence; threatening thousands of farms across the US, including upstate NY (cp. Gowda et al., 2018). In Madison County, a rural region in Central New York, I visit Oake*, a local organic farmer. 2018 had been challenging for her as well. Torrential rains and heavy downpour events in the spring were devastating for many in the region, and the following summer heat and drought created conditions that significantly impacted the farms across the region, as Oake* describes:

> I mean, this year was harsh. We had those really wet springs, so our pastures were not performing at all and we really got into troubles — how do we feed our herd, how do we make sure they gain weight? And at the same time, we really ran into trouble producing the milk quotas we need, especially with the dry and hot summer we had.

2018 and 2019 were devastating years for U.S. agriculture, with severe flooding, heat and drought events — including in New York. In January 2020 U.S. federal legislators issued an agricultural disaster designation due to excessive flooding and drought events in 2019, including for 43 counties in upstate New York. Senator Charles Schumer of New York declared in a joint press release with Senator Kirsten Gillibrand:

> After weathering a brutal farming season last year, the USDA's disaster designation will provide much needed assistance to farmers and growers throughout Upstate New York […]. From corner to corner of the state, I have seen firsthand the aftermath of last year's severe rain and flooding. Thankfully, this disaster declaration means our Upstate farmers and growers will have access to critical emergency loans and more, at a time when they need it the most (Gillibrand & Schumer, 2020).

1.1.1. Agricultural Devastations and Climate Emergency

Extraordinary and unprecedented challenges lie ahead for local farmers and rural communities. Globally, they are on the frontlines of the climate crisis. It causes escalating disruptions to the livelihoods of local farmers, entire rural communities and regions, and the global food system as a whole. Escalating weather extremes, seasonal disruptions and longer-term climatological changes are constituting a significant shift in how and what kinds of agriculture is possible, livable and viable today and in the future. The U.S. Fourth National Climate Assessment, for example, articulates a dire warning about the potentially devastating disruptions of climate change on agriculture:

> Climate change has the potential to adversely impact agricultural productivity at local, regional, and continental scales. Crop and livestock production in certain regions will be adversely impacted […]. Risks associated with climate changes depend on the rate and severity of the changes and the ability of producers to adapt to changes. […] Many countries are already experiencing rapid price increases for basic food commodities, mainly due to production losses associated with more frequent weather extremes and unpredictable weather events. The United States is a major exporter of agricultural commodities, and a disruption in its agricultural production will affect the agricultural sector on a global scale. Food security, which is already a challenge across the globe, is likely to become an even greater challenge as climate change impacts (Gowda et al., 2018, p. 398).

In Europe, more and more countries (including Austria as well as the EU itself) have declared climate emergencies. Barack Obama, then the president of the U.S., explained in his 2015 State of the Union address:

> And no challenge -- no challenge -- poses a greater threat to future generations than climate change[3].

The present scale of climate escalation, and the ensuing disrupting force on rural communities, forces a reaction, one way or another. Responses emerge on the political level as well as locally from the ground up.

[3] https://obamawhitehouse.archives.gov/the-press-office/2015/01/20/remarks-president-state-union-address-january-20-2015

1.1.2. “You Can’t Bend Nature, Nature Bends You”

In the face of escalation, changes are underway. As one farmer put it during an interview for this research: “You can’t bend nature, nature bends you.” Where mitigation fails, adaptation becomes necessary.

Mitigation alone was no longer enough, as some impacts of climate change became unavoidable. Adaptation emerged in the 2015 Paris Climate Agreement as second pillar of global climate governance, complementing mitigation. At that time, responses were already emerging on a national scale. This happened earlier in the majority world, which primarily carried burden of climate impacts. This forced them to adaptat significantly earlier than amongst the main polluting nations. But recent impacts brought adaptations on the policy agendas also in the “West.” In 2012, New York State released a first planning document for developing its own adaptation policy — the ClimAID report. Around the same time, Austria adopted its own National Adaptation Strategy (NAS) and National Adaptation Plan (NAP), embedded in a cross-EU initiative to advance, establish and implement adaptation in a coordinated manner. “On the ground,” in rural agricultural communities, adaptation as a gradually unfolding process was already well underway, embedded in accelerating trends towards industrialization and globalization of the food-system. Farmers were increasingly forced to face major disruptions associated with escalating weather extremes and the climate crisis, impeding the paradigm of production and efficiency of the large-scale agricultural industries.

Yet, it remains unclear how exactly adaptation unfolds in rural communities and through governmental planning. What are the decisions farmers, policy makers, planners and other involved stakeholders face as they adapt to climate change? This study investigates the “responses to the unavoidable,” as they emerge in farming communities and through governmental policy and planning.

1.1.3. Governing Change Through Adaptation

Climate change confronts societies with a new reality that is nothing short of a fundamental system change, brought about by dramatic alterations in the elementary conditions of life: the climactic and environmental conditions in which human and non-human societies exist. To govern these changes, states have begun to accelerate adaptation planning, policy and its implementation across scales.

In doing so, they make fundamental determinations about what warrants protection, by what means, and to what ends. As adaptation policy becomes established and localized across scales, and as local actors themselves begin to adapt, key decisions are made that go to the foundation of societal order: What deserves protecting and what does not? What needs to be maintained and what changed? Who is considered vulnerable, and who fall outside of consideration? As the climatological basis of life changes on a global scale, adaptation decisions consider by definition what should and could weather the changes, what should be maintained — and what should not.

In this sense, adaptation is the process of (re-)constituting society as conditions of the past are brought into question through environmental change on a climatological scale. Adaptation inherently involves decisions about the foundation of society, social systems and socio-cultural orders — and as such is inherently political, as Eriksen, Nightingal and Eakin (2015) discuss:

> We argue that what counts as 'adaptive' is always political and contested. What is seen as positive adaptation to one group of people may be seen as mal-adaptation to another, and political processes determine which view is considered more important at different scales and to different constituencies. We therefore propose a reframing of adaptation that focuses explicitly on its political nature, in order to speak directly to how changing vulnerability patterns intersect with contestations over who is expected to adapt to climate change and who ought to plan and guide those processes (Eriksen, Nightingale, & Eakin, 2015, p. 525).

Yet, it remains unclear how these processes play out and what the mechanisms are that distribute and manage political decision-making power as adaptation is localized across scales. As adaptation increasingly is introduced in agricultural communities in New York and Austria, it remains unclear how adaptation decisions are made, who is involved and excluded from them, and to what consequence. With adaptation emerging as the gradual re-constitution and re-design of societal order and entire social systems, the stakes are high and the outcomes consequential.

I argue that these determinations are made in inherently political processes. These involve managing a) decision-making spaces and processes, b) the validity of knowledge claims that inform adaptation decisions, and c) the legitimacy of different stakeholders to participate in decision-making.

I describe these processes as *adaptation localizing*: as the ways in which specific determinations of what adaptation is about are stabilized and enforced across scales, while overwriting alternative/competing claims about adaptation, risk, vulnerability and impacts.

This dissertation focuses on how the governments of New York State (NYS) and Austria (AT) seek to stabilize adaptation (Chapter 3 and 4) and how this collides with competing imaginaries of adaptation (what is being adapted to, how, and to what ends) (cp. Chapters 5 and 6).

By attending to major differences in how New York and Austria manage adaptation in processes of adaptation localizing, I make explicit that these processes are directly engaged in the (re-)ordering of political, material, social and cultural relationships of power, authority and political legitimacy — with significant consequences for equity, justice and democracy in social systems of food-production.

1.2. Research Design

This project addresses, for the first time, on a systematic and comparative level how adaptation as political processes play out in the materialization of adaptation within agricultural communities. In a comparative, multi-sited case study (Yin, 2003) of two rural, agricultural communities in Austria and New York, this dissertation asks: **How is adaptation of the agricultural sector governed across scales, and to what consequence?**

To address that question, this study comparatively analyzes how adaptation manifests in two concrete rural, agricultural communities, as they participate in respective state programs for localizing adaptation policy. The Unteres Traisental region is designated as one of Austria's "KLAR!" climate adaptation model regions (**Kl**imawandel **A**npassungs **R**egionen; Climate Adaptation Regions), and Madison County is a "bronze"-certified New York State "Climate Smart Community." Both communities are undergoing significant transformations, as climate escalations disrupt local farming communities and state adaptation planning becomes systematically implemented locally.

The **empirical research period** was from 2016 – 2019, and was concluded just as New York State adopted a new major climate legislation. Since the end of the empirical work for this research, the NYS Climate Smart Communities program saw major changes as well, introducing a citizen task force to allow for more collaborative decision making, and strengthening the position of the community program manager. **I was not able to integrate these changes in this dissertation.**

A comparative and locally situated research design leverages a qualitative mixed-methods approach, recognizing that the governance of adaptation, the development of policy, and its localizing

across scales unfold as inherently social processes, reflective of their socio-cultural and political contexts. This constitutes the need to examine how adaptation is governed in both a comparative, as well as a socially situated perspective.

1) It compares differences between two national policy contexts: Austria (European Union) and New York State (United States). The comparison between national policy contexts thereby reveals key differences in political prioritizations of adaptation inherent in two socially, culturally and politically distinct systems of environmental governance.

2) Within each country, this study compares state adaptation planning with the local lived experiences "on the ground" at local farms. Within these contexts, and across scales, adaptation materializes in key political processes that determine how adaptation manifests in concretely local experiences. Adaptation unfolds, is planned, and materializes in highly localized ways, responding to specifically local conditions and reflective of the cultural, social and political orders in which it unfolds.

1.2.1. Research Questions and Key Concepts

This study investigates how rural, food producing communities adapt to climate escalations. The objective is to foreground differences in "on the ground" practice and policy in the agricultural sector in New York State and Austria. The political and social consequences of these differences are made explicit. Comparative policy analysis brings these politics into sharp relief, in order to address the following overarching research question:

How is adaptation of the agricultural sector governed across scales, and to what consequence?

Some key conceptual clarifications are required to systematically investigate this research question and operationalize it into sub-questions. Specifically, what governance means in the context of this research needs clarification.

1.2.1.1. Key Conceptual Framings of the Research Question

Stabilization of Adaptation: For the purpose of this study, I examine how adaptation is conceptually and politically stabilized, drawing on social constructivist literatures in STS. Two critical dimensions are in particular consideration for the purposes of this study: a) How different actors involved in the governance of adaptation are able to make determinations about adaptation in terms of its ends,

subjects and means (and about what adaptation is not, for example, who is excluded from adaptation considerations); and b) how these determinations prevail against other conceptualizations of adaptation.

This draws on key concepts about governance, in particular, Foucault's dispositive, or apparatus, which is:

> […] a thoroughly heterogeneous set consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions […] Such are the elements of the apparatus. The apparatus itself is the network that can be established between these elements (Michel Foucault, 1980, p. 194).

This concept puts into perspective the "disposition of things" (or issues, cp. Marres, 2007): How issues and concepts on the one hand, and the assembly of social, material and discursive/knowledge orders on the other, are brought in disposition to each other as to exercise control. Applied in the context of this study, adaptation emerges as an inherently political concept, the meanings of which is determined by the disposition of social, cultural, epistemological and material orders for the purpose of governance, and their political ordering is the result of a political governance apparatus, which is multi-sited and spans across scales. As such, with Agamben (2009), one of the central aspects of poststructuralist analysis aims at understanding the "disposition of things" that are brought about by and re-constitute the apparatus — that is how and through what means world-making and order-making is achieved.

Problematization: In this context, Foucault's concept of problematization becomes critical in the conceptual (in political terms) stabilization of adaptation. Constructivist, post-structural policy analysis emphasizes how problematizations (i.e. the construction of problems as a form of epistemological politics) are social constructs with political implications. The governance of x is conditional of making x a "problem" for governance, or something that needs to be governed. Problematizations are an elementary constituting aspect of governance, and directly connected to epistemology:

> The further contention among poststructuralists is that governing takes place through the ways in which issues are problematized. Critical attention, therefore, is directed to analyzing governmental problematizations— how 'problems' are represented or constituted within policies, and how they have come to be represented in this fashion. In other words, the task becomes analyzing how 'problems' are *made* (Bacchi & Goodwin, 2016, p. 39).

In this perspective, (policy) issues are a) not objective givens but socially/politically constructed ("problematization") and b) problematizations are directed towards social as well as regulatory order. In

the context of this study, this means that it is critical to understand the problems that are presented (and those that are concealed) as justifying adaptation; thereby shaping the subjects, ends and means of adaptation.

Co-Production: As a final key concept, Jasanoff's idiom of "co-production" articulates how epistemological, political and social orders are **co-produced**. She offers a conceptual framework that emphasizes the mutual shaping of each of these dimensions:

> Briefly stated, co-production is shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it. (Jasanoff, 2004, p. 2f).

She directs attention towards the ways in which knowledge, political and social orders are deeply entangled and co-produce one another. For example, the kinds of knowledge orders which are legitimized as "relevant to the problem" of adaptation in society will shape the political options available to tackle the problem and the ways in which these are executed. In turn, existing political and social orders will shape knowledge claims and the determination of their validity and therefore which ones remain excluded or "unthinkable" (cp. Fleck, 1981; Kuhn, 1962).

Localizing: A critical aspect of adaptation governance is its implementation in concrete local contexts through processes of managing decision-making spaces and their boundaries. I draw on a number of theoretical frameworks from the STS literature, particularly on deliberative democracy, to establish *localizing* as an analytical conceptual framework — this discussion is provided in Chapter 2 (Literature Review). At this point I want to provide some critical points as they regard the operationalization of the sub-questions and as they inform the methodological approach.

Not only is the concrete manifestation of adaptation in a particular locale with socio-cultural and material orders "on the ground" a product of negotiations between actors across scales, but policy itself. The concept of *localizing* brings processes of "bringing governance onto the ground" as processes of political power and its (re-)constitution into sharp relief. Processes of localizing are multi-directional and involve the constant management of negotiations between different actors, including the configuration of decision-making spaces, deliberative participation in adaptation planning and implementation, and the competing claims about adaptation made across different sites and scales — **with the explicit objective of enforcing a specific stabilization of adaptation, while silencing or overwriting competing**

claims. This is a major addendum to existing discussions in the literature. The ways in which issues at stake in adaptation of food-producing systems are governed and play out with fundamental consequences across scales have not yet received adequate attention, as Alan Irwin puts it:

> In the end, scientific governance is about making choices with regard to the kind of societies we wish to create – and to live in. Whilst an issue like food policy or climate change raises questions about basic value decisions, about sustainable ways of living and about the very meaning of 'development', these questions seem to slip away amidst the specifics of international agreements, government policies and arguments over the scale of human and environmental threat.

By attending to the processes of localizing adaptation as the stabilization of adaptation in relation to — but also in exclusion of — local, regional and higher-level communities, publics and stakeholders, these questions are explicitly brought into focus.

This allows me to revisit the initial research question and provide a more concrete conceptual framing for the purpose of its investigation: **How is adaptation of the agricultural sector governed across scales, and to what consequence?**

- The governance of adaptation emerges from problematizations and their relationship with epistemological orders. Problematization thereby is a key element in the "disposition of things" to make them governable in a double meaning: governable as in actionable for governance (by providing clear goals, definitions of risks, subjects of governance, etc.), and governable in the sense of constituting adaptation itself as a matter of governance
- These processes of problematization and disposition, however, are not one-sided. Power in post-structuralist analysis is not a one-sided, one-way exercise of control, but rather unfolds as complex processes. The concept of co-production brings into perspective the mutual shaping of societal orders and the ordering of society.
- Therefore, one must attend analytically, empirically and politically to the processes of localizing — the assertion of specific adaptation-dispositions across scales, while overwriting or erasing competing claims. This requires the analysis of such processes as exercise of power, control and authority.

1.2.1.2. Operationalized Sub-Questions

These clarifications allow now the operationalization of the research question into three sub-questions. This dissertation will examine each of these questions respectively, before discussing them conjointly in order to draw conclusions about the governance of adaptation and its consequences.

1. How do New York State and Austria plan adaptation through policy?

The first research question regards the ways in which adaptation manifests in the determinations of state planning across governance scales in the two contexts. Corresponding to the conceptual framing, particular attention is paid to the different problematizations mobilized across scales of governance in manifesting adaptation.

STS literature makes explicit that how "issues" are imagined to impact communities by the state is shaped by (historically grown) institutionalized social and epistemological orders, values, and moral systems (Jasanoff, 2004; Marres, 2007). These *problematizations* carry political implications in prioritizing populations and counting/discounting life (Foucault, 1988; Guthman & Brown, 2015; Spivak, 1988), narrowing the ways in which the climate crisis are governed by the state (Agamben, 2009; Foucault & Rabinow, 1997; Rose & Novas, 2005). Drawing on insights by Jasanoff (2004, 2009) and post-structuralist policy analysis (Agamben, 2009; Michel Foucault & Rabinow, 1997), this study foregrounds the coproduction of adaptation and its governance on one hand, and knowledge about climate impacts, adaptation needs, pathways and objectives on the other, as they are mobilized by Austrian and New York governments to regulate adaptation.

This sub-question considers in particular how climate risks are problematized in terms of

- what risks are understood to be constituted in,
- what/who is problematized as impacted and how,
- and what kinds of knowledge claims are made in the support of these problematizations.

Adaptation is analyzed for its co-production with knowledge claims about risks and their constitution, drawing on post-structuralist literature. In this perspective, adaptation governance emerges in the disposition (i.e. the specific arrangement) of social-political-material orders co-produced with problematization.

2. How does adaptation materialize through processes of policy localizing across scales?

The second question regards the processes of localizing policy across scales. These are the processes through which competing adaptation conceptualizations become stabilized and managed across scales. Adaptation emerges out of complex and dynamic processes that are multi-sited. It manifests in individual decisions of farmers, of workers in the fields, in developing and promoting new farming technologies, and in policy decisions. In this research, I focus on how adaptation is stabilized in negotiated and managed processes between actors in the polity — the institutions of government — and specifically, local stakeholders. The stabilization of adaptation is of course not achieved solely in processes of localizing policy. Different stabilizations of adaptation co-exist. In this dissertation, I focus on how the state governs adaptation: 1) how it manages the processes of stabilization across scales, and 2) how it manifests them in the concretely, locally situated reality of food-producing communities, and 3) how it manages competing stabilizations of adaptation through different configurations of democratic-deliberative and participatory decision-making processes — the sum of which I call *localizing*.

3. How is adaptation co-produced in the local orders of rural agricultural communities and political orders of state planning?

To understand how adaptation policy is localized, one must focus-in on its interactions with local epistemological, social and cultural orders. Localizing — following Foucault's work on the interactions of power, epistemology and local situatedness — is a complex process that is inherently social as much as it is political. This study therefore pays close attention to how local farmers problematize (climate) risks in their local situatedness, formulate solutions (based on their experiences, available resources, and interactions with others), and prioritize what to protect amid escalating environmental disruption. I compare these experiences with the commitments of state adaptation planning. I observe their interactions in the unfolding of adaptation governance across scales. Doing so, I foreground the ways in which the state manages the stabilization of adaptation, the ways in which local farmers participate, shape — and are shaped by — the processes of localizing, and to what consequence.

This incorporates a co-productionist stance: Just as much as the state seeks to manage local orders through adaptation and processes of its localizing, so are the ways in which adaptation is stabilized shaped by and reflective of the local orders it interacts with in the process of localizing. Agency

is explicitly not understood one-sided, nor confined to the places of decision-making. Social, economic and material orders of the local play an important role in shaping political determinations about adaptation and its stabilization.

1.2.2. Multi-Sited Case Study: The Two Case Study Regions

A multi-sited, comparative case study approach was chosen to foreground key differences in 1) national adaptation policy and the effects of different adaptation approaches on local adaptation, 2) the ways that socio-cultural orders of food production shape adaptation “on the ground”, and 3) the ways in which parallels in adaptation approaches produce different outcomes in the convergence of policy and local practice. A comparison between Austria and New York appears particularly useful, due to their similarities in size, structure, political relevance of climate governance, and similarities in their respective agricultural sector in particular. Importantly, the NY-AT comparison was chosen, as both are implementing adaptation locally through concrete governmental climate action programs targeting local communities.

1.2.2.1. The Regions

Within New York State and Austria, two rural regions were identified that are participating in the respective governmental climate action programs: **The Unteres Traisental Region**, located in the province of Lower Austria, is a socially, culturally, and economically diverse region. Agriculture is a central economic and cultural driver that also shapes local tourism and recreation. Farmers play an important role in local and national politics as well as culture. The selected region is currently implementing a diverse climate change adaptation plan as “Climate Adaptation Model Region” (KLAR!). Thereby, transformations of rural live in a changing climate are emphasized; particular attention is paid to the adaptation of the agricultural sector.

In 2017 the second region, **Madison County** in New York State, was named NY’s 10th Climate Smart Community. One of a few “bronze” certified communities, it implemented an adaptation strategy in response to “extreme weather events” as challenges for the predominating agricultural rural communities. Thereby balancing economic needs and climate adaptation is an integral element of the process. The Madison County region in many ways is reminiscent of the Unteres Traisental region, with agriculture as an important driver, and with a number of semi-urban and urban centers of an otherwise strictly rural

region. Yet, the developments of the two regions go in different directions: Madison County has seen challenges of rural socio-economic decline on its peripheries, as well as post-industrial decay in centers along the Erie canal. Agriculture is in a deep economic crisis, leading to consolidation and economic disruption. In Austria, agriculture transformed into a specialized cultural market that deeply shapes the region economically — also through tourism, cultural programs and leisure. At the same, time urbanization pressures, demographic shifts in the agricultural community and socio-economic pressures increasingly affect the sector — consolidations and a shrinking number of producers are the consequence. Economic and social transformations in both regions converge with an escalation of the climate crisis, and the communities begin to adapt.

In this context, four key reasons establish the chosen field sites as particularly apt for answering the questions of this study. 1) Both face similar challenges in regard to climate extremes, especially in the context of seasonal disruptions, focused climate disasters and an escalation of uncertainty. 2) Both are considered to be taking relatively strong, proactive approaches in their environmental and climate regulations and policies, especially through the locally focused climate programs; yet, both are repeatedly criticized by advocacy groups, news media and experts for not matching claims to action with actual execution. 3) Both are of similar size with similar geographic, demographic, social, cultural, and economical structures (dominated by rural, agricultural economies, producing similar goods, dominated by rural economies contrasted by major cities; similarly politically driven by farmers as stakeholder). 4) Both leverage community leadership certifications as pipelines for policy implementation – the Climate Smart program in NY and the KLAR! program in Austria.

1.2.2.2. Policy Context: New York State

General Political Context: Generally, New York State is considered to take strong efforts in preparing for climate change — media and politicians in the U.S. routinely invoke this idea of New York State as leader in climate action. However, this preparedness only materializes in adaptation strategies that still need implementation, due to lacking legislative/political consensus and embedded in a governance approach that emphasizes subsidies and active uptake through local actors. This leads to a problematic lag in bringing strategy papers successfully into communities: “New York is taking strong action to address its current climate risks through its State Hazard Mitigation Plan, Emergency Operations

Plan, and various sector level programs. […] While it has developed multiple climate change adaptation planning efforts […] there has been little continuity efforts, and no adaptation plan has been officially approved with a timeline for implementation" (ICF International & Climate Central, 2015).

Key Reports/Policies: New York has a principal climate adaptation planning document called "ClimAID report." Agriculture is discussed in a separate chapter, addressing it primarily as an economic sector that is impacted by climate change. The ClimAID report was not adopted into a strategy, but informs adaptation planning informally — as it mainly unfolds within state agencies and in coordination by an interagency working group on adaptation. The report is complemented by the Community Risk and Resiliency Act with provisions affecting permitting processes for the management of sea level rise and storm surge related impacts.

Local Implementation: These policies translate into local and regional strategies. Adaptation strategies must be differentiated between long-term adaptation, and emergency plans responding to extreme heat events as acute episodes. Interventions take fast-acting strategies (such as emergency protocols) and long-term interventions that redesign the social and material fabric in which heat unfolds (such as the strengthening of green and blue infrastructures, establishing cooling centers). The latter actively attempt to reshape the ways in which life in a changing climate unfolds. This adds significance to attending to the political and social implications of these potentially severe and long-lasting, state-led transformations, and make the lack of reflection even more striking. Most planning efforts are coordinated through the state via specific — incentive-driven — programs most importantly the **Climate Smart Communities Program.**

New York's **Climate Smart Communities (CSC) Program** seeks to locally implement climate mitigation *and* adaptation in a combined approach via a tiered process. Participating communities — municipalities or counties are eligible — can "earn" different status by completing actions. By passing a resolution with ten "pledge" elements, communities become "registered Climate Smart Communities." This grants them access to important program services and resources, makes them eligible for grants supporting actions associated with the program, and improves their ranking in other state grant programs. After registration, communities can choose from a long laundry-list of actions, bundled into ten areas (one

of which is adaptation) to complete. By submitting documentation of completed actions, communities then earn credits towards different levels of certification: bronze – silver – gold.

1.2.2.3. Forms of Agriculture

Throughout this dissertation I discuss various forms of agriculture. Particularly, I make differentiations between industrial, conventional, sustainable, family-farming, organic and regenerative forms of agriculture. These terms are used to describe different production regimes of agriculture and their different ecological relationships implicit in producing food.

Simply put, conventional and sustainable agriculture distinguishes farming approaches for the ways in which food production engages with land as resource: the first relies on extractive practices to produce food and thereby depletes finite ecological resources. Sustainable agriculture on the other hand seeks to maintain the ecological resource base of a farm to prevent their depletion. Sustainable farming is a general term that is used to describe several different farming approaches, for example: regenerative, and permaculture. Regenerative farming approaches, for example, situate farms and farming within a larger ecosystems-perspective, taking into account the effects farming has on larger ecologies that extend far beyond the geographical boundaries of a farm. Regenerative farming does so with the explicit goal to regenerate land, social communities and larger ecologies as a whole. The premise is to leave behind through farming practices more than what was initially there. Family-farming is an often-invoked imaginary of farming as a generational legacy, with the family unit at the center. Industrial farming refers to large-scale, highly efficient and increasingly automated production regimes. For a more detailed discussion of various farming “philosophies” refer to Spedding (2012).

While I use these terms, it is important to note that their meanings are always constituted in local socio-cultural and material orders. Every farm is different, and farmers constantly shape the meaning of farming in their individual practices on their farms — underscoring the incredible capacity for experimentation. Similarly, national contexts and political regimes heavily shape the meanings of these different categories, as do the ways in which farming occurs and unfolds within specific cultures. Because of this, the boundaries between the different categories are inherently instable, can mix, or can be abandoned and contradicted at any time. These categories are also by far not all-encompassing and

leave out important knowledge-cultures of farming; particularly the broad scope of different indigenous ways of farming around the globe.

There is nothing “natural” about how we farm — and this provides opportunities for change and transformation.

1.2.2.4. Policy Context: Austria

General Political Context: The Austrian governance strategy is organized similarly to New York. A federal climate change panel formulates strategies that translates into state plans. Most environmental governance is carried out on the state level. A significant difference is, that planning efforts have been adopted by federal and state legislatures and led to the National Adaptation Strategy (NAS) and National Adaptation Plan (NAP). NAS and NAP provide explicit policy objectives, definitions and criteria which guide adaptation implementation. Additionally, these processes are integrated in EU governance, including reporting obligations. New York State and Austria similarly began their planning efforts around 2012/2013, yet Austria’s adaptation planning is more centrally organized on the federal level, whereas adaptation governance in New York is strongly shaped by home rule and geographically localized planning authorities on the municipal and county level.

Key Reports/Policies: The federal key policy document is the Austrian Climate Adaptation Strategy (BMLFUW, 2012b, 2012a). It articulates strategies, best practices, and is integrated in a federal mandate requiring states to implement their own climate adaptation strategies – leading to concrete actions, as opposed to the relative stagnation attested for NYS. The 2007 Climate Study, the State Climate and Energy Program, the State Climate Adaptation Evaluation Program, and the State’s model regions for climate adaptation are all part of larger EU Climate initiatives.

Implementation Austria has established the **“KLAR” program** („**Kl**imawandel-**A**npassungs **R**egionen“, or Climate Adaptation Regions) to localize federal policy on the local level. Explicitly focused on adaptation, it’s aim is to constitute local adaptation regions in which concrete actions are planned and implemented, thereby taking a regional approach. This means that at least two municipalities are needed to constitute an adaptation region, and a specifically hired regional KLAR! manager is tasked with management, coordination and execution of the various program objectives. The program unfolds in 3 phases (plus a pre-application phase 0). In phase 0, municipalities collaborate as a region to draft a

regional adaptation strategy and submit to it the federal funding agency (the Climate and Energy Fund). This draft is evaluated for certain quality criteria and standards by an expert jury. A positive evaluation allows the region to become a KLAR! region and therefore enter into phase 1 of the program. In this phase communities refine and finalize their regional adaptation strategies. After one year, the regions submit their final strategies for another round of evaluation. In case of positive evaluation, they enter into phase 2 where they implement concrete actions (as described and justified in the strategy) set-up in conjunction with participatory, engagement and outreach activities. After two years, this phase is completed via evaluation and reporting, moving the communities into a continued revision, expansion and formalization of adaptation processes in phase 3.

1.2.3. Methods

I used a mixed-method case study approach: triangulating methods for interviews, ethnographic observations, document analysis and policy analysis. Methods and analysis were conducted iteratively in order to re-evaluate the empirical and analytical approach as data was generated. The approach is chosen to address the following research questions:

Ethnographic Research: Ethnographic research in the study region involved interviews, document analysis, participatory observation at workshops and local events, as well as participatory ethnographies in on-farm work tasks — such as harvesting tasks. *This addresses research question 3.*

Policy Analysis: Policy analysis relied on the analysis of a wide range of policy documents regarding adaptation across policy levels, using inductive coding following grounded theory. *This addresses research question 1*

Expert Interviews: Expert interviews with policy makers, adaptation professionals and local public officials complemented the policy analysis and ethnography, addressing in particular RQ3 regarding the epistemologies of adaptation policy and practice across governance scales. *This addresses research question 2 and 3.*

All methods, including observations during ethnographies on farms, were conducted with the informed consent of the participants, aside from observations during public events.

1.2.3.1. Ethnographic Research

Ethnographic research was conducted over two years in 2018 and 2019 in the two study regions. Field access was established through local interlocutors (Cornell Cooperative Extension and the local KLAR! manager) as well as through direct outreach to farmers in the region. Further contact to farms was established via snowball sampling. Overall, ethnographies at eleven farms in Madison County and 19 farms in the Unteres Traisental region were conducted, involving interviews, farm tours and — in four cases — observations during the participation in harvest and other on-farm work tasks. Additionally, ethnographic observations were conducted during public events and meetings, including open farm days, public workshops by the Cornell Cooperative Extension, a two-day adaptation planning workshop in the Unteres Traisental region and meetings of local interest groups (including the state-wide meeting of the New York Farm Bureau). Finally, numerous local events — such as on-farm cultural events — were attended, and informal conversations at events further informed this research for identifying interviewees, resources and additional data relevant to the study.

Observation data was documented through notetaking during events, observational notes, research diaries, photographic documentation as well as audio-recordings during interviews. Additionally, documents related to the research questions of this study (such as information leaflets on adaptation, local adaptation plans, meeting documents and minutes, etc.) were collected and analyzed.

1.2.3.2. Policy Analysis

Policy analysis included a wide range of adaptation and other policy documents from different governance layers. Stakeholder interviews with regulators and policy makers supplemented the document analysis.

The analyzed documents were coded and analyzed using analytical grids that direct the research and ensure adequate comparison, using inductive coding in grounded theory (Glaser & Strauss, 2009). Analysis followed a guiding scheme developed inductively. Coding guidelines are continuously revised following inductive grounded theory. The most important policy documents analyzed for this study were[4]:

New York/U.S.

[4] Documents analyzed included the reports and other policy statements and public releases

Climate Smart Communities Program (documents, online resources, plans and reports of the local community), ClimAID report, Community Risk And Resiliency Act, USDA Climate Change Adaptation Plan, U.S. National Climate Assessments NCA3 and 4, EPA ARC-X Resource Center, U.S. Climate Resilience Toolkit, DEC Adaptation Webinars, NOAA Climate.gov, USDA Climate Solutions resources, Presidential Executive Orders pertaining climate change and other reports, policy publications and releases.

Austria/EU

The EU Adaptation Strategy and related documents (white books, releases, policy statements), the Austrian National Adaptation Strategy (NAS) and Austrian National Adaptation Plan (NAP), The Lower Austria Climate and Energy Program, KLAR! (Climate Adaptation Regions) program resources, including press releases, online resources and plans, strategies and reports form the local region, key Austrian agricultural policies and programs, such as ÖPUL, as well as other reports, policy publications and releases (such as the 2018 Austrian Climate and Health report).

1.2.3.3. Semi-Structured Expert Interviews

Ethnography and policy analysis were complemented by expert interviews. Sixteen expert Interviews were conducted for the NY case and 19 Expert Interviews were completed for the Austrian case. These interviews included top administrators in governmental agencies on the federal and state level, local public officials, academic experts, officials of local agriculture interest groups, tourism associations, agricultural/cooperative extension representatives and experts, governmental research experts and environmental advocacy groups. Interviews in the regions included the following key actors:

New York State: NYSERDA, EPA, USDA Meteorological Service, USDA-NRCS, NYSDEC, NYS-DoH, NYS-DoS, NYS-Dep. AG, Cornell Climate Smart Solutions, Cornell Climate Smart Farming, NYFB, academic expert on migrant labor in agriculture in NYS, local public officials in the case study region.

Interviews Austria WIFO, CEF, BMNT (4), Umweltdachverband, Global 2000, Lower Austrian Government — Section Regional Planning, ENU, local public officials, BOKU Vienna, PROGRE.

Interviews were recorded via audio recording device or by hand, transcribed inductively coded and analyzed using Excel. Interviews were conducted in person or via phone.

1.2.3.4. Stakeholder Interviews

Twenty interviews with local farmers were conducted in each region. Interviews were conducted in person as semi-structured interviews and recorded using an audio recording device. The interviews were conducted on-site on local farms and were accompanied with farm tours and participatory observations attending on-farm labor tasks, such as harvests. Each interviewee signed an informed consent. Interviewees were identified via snowball sampling.

1.2.3.5. Data Analysis

Data was iteratively analyzed throughout the research process for testing and developing new hypotheses, identifying further stakeholders, policy documents, and other key empirical material. This iterative approach was also used in the preliminary research process. All material, including field notes, interview transcripts, and document analysis were keyword-coded for themes identified through the material (inductive coding) as well as in the literature research (deductive coding) following grounded theory (Glaser & Strauss, 2009). Coding was conducted and documented in excel files. The two cases were analyzed for similarities and differences using the codes and code definitions.

Privacy and confidentially were guaranteed to all participants, except if they opted to be identified by indicating so on the IRB form of consent. All data was anonymized in the transcription process. No personal data was recorded in notes at public events. Identifying information was destroyed immediately, except for audio recordings of interviews, which are stored safely on an encrypted external hard drive and will be destroyed after the conclusion of this research. Paper consent forms and digitized interviews were maintained throughout this project and were not distributed unless otherwise agreed.

1.3. Conclusion and Chapter Organization

The main argument of this dissertation is that adaptation itself is inherently political and deployed as a means for governing societal orders in the face of environmental change on a climatological scale. Determinations about adaptation are made in processes of **adaptation localizing** across scales, involving a wide range of actors, while excluding others.

Localization is the sum of processes in which competing adaptation stabilizations are managed in governance processes. The stabilization of adaptation is of course not achieved solely in processes of

localizing policy, as different stabilizations of adaptation co-exist. Localization processes emerge from and unfold across sites, scales, place, time and socio-cultural strata. In this dissertation I focus on one specific instance of adaptation localizing — namely the localizing of state adaptation policy; or in other words: how the state governs (with) adaptation across scales: 1) how it manages the processes of stabilization across scales, 2) how it manifests them in the concretely, locally situated realities of food-producing communities, and 3) how it manages competing imaginaries of adaptation through different configurations of democratic-deliberative and participatory decision-making processes — the sum of which I call localizing.

These processes of adaptation localizing unfold at carefully managed and safeguarded sites of decision-making across scales. Who is able to participate in making adaptation determinations and on what terms they do so, is carefully governed and organized. Each of the chapters of this dissertation focus on specific aspects of adaptation localizing processes as modes of governing societal orders and cohesion in the face of change, to develop a better conceptual understanding about how adaptation is a) governed and b) used to govern.

In **Chapter 3** and **Chapter 4** I compare how adaptation is established through specific modes of problematization that constitute distinct regimes (or apparatus; cp. Foucault & Rabinow, 1997) of adaptation governance in New York and Austria, respectively. In **Chapter 3** I describe how an adjustment approach to adaptation emerges in the problematization of climate risks that are conceptualized as constituted in escalating natural hazards (such as droughts, flooding and heat waves). These problematizations are associated with specific epistemological orders, informed by techno-scientific risk assessment science, which promote technological fixes to maintain existing orders of food production in a productionist paradigm. New York promotes “adjustment” adaptation across scales as the maintenance of productionist regimes of agriculture. I trace how the commitments associated to adjustment adaptation manifest and stabilize across scales, from policy documents to local adaptation planning in Madison County — drawing importantly on techno-scientific risk assessments that center-stage the problematization of natural hazards.

This is contrasted in **Chapter 4** with a transformative adaptation approach in Austria. The National Adaptation Plan and Strategy establishes adaptation through key definitions, objectives and criteria that

allow management of epistemologies of risk, vulnerability and adaptation across scales. Thereby, climate risks are problematized as emerging not only through the escalation of natural hazards, but through societal orders and organization. In this context, social systems themselves become problematized for their capacity to produce risks and vulnerabilities. Adaptation aims at reforming social systems to mitigate risks and their impacts. This becomes explicit in adaptation objectives to promote sustainability and equity transitions of the national food-production system. Establishing these problematizations and epistemological commitments through the NAS/NAP, adaptation governance in Austria is primarily focused on prioritizing specific epistemological orders of adaptation across scales, rather than promoting concrete techno-scientific fixes, as it is the case in New York State. This is associated with the explicit commitments of adaptation governance in Austria and New York, respectively: Problematizations of natural hazards are facilitating techno-scientific interventions with the objective to maintain social systems and weather the impacts of external-natural risks. On the other hand, the problematization of risk-producing societal systems justifies an interventionalist-reformist adaptation agenda, so that adaptation governance is focused on managing epistemologies determining decision-making outcomes and adaptation objectives across scales.

Adaptation localization, in this context, is the management of adaptation epistemologies across scales: determining what is being adapted to (escalating natural hazards or risk-producing systems, or both), what is problematized as risky (systems or nature), what are vulnerabilities seen as constituted in (structural production of risk and vulnerability, or uneven distribution of vulnerability in a managerial paradigm), and what are the ends of adaptation (adjustment or reform).

Chapters 3 and 4 focused on the governance **of** adaptation localizing. In **Chapters 5 and 6** I focus on the governance **through** adaptation localizing by attending to the interactions between state adaptation governance and the socio-political orders of food production regimes. These chapters turn attention to the ways in which governing adaptation also involves governing socio-political and material orders of social systems — a means of governing through adaptation.

I argue that governance approaches in Austria and New York are both not “neutral”, but that reformist as well as adjustment adaptation are explicitly engaged in the ordering and control of food production regimes, however with different outcomes in mind. Particularly, both unfold in the backdrop of

sociotechnical imaginaries about “good” agriculture — and adaptation is involved in reinstating, maintaining and attaining these imaginaries.

Despite (or rather: because of) claims of “neutrality”, **Chapter 5** discusses New York’s adjustment adaptation as engaged in the maintenance of the existing orders of modern agricultural production and attached imaginaries of innovation driven agricultural production that “feeds the world.”

And while Austrian adaptation governance (**Chapter 6)** claims to have reformist intentions of system re-design, it does so in pursuit of a historically grown imaginary of agriculture as custodian of “pristine” (although cultivated) landscapes and rural culture. In that, both are engaged in ordering food production — and primarily in reinstating existing political orders of agricultural regimes. This is also the case in Austria, despite claims to reform: Small in scale, current orders of Austrian food production are threatened by “outside” industrial agricultural regimes — and claims of sustainability reforms only serve to reinforce existing orders and protecting them from “outside” transformational forces.

I thereby examine how different manifestations of adaptation are reflective of the social, political, economic and epistemological orders in which they unfold and from which they emerge. The central argument here is that systematic interdependencies and the disproportionate ability of industrial actors to create interdependencies strongly limits possible problematizations of the power-structures of adapting systems.

In the **conclusion** I make explicit the politics of adaptation governance — and the importance of processes of localizing. A dual process is at display: the governance of adaptation, and the governance through adaptation — both of which are inseparable.

First, localizing adaptation is the governance of adaptation: by the means of 1) managing epistemological adaptation orders, their stabilization as imaginary (chapters 3 and 4); 2) by managing competing adaptation imaginaries in the concretely locally situated (chapters 5 and 6), and 3) by the managing decision-making processes and their outcomes (chapters 5 and 6).

Second, localizing is (in its extension into the local) directly engaged in the governance of social, political, material, cultural and economic orders. Asserting a specific imaginary of agriculture and adaptation, the orders it engages in are fundamentally reframed and resituated. They are thereby made governable through adaptation. What may not be called in question, can be called in question by

adaptation; And what may be brought into focus of critique and questioning, may be silenced in the justification of disruption and response.

This two-fold governance of adaptation makes explicit why *localizing* is the choice of word; as both play out in the concretely locally situated across scales. From the level of international policy to that of the individual farms, parcels of lands and individual plants — adaptation manifests within the concretely localized orders that it engages with and unfolds while also interacting across scales. Localizing in this sense, points to the concrete processes of interactions across scales while understanding each of the sites on the scales (from government agencies, to planning offices, farms or governors' offices) are themselves locally specific. Localizing therefore points to the mutual making of adaptation in place and the making of place through adaptation.

2. LITERATURE REVIEW

This chapter provides an overview of key literatures informing this dissertation. It first provides an overview of how climate risks and adaptation have been theorized so far, before connecting current debates about adaptation with key literatures in STS. It concludes with an overview of the organization of the argument made in this dissertation.

2.1. Introduction

This literature review is organized into four sections. First, it gives a brief overview of the development of adaptation policy. Second, it discusses key aspects of the traditional literature that theorizes adaptation, focusing on risk assessment and adaptation management literatures to draw attention to key critiques of said literature for its essentializing of risks. Third, it discusses key concepts in recently emergent "political economist" literatures on adaptation that focus on concepts and processes of power. These literatures advance the critique of the "natural hazards" school by problematizing risks, vulnerability and resiliency — and ultimately adaptation — as socially constructed and inherently political. The fourth section builds off of the discussion of adaptation as "inherently political" and draws on STS literatures to bring into conversation different aspects of adaptation governance: a) the role of public engagement and deliberative democratic processes in governance, b) the entangled roles of epistemology and power, and c) the processes of agenda setting, issue formation and socio-political construction and management of ideas and their materiality.

Doing so, I situate existing literatures within the overarching argument of this dissertation: that we need to not only recognize that adaptation is socially constructed, that these constructions and their processes are political (Pelling), and that this involves different epistemologies and politics (as political economists argue) — but that it is necessary to understand adaptation as a political tool for governance in a double-sense: the governance of what adaptation is ought to be (in its means, ends and subjects); and as a mechanism to govern societal orders.

2.2. A Brief History of Adaptation Policy

The first section of this literature review provides a brief and general overview of the historic development of adaptation as a policy domain in climate governance internationally, in the EU and the U.S., and in Austria and New York.

2.2.1. The Formation of International Adaptation Policy

International frameworks importantly inform national adaptation policy in the U.S. and the EU alike. Key components of the currently existing adaptation frameworks gradually developed into the central approaches of adaptation policy in the EU and U.S., albeit with important and consequential differences.

The most concrete frameworks shaping adaptation policies derive from international climate governance. Importantly the UNFCCC first formalized adaptation on the international stage in 1992, leading into the (legally binding) Kyoto Protocol (concluded in 1997). The Paris Accords established and formalized adaptation as second pillar of climate governance besides mitigation. Article 4 of the UNFCCC, Paragraph 1(b) provides that:

> […] parties must formulate and implement national or regional programs containing 'measures to facilitate adequate adaptation to climate change'. Paragraphs 1(3) commits the parties to international collaboration — a lived practice in adaptation governance particularly for coastal zone management, water resources and agriculture and — as it is the case for the Alpine Convention between Austria, Switzerland and Italy — for the European Alps. Article 3(3) commits parties to "take precautionary measures to anticipate, prevent or minimize the causes of climate change (Albrecht, Schmidt, Mießler-Behr, & Spyra, n.d., p. 3).

Associated with these general commitments are reporting obligations (Article 12(1)) as well as (limited) financing commitments through article 4(3) for all signature parties (which the U.S. is not). These provisions also directly informed the EU's proactive approach to adaptation leading to the development of NASs and NAPs across its member states.

The UNFCCC was conceived as a framework for national-level action with broad individual flexibility while formalizing a pathway (or "protocols") towards binding international agreements — establishing the Kyoto process. It is in this context differences between U.S. and EU/Austrian adaptation policy are shaped by the U.S.'s withdrawal from the Kyoto protocol.

While international frameworks constitute reference points for U.S. policy makers, the lack of international commitments and protocols perhaps exposes adaptation planning more explicitly to domestic politics and priorities (Schippinger, 2006). This becomes particularly explicit when considering the timeline of major developments in U.S. and EU adaptation planning efforts. The EU continuously develops adaptation and mitigation efforts, strongly framed by international commitments (and of course still embedded in domestic and global-economic political dynamics), as the Kyoto protocol progresses, and is intensified as the Paris Agreement takes shape and is then adopted. On the other hand, U.S. efforts in adaptation planning fundamentally took shape during the Obama administration and stalled during administrations that did not commit to climate policy internationally and/or domestically — with the major exception of more concrete disaster and emergency planning, preparation and responses to specific disaster events.

The emergence of climate adaptation in national policy agendas is strongly tied to its establishment as the “second pillar” of climate governance in international frameworks and the continued attempts to achieve global climate governance action. Most formative are the Kyoto Protocol as well as the successive UNFCCCs. All signing parties of the Kyoto Protocol were mandated to develop adaptation strategies. Additionally, the UNFCCC Cancún Agreement provided a first clear adaptation framework. The Kyoto Protocol and the UNFCCC adaptation framework therefore are pivotal in shaping the ways in which adaptation policies develop on an international level and by individual states. Both the U.S. and Austria directly mobilize and refer to internationally established definitions through the IPCC, and the overarching goals of adaptation in both countries mirror the internationally established IPCC definition of risk reduction and taking advantage of emergent opportunities.

As a consequence, the IPCC offers limited opportunities to incorporate vulnerability-centered problematizations of risk production in socio-structural conditions, as Bassett et al explain:

> There is a strong sense of déjà vu in reading the IPCC reports and climate change journal articles. The contrasting ‘‘adjustment’’ and ‘‘transformational’’ conceptualizations of adaptation in this literature are reminiscent of the debate between political economists and hazards scholars over the sources of vulnerability. The emphasis of the hazards school on the biophysical hazard and the different types of possible adjustments is similar to the IPCC interpretations of vulnerability as an outcome of climate change impacts (exposure and sensitivity) and adaptation as a mitigating response (Bassett & Fogelman, 2013, p. 51).

2.2.2. The Relationship of International Policy and National Governance

The political realities for climate action in general, and adaptation policy within that, are strikingly different in the EU and U.S. contexts despite shared definitions of adaptation derived from international frameworks. While the EU is considered a leader in climate action and has recently also accelerated its efforts in supporting climate actions on the international stage through its commitments in the GEF, the U.S. accelerates rescission of the marginal progress made during the Obama administration, culminating in its withdrawal from the Paris Climate Agreement.

Adaptation took first concrete shape in the EU with the "white book" on Climate Adaptation of 2009, published as EU Communication[5] and in accordance with international commitments. This document establishes the central frameworks for the development of member state strategies (including the Austrian Strategy) and centrally structures design and implementation approaches. The communication led to the EU adaptation strategy, adopted in 2013, and was further integrated in the EU-program "CLIM-ADAPT" as a one-point-source amongst others for developing, implementing and evaluating National Adaptation Plans (NAP) and Strategies (NAS). While the EU in general has adaptation policies in place in almost every of its member countries (and development is underway in remaining countries in varying degrees), similar trends towards adaptation (planning) are — although less substantive in scope and depth — spreading across the U.S. as well:

> The Third National Climate Assessment (released in 2014) found the first three phases underway throughout the United States but limited in terms of on-the-ground implementation. Since then, the scale and scope of adaptation implementation have increased, but in general, adaptation implementation is not yet commonplace (Lempert et al., 2018, p. 1311).

Adaptation planning in the U.S. took hold during the Obama administration. Initial outlines of an U.S. adaptation policy were established in 2013 with Executive Order[6] EO 13653 "Preparing the United States for the Impacts of Climate Change." This mandated that all federal agencies must mainstream

[5] A communication is a policy document with no mandatory authority

[6] https://sftool.gov/learn/annotation/427/executive-order-13653-revoked-preparing-united-states-impacts-climate-change

climate risk management. In the same year, the bi-annual update to Obama's Climate Action Plan (The Executive Office of the President, 2013) also integrated climate adaptation goals (Office Of The White House Press Secretary, 2013). President Obama's second term was generally focused on key shifts in policy priorities towards climate and environmental regulation.[7] Yet, with congress in Republican control and the now (in)famous vow by Mitch McConnel to commit to an obstructionist legislative strategy for "President Obama to be a one-term president", most of the Obama administration's climate policies had to be implemented through presidential powers and his control over the executive branch. Executive orders became the central vehicle to establish climate policy during this administration, most notably the Clean Power Plan to curb CO2 emissions of power plants.

The third National Climate Assessment 2014 saw some progress in planning for climate escalations in the U.S. during the Obama administration. A 2015 report to Congress (Leggett, 2015) substantiated this impression in a thorough review of adaptation efforts up until January 2015. More recently, the fourth National Climate Assessment (2018) points out:

> Adaptation planning and implementation activities are occurring across the United States in the public, private, and nonprofit sectors. Since the Third National Climate Assessment, implementation has increased but is not yet commonplace (Lempert et al., 2018).

And continues:

> While the level of implementation is now higher than at the time of NCA3, the scale of adaptation implementation for some effects and locations seems incommensurate with the projected scale of climate threats. Communities have focused more on actions that address current variability and recent extreme events than on actions to prepare for future change and emergent threats. […] Furthermore, many communities' adaptation actions arise and are funded in the context of recovery after an event, rather than taken proactively. Often, such adaptation is not as comprehensive as suggested by best practice guidance, as when adaptation plans address sea level rise but not other climate impacts. Few current adaptation plans seek to exploit synergies among various types of actions, and many plans pay little attention to the costs of actions or their co-benefits. Often explicit attention to evaluation and monitoring is scant or nonexistent (Lempert et al., 2018).[8]

[7] The first term's climate policies barely differ from Obama's predecessor in office, George W Bush, avoiding emission reduction legislation.

[8] It is notable that this assessment to a striking degree matches the findings of this research for New York State as presented in Chapter 3. Chapter 3 will describe an adjustment approach to adaptation that unfolds in a lack of long-term planning, and as ad-hoc responses to escalating natural hazards — with significant political consequence.

In this context, the 2015 report to congress concluded that federal guidelines for adaptation, regardless of extent of execution, play an important role in how adaptation is understood and implemented across agencies and:

> […] found that federal agencies are largely using a set of common approaches in their climate change adaptation efforts (Leggett, 2015, p. 18).

Yet, this set of shared approaches still relies on internal commitments and has not been formalized — or where it has been, largely rescinded — since 2016. Most of President Obama's signature climate initiatives were rolled back or are in the process of reversal since the new administration took office in 2016. An important instrument here is the Congressional Review Act (CRA). While prior to 2017, CRA was used only once to overturn a rule (in 2001), the new Republican lead congress overturned 14 Obama-era rules reaching back to 2016. Others were revoked using executive orders since Donald J. Trump took office, including many of the Obama-years climate actions, such as the Clean Power Plan. Due to recent shifts in policy priorities, climate mitigation and adaptation efforts have seen a drastic stagnation and even reversal on the federal level in the United States. Importantly, EO 13653 — together with a number of other important adaptation and mitigation initiatives — was rescinded by President Trump on March 28, 2017. Others continue to be eroded as the presidency continues. In November 2019 — the earliest date to do so — the Trump administration formally began the one-year-long process of leaving the Paris Agreement.

At the same time (as also the 2018 National Climate Assessment makes explicit) individual actors and stakeholders as well as individual government agencies executing federal guidelines and orders heavily rely on definitions of adaptation derived from international frameworks and agreements. These got centrally applied in the relevant Obama executive orders which in turn apply IPCC and WHO definitions and frameworks. As these initiatives are being rescinded today, and the U.S. has entered into the formal process of withdrawing from the Paris Agreement, a void in adaptation planning on the federal level emerges, leaving action to individual state's initiatives.

However, this dissertation will argue that this has complex reasons and are associated, amongst others, with the structures of agricultural food production, and the productionist paradigm of industrialized agriculture (cp. Chapter 5 and 6).

2.3. Governing Risks and Vulnerability Through Adaptation

This section discusses how two key strands in the adaptation literature engage with adaptation in contrasting perspectives. First, the “natural hazards school”, problematizes adaptation as the response to escalating natural hazards and is primarily concerned with the management of adaptation to better weather these escalations and their impacts. Second, the political economist literature critiques this stance as reductionist, as it obscures the inherently political aspects of adaptation. In this perspective, adaptation is revealed as “political all the way through.”

2.3.1. Natural Hazards and Adjustment Adaptation

As the response to external stimuli of change, adaptation is a common practice in natural as well as human systems. Accordingly, traditional literatures on adaptation centrally problematize the matter maintaining the stability of social systems in the face of environmental change. A large body of literature, particularly in environmental sociology, investigates how social systems respond and adjust to external pressures of change in order to maintain stability, cohesion and societal orders. With the acceleration of climate change and its presently unfolding impacts, questions about how societies can best adapt and adjust to this global scale of environmental change are restated. Particularly, as climate adaptation became institutionalized as the “second pillar” of global climate governance through the IPCC, a plethora of new scholarly work began to re-explore possible pathways for how to best adjust to the changing realities ahead.

In many ways, literatures on adaptation policy centrally engage with the problem of system-maintenance in the face of external stimuli for change. Ultimately, the question posed by these literatures is how to adjust to external change, so that central socio-political orders of a social system can be preserved. The IPCC defines adaptation as "adjustment of natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (*IPCC,* 2001, p. 72). Nelson, Adger, & Brown (2007) problematize adaptation for its focus on the maintenance of existing norms:

> We define *adaptation* as the decision-making process and the set of actions undertaken to maintain the capacity to deal with future change or perturbations to a social-ecological system

> without undergoing significant changes in function, structural identity, or feedbacks of that system while maintaining the option to develop (Nelson et al., 2007, p. 397).

This focus on system maintenance in the face of external stimuli of change also constitutes an important distinction to the climate mitigation literature, which more squarely problematizes anthropogenic drivers of climate change and seeks system adjustments that intervene in the (climate) risk-producing elements of human society — ultimately pushing for change of human systems, while adaptation seeks to maintain them:

> The first is the prevention of dangerous interference with the climate system by the stabilization of greenhouse gas concentrations in the atmosphere, commonly referred to as 'mitigation'. The second is reduction of vulnerability to climate change by the process of 'adaptation'. […] Both cases involve the science of impacts and their assessment (Taylor et al., 2002, p. 145).

The most influential and well-established strand of the adaptation literature remains established in explicit distinction to such measures and activities. Adaptation is in this perspective the counterpart to mitigation, with the latter focused on reducing primarily CO2 emissions as a driver of climate change, and the former preparing social systems for climate impacts. Consequently, adaptation-as-adjustment draws a conceptual distinction between human systems as vulnerable to (external) natural systems that are hazardous and risk-bearing. Basset and Fogelman (2013) describe this as the natural hazards school of adaptation, "which has had the greatest impact on the climate change literature." Adaptation in this perspective is discussed as a response to material-natural "hazards" (such as drought, flooding, sea level rise, …) that pose risks to society as an *external* threat (Burton, 2009; Johnson, Stanforth, Lulla, & Luber, 2012; Lal, Alavalapati, & Mercer, 2011; Lempert et al., 2018; Preston, Mustelin, & Maloney, 2015; Yamin, Rahman, & Huq, 2005).

Accordingly, this literature examines adaptation policy and local practice primarily for their effectiveness and appropriateness to weather climate disruptions in a risk management and preparedness approach. Such a conceptual differentiation constitutes adaptation as a matter of managing natural risks and hazards (cp. Füssel, 2007; Pelling, 2011). Concerned with one-way-linear acting of natural systems onto human systems, this literature seeks to identify and assess local and/or sector-specific vulnerabilities, evaluate adaptation capacities, and develop pathways for increased resilience (as the ability of human systems to weather and recover from climate change impacts as an external-natural

force). The fact that climate change is the result of human activity is to a large extent immaterial for appropriate adaptation in this perspective; essentially "externalized" as a matter of mitigation policy.

The analysis of adaptation policy as well as practice is in this literature primarily discussed in terms of "technical" problematizations, for example considering action and pathway development, planning and implementation, and policy mechanisms. Policy frameworks across governance scales are evaluated for the effectiveness in guiding local adaptations in minimizing vulnerabilities and ensuring societal stability. For example, Lim and Spanger-Siegfried (2004) propose in their UN report the "Adaptation Policy Framework" (AFP) four major principles for adaptation:

> Adaptation to short-term climate variability and extreme events serves as a starting point for reducing vulnerability to longer-term climate change; Adaptation occurs at different levels in society, including the local level; Adaptation policy and measures should be assessed in a development context; and the adaptation strategy and the stakeholder process by which it is implemented are equally important (Lim, Spanger-siegfried, Burton, Malone, & Huq, 2004, p. 1).

Discussions revolve centrally on how concrete policy, policy mechanisms and individual adaptation options can best minimize the negative impacts of climate hazards while taking advantage of potentially arising opportunities. For example, developing indicators, policy frameworks, adaptation strategies, concrete adaptation pathways and mechanisms for policy integration and implementation on the local level (Corfee-Morlot, Cochran, Hallegatte, & Teasdal, 2011; Johnson et al., 2012; Lal et al., 2011; McCarthy, Canziani, Osvaldo, Leary, Dokken, & White, 2001; Ren et al., 2012):

> There are many classifications of adaptation options (summarized in Reference 14) categorized by their purpose, mode of implementation, or on the institutional form they take (Nelson et al., 2007, p. 397).

A plethora of complementary literatures focus on assessing and evaluating existing strategies for their efficiency. Complementing these literatures, a myriad of studies examine individual adaptation projects, processes and initiatives on the local level; examining them for their effectiveness to increase resiliency and reduce risks and developing best lessons and recommendations for their adoption in other locales. These case studies are usually collected in clearing houses, such as Climate Adapt (Climate Adapt, n.d.) or CAKE (Climate Adaptation Knowledge Exchange, n.d.). The natural hazards school of adaptation literatures draw on key categories derived from risk management and develop them for adaptation: identification of hazards, calculations of risks in terms of probabilities, the analysis of

vulnerability distributions, the calculation of adaptive capacities and measures, indicators and evaluations of resilience.

Traditionally, adaptation policy analysis emphasizes the adequate identification and assessment of vulnerabilities (Brooks, 2003; Cutter, Boruff, & Shirley, 2003; Smit & Wandel, 2006) to environmental stressors and hazards (Burton, Saleemul, Lim, Pilifosova, & Schipper, 2002; Corfee-Morlot et al., 2011; Smit & Wandel, 2006; Taylor et al., 2002) and the efficiency of decreasing those vulnerabilities in building up resiliency (Walker, Holling, Carpenter, & Kinzig, 2004) or by setting in place preventive measures (usually addressed as prevention/mitigation).

2.3.2. From Risks to Vulnerability: Adaptation Transformations

While the natural hazards school continuous to be widely influential, its techno-scientific response to externalized climate risks has become recently scrutinized as reductionist in multiple ways:

> [M]uch research on climate change vulnerability continues to situate vulnerability within analyses of climate, rather than in societies and political economies (Eriksen et al., 2015, p. 523).

An interdisciplinary body of literatures draws attention to the social production of risk and vulnerability (M. J. Douglas, 1966; M. Douglas & Wildavsky, 1983; Irwin, 2008; Luhman, 1993; Lupton, 1999), arguing that vulnerabilities and risks emerge from socio-political orders that particularly impact marginalized populations. In response, a growing body of research focuses on the scope and objectives of (planned) adaptation in response to vulnerability. Political economists, for example, understand (different to the natural hazards school) “risk as a function of vulnerability and the natural hazard, the latter acting as a trigger mechanism” (Bassett & Fogelman, 2013, p. 44). Vulnerability would in this perspective reveal inherently unjust societal orders that cause uneven distributions of risk, and therefore constitute the management of risk as inherently political.

As Pelling (2011) explains, this is constituted in the tensions of vulnerability, risk and governance — and the potential for local adaptation constituting direct challenges to the power structures of risk-producing systems:

> Risk and its management is therefore a political as well as a technological concern and one where the poor are at risk of carrying a double burden when competition leads to their being marginalised from mechanisms providing security as well as wealth, or indeed where such burdens are interpreted as unfortunate but necessary costs for the production of security and

> wealth for others, elsewhere or in different times. This is a politic that needs to be critiqued from the perspective of social justice, leading to a vision of adaptation as a potential tool for progressive development, not one that uncritically defends the status quo (Pelling, 2011, p. 164).

Generalizing and paraphrasing, the important question for Pelling is: how can we get to a politic of adaptation that incorporates progressive transformation to maintain the stability of the social system by making it work for everyone?

Authors such as Eriksen et al. (2015) explicitly critique the natural hazards school for masking the social production of vulnerability and risk. They argue that in the natural hazards school of adaptation, vulnerabilities become merely a technical aspect of risk management, and Bassett and Fogelman further suggest that adjustment adaptation in consequence re-constitutes orders of power through an emphasis on adjustment:

> The activities that are recommended to minimize damages [in the natural-hazards school] are technocratic and top-down in nature, such as establishing early warning systems, building higher levees, designing better buildings, or developing new crop varieties. This emphasis on biophysical risks and technical solutions to minimize losses seeks to preserve the existing system by strengthening its 'absorptive capacity' (Bassett & Fogelman, 2013, p. 44).

Doing so, adjustment to natural hazards would not address the societal root-causes of vulnerabilities, but instead mask them:

> In doing so, this research masks the social-political causes of risk and vulnerability (Ribot, 2011), as well as the socio-environmental processes (Nightingale, 2015) that mediate responses to climate change and that have been central to how humans have always responded to environmental variability. […] [A] vast majority [of literatures] incorporates the social construction of risks as "social"/"societal" dimensions and as such do not reflect adaptation as involved in these processes of power beyond overcoming management problems (Bassett & Fogelman, 2013, p. 524).

This politization of adaptation leads Forsyth and Walker (2008) to point to tropes and constructions of identities through environmental and adaptation knowledges, making explicit how e.g. imposed identity constructions of indigenous peoples as environmental "sinners" or "saints" ultimately preclude pathways to livelihoods in the escalation of climate change and environmental collapse. Importantly, they show how knowledges and their importance in shaping policy are implicated in constructing power relations on the local/implementation level and through that importantly reconstitute vulnerabilities on the ground.

Advancing this critique, political economists, environmental sociologists and others scrutinize adaptation itself more carefully as political projects, with an explicit normative commitment to address the societal conditions in which vulnerabilities and risks are constituted in and by which they are produced (Eriksen et al., 2015).

In this stance, adaptation cannot merely focus on the gradual adjustment of social systems to better weather external-natural hazards, but rather should head-on address the production of vulnerability through societal transformations. Focusing on the economic, social and political production of vulnerabilities, "political economists highlighted the social nature of so-called 'natural disasters', drawing on constructivist perspectives on risk." Key contributions to this literature differentiate adaptation for its degrees of intervention in social systems, for example, delineating between reformist, adjustment, and transformative adaptation (cp. Bassett & Fogelman, 2013), focusing on different scales at which these interventions take place (e.g. adaptations that unfold on local vs global levels):

> The hazards school asked, How do people choose the degree of risk they will bear and the adjustment they will make? In contrast, political economists asked, How is vulnerability shaped by political economic processes and the social relations of production in which constraint rather than choice limits adaptive capabilities? (Bassett & Fogelman, 2013, p. 45).

These literatures are centrally concerned with the degree of change of the elements of social systems that produce risks and vulnerabilities. Itself reflective of the ways in which risk and vulnerabilities are produced through social orders and within social systems, the political-economy literature promotes an explicitly political approach to adaptation, varying in the ways that they address the distribution of vulnerabilities through degrees of intervention (cp Pelling, 2011). As a consequence, these authors are calling for an adjustment of adaptation policies, frameworks and practices alike, to better incorporate the production of vulnerabilities through an interventionist and transformative adaptation approach. They are also examining adaptation policies and local practices for their political economies and the capacity for equity-focused transformation.

Wamsler and Pauleit (2016) compare local adaptations in Germany and Sweden for pathways to transformative adaptation, arguing for better mechanisms to formally integrate such models in policy processes, focusing on the implementation of policy across scales. Others (Kates, Travis, & Wilbanks, 2012) argue for transformative adaptation due to the otherwise insufficient response to the scale and

scope of climate change and its impact on distribution of vulnerability. The majority of studies in this context focus on concrete adaptation pathways in policy and practice. They do so by explicitly addressing how policy, social orders and material threats are entangled and how they co-produce vulnerabilities. They examine policy, social institutions, and individual actors (usually in case studies of concrete adaptation initiatives) for their role in producing and addressing vulnerabilities (Adger, 2013; Adger, Arnell, & Tompkins, 2005; Lass, Haas, Hinkel, & Jaeger, 2011; Nelson et al., 2007; O 'brien, Eriksen, Nygaard, & Schjolden, 2007).

2.4. The Politics of Adaptation

These authors draw attention to the political dimensions of adaptation, formulating an explicit critique of adjustment adaptation approaches as masking the societal production of vulnerability. The focus on external risks impacting society, also masks the societal production of climate change itself, even if directly: On the one hand, it allows to silence the ways in which climate change is itself socially constructed by "essentializing" the relationships between drivers of climate change and the responses of climate systems. Additionally, it separates out questions about the production of climate risks on the one hand (as a matter of mitigation), and the proper response to impacts on the other (adaptation). As such, the natural hazards school renders invisible the interactions between the production of risks and adaptation to their impacts.

Recognizing the politics of vulnerability and risk, they propose adaptation to constitute potential societal reform, and hence an opportunity (if not necessity) to facilitate through adaptation changes of the societal structural conditions that constitute both vulnerability and risk. Thereby political economists make explicit vulnerability and its coproduction in social orders as well as orders of risk; explicitly pushing back against the natural-hazards school's techno-scientific reductionism, including some of the imports of IPCC definitions of adaptation.

2.4.1. Addressing the Social Production of Risk and Vulnerability

Many political-economic studies focus on the "polity-proper", negotiating how political structures shape adaptation and its implementation, yet do not problematize adaptation itself as an inherently

political category. Bassett and Fogelman conclude that these still fail to address the politics of power involved in adaptation itself:

> In short, despite the recent shift away from linear, biophysical explanations, we see in most scientific writing and policy responses a reluctance to deal with the politics of adaptation head-on. This reluctance is underscored by the lack of a coherent conceptual framework to facilitate addressing this challenge. The consequence has been a lack of empirical research focusing explicitly on the social-political domains within which a fuller understanding of adaptation processes for long-term change can emerge and a need for more theoretical innovation to help guide such studies (Eriksen et al., 2015, p. 524).

This is problematic for Eriksen et al (2015, p. 525), who argue that the analysis of adaptation must be explicitly conceived as a political analysis of power. Adaptation as part of environmental governance not only becomes materially engaged with the weathering of environmental change, but itself emerges as a political enterprise:

> […] [O]ur paper is motivated by concerns that present conceptualizations of climate change adaptation – justified in the name of urgency (Forsyth, 2014) – have by-passed critical analytical lessons learned in relation to other society-environment issues. At the core of our argument is a conceptualisation of adaptation as political 'all the way through'. Rather than politics being something that affects adaptation outcomes, we offer a conceptual framework to capture how politics are embedded in society's management of change (Eriksen et al., 2015, p. 523).

Bassett and Fogelman (2013) and in particular Pelling (2011) situate their work explicitly politically, arguing that adaptation itself should be considered as a political process. This limited set of literatures scrutinize how adaptation is a mechanism for "perpetuating the status quo" and propose instead a "reformist agenda" (cp. Bassett & Fogelman, 2013). Implied is a call for adaptation that is focused on addressing the societal-structural production of marginalization and vulnerability wile simultaneously critiquing risk-focused adaptation approaches as incremental adjustments that perpetuate and maintain an inherently socially unjust status quo.

Drawing amongst others on Beck (1992), Pelling argues that as societies adapt, a substantive challenge to the system that produced them becomes possible. For Pelling this requires an analysis of adaptation that actively contests established power relationships:

> In this context, perhaps the most profound act of transformation facing humanity as it comes to live with climate change requires a cultural shift from seeing adaptation as managing the environment 'out there' to learning how to reorganize social and socio-ecological relationships,

> procedures and underlying values 'in here'. This in turn demands a strong component of conceptual and social reorganization. How far this might precipitate political and economic regime change is unclear (Pelling, 2011, p. 88).

For political economists, adaptation in its scope, ends, means, subjects and objects is overdue for a critical reexamination. New questions emerge that regard the maintenance of control and authority along with societal stability in the face of new scales of environmental and climatological change.

This problem arises, as challenges to established relationships of power are constituted in the sheer scale of the climate disaster. For example, Gowdy (2020) argues that the scale of human-driven ecological disaster on a global and geological scale would constitute an existential threat to the cohesion of social systems. He anticipates a future in which agriculture becomes increasingly impossible:

> Given the large human population, the likely effects of climate change on economic and social stability, and the potential fragility of the world's industrial agricultural system, it is unlikely that human civilization can survive the coming mega-greenhouse. The prospect of civilization collapse has now entered the mainstream of scientific and popular discourse (BBC, 2019; Diamond, 2019; Spratt & Dunlop, 2019). (Gowdy, 2020, p. 2)

This would pose significant problems for institutions and actors of power and their claims to authority and control, as they themselves are directly involved in global scales of risks. To re-frame Pelling's problematization of adjustment adaptation: This constitutes shifts in the governance of environmental change where adaptation-as-maintenance is fundamentally called into question by the global-climatological scales of disruption and its anthropological drivers.

Ulrich Beck prominently argues that the globalization of risks fundamentally calls into question the authority of social institutions of power. As risks become global and threaten the legitimacy of the systems that produce these risks, fundamental contradictions would emerge:

> […] The institutions of modern society must unavoidably acknowledge the reality of catastrophe while simultaneously denying its existence, hiding its origins and precluding compensation or control. To put it in another way, risk societies are characterized by the paradox of more and more environmental degradation - perceived and potential - coupled with an expansion of environmental law and regulation. Yet at the same time, no individual or institution seems to be held specifically accountable for anything. How can this be? (Adam, Beck, & Van Loon, 2000, p. 224).

In other words, Beck suggests that a fundamental question emerges in the field of environmental governance, as the reality of the Anthropocene (Crutzen, 2002) becomes unavoidable in its effects of

ecological and climate collapse: How can institutions of power maintain legitimacy, authority and control as the risks that they co-produce become explicit on a globalized scale? And how can social systems that produce global and geological scales of risks retain their legitimacy and secure their existence in the face of these challenges?

As adaptation progresses, the same institutions and actors of power are called on to govern adaptation, constituting adaptation itself as inherently contested for its involvement in orders of power. The question of power and politics in adaptation gets turned in its attention on adaptation itself, re-situating recent academic debates within the overarching questions this literature review started with. How do actors compete not only for security and wealth, as Pelling argues, but for control over and through the processes that determine such outcomes — meaning adaptation processes (in a broad sense) themselves? Determining who gets a say in what the ends, means and subjects/objects of adaptation are — and the locales in which it unfolds — is not only political as it determines the distribution of security, risks and vulnerabilities — but as it determines the allocation and re-establishment of power itself. Eriksen et al (2015) make this particularly explicit:

> We argue that what counts as 'adaptive' is always political and contested. What is seen as positive adaptation to one group of people may be seen as mal-adaptation to another, and political processes determine which view is considered more important at different scales and to different constituencies. We therefore propose a reframing of adaptation that focuses explicitly on its political nature, in order to speak directly to how changing vulnerability patterns intersect with contestations over who is expected to adapt to climate change and who ought to plan and guide those processes (Eriksen et al., 2015, p. 525).

The political economic critique of adaptation becomes here extended: Political economists examine adaptation for how it addresses or masks the societal production of vulnerability. Yet, building off of a long tradition within environmental sociology, I suggest reexamining how adaptation is mobilized for maintaining the societal and political orders of power — the same powers that constitute the undercurrent of the climate crisis: the societal production of risk and of vulnerability.

Environmental sociologists in particular examined the contradictions that emerge, as the same institutions and actors that cause environmental degradation are centrally responsible for its governance (Adam et al., 2000; Beck, 2010; Frickel & Vincent, 2007; McGoey, 2012; Shove, 2010; Swyngedouw, 2011). This double-bind restates itself anew in the context of adaptation: The same social institutions and

actors that govern the adaptation to environmental change are inextricably tied to the production of climate change, risks and vulnerabilities. The governance of adaptation is inextricably tied to the systems of extraction that produce ecological collapse and depletion and unevenly distribute these risks along socio-ecological, racist and geopolitical lines of fracture.

This raises two intertwined questions: 1) How is societal stability maintained in the face of ecological, climatological and environmental change, and 2) How are authority and legitimacy of risk producing social systems and their social institutions and actors of power maintained, as their involvement in the risk production becomes increasingly explicit in its material consequences?

This dissertation addresses the two questions together: It analyzes adaptation as a diverse set of responses to environmental change on global climatological scales, asking how societies adapt to climate change. It analyzes adaptation as itself a multi-sited and multi-scaled processes of power, turning the focus on how different claims to authority, power and control (over adaptation and the adapting social systems) are (re-)established and contested.

As political economists propose a political analysis of adaptation, I turn attention towards the ways in which structures of power are maintained and contested in and through adaptation. This is situated in an understanding of adaptation as societal redesign in the context of disruption. As Fortun and Frickel argue, “disasters importantly make explicit that the social dynamics of science and technology are deeply implicated in how governments, industries, legal systems, affected communities, and other social institutions deal with disaster, risk management, emergency response, and longer-term recovery” (K. Fortun & Frickel, 2011). They make the argument that “sudden and large-scale changes that disasters trigger in ecosystems, societies and knowledge practices” (K. Fortun & Frickel, 2011) make explicit how structures of power are held in place. This allows to address a central problem that political economists face as they propose transformative adaptation to change structures of power: While climate change makes explicit the involvement of social institutions and actors of power in the production of vulnerability, risks and marginalization, these same actors/institutions are centrally involved in shaping adaptation in policy and practice. While the material explication of socio-ecological risk production appears to challenge claims of legitimacy and power of individual polluters, social institutions, political governments and entire economic and societal systems, it is unclear in how far adaptation truly constitutes structural change or

mere adjustment to maintain the status-quo of power. Turning attention to the politics of adaptation allows to better understand the mechanisms for how social systems — and in particular structures of power and injustice — are maintained, reestablished and exercised or indeed contested and transformed in the face of environmental change.

2.4.2. The Three Faces of Power

In the analysis of power in adaptation, Lukes (1974) discussion of the "three faces of power" can be helpful. He argues that power is multi-dimensional, and analysis must pay attention to all three. In brief, these three dimensions are: 1) The direct exercise of power, as discussed in traditional pluralist political analysis, as prominently developed by Dahl, Polsby, Wolfinger and others (cp. Lukes, 1974, p. 11):

> In his early article, 'The Concept of Power', Dahl describes his 'intuitive idea of power' as 'something like this: A has power over B to the extent that he can get B to do something that B would not otherwise do' (Lukes, 1974, p. 11).

In other words, the first face of power addresses the observable behavior of actors as they exercise power over others. For Lukes, this perspective is restrictive — following arguments by Bachrach and Baratz (cp. Lukes, 1974, p. 16), and power is exercised also "when A devotes his energies to creating or reinforcing social and political values and institutional practices that limit the scope of the political process to public consideration of only those issues which are comparatively innocuous to A" (Lukes, 1974, p. 16).

The second face of power regards the institutional organization of political processes, the ways in which its rules are written, and how these are deployed to manage the participation of "publics" in decision-making. This includes, what kinds of questions can be raised, what issues addressed, on what terms and at what places (Lukes, 1974, p. 17). This second face of power thereby regards the exclusion of certain kinds of problematizations — and therefore forecloses the development of political contests over others:

> [The second face of power; or two-dimensional view] incorporates into the analysis of power relations the question of the control over the agenda of politics and of the ways in which potential issues are kept out of the political process. None the less, it is in my view inadequate on three contours (Lukes, 1974, p. 21).

The third face of power, for Lukes extends the second in a three-fold critique. First, the second face is still committed to overt or 'actual' behavior; Second, it would be inadequate "in its association of power

with actual, observable conflict" (Lukes, 1974, p. 22). And third, it is inadequate in its instance that "nondecision-making power only exists where there are grievances which are denied entry into the political process in the form of issues" (Lukes, 1974, p. 24).

In response, the third face of power pays particular attention to how power plays out subtly through the shaping of identity, thought styles and ideology. In other words, it closely follows ideas of power that developed from Gramsci's concept of hegemony and Foucaut's analysis of biopolitics. For Lukes, power can be exercised not only where "A may exercise power over B by getting him to do what he does not want to do, but he also exercises power over him by influencing, shaping or determining his very wants", or by:

> the most insidious exercise of power [that is] to prevent people, to whatever degree, from having grievances by shaping their perceptions, cognitions and preferences in such a way that they accept their role in the existing order of things, either because they can see or imagine no alternative to it, or because they see it as natural and unchangeable, or because they value it as divinely ordained and beneficial? (Lukes, 1974, p. 24).

This establishes three dimensions in which the power politics of adaptation shall be considered in this dissertation: 1) The ways in which adaptation manifests in the written and unwritten rules of adaptation: the establishment and execution of adaptation guidelines, regulations and laws or other instruments that the polity and other actors of power have at their disposal to enforce a certain kind of adaptation over others; 2) The ways in which the rule-making of adaptation itself is managed and mediated: the ways in which different epistemologies of adaptation become stabilized in processes of negotiation, rule-making, institutional organization and structuring of political/decision-making processes about adaptation, as well as the organization and management of the sites of decision-making and the access to them. And 3) the ways in which socio-political and epistemological orders co-produce adaptations while foreclosing others: the ways in which certain kinds of adaptation become impossible through the very ways in which the systems that adapt and their socio-political processes work.

Drawing on the discussions of the politics of adaptation by Pelling (2011), Bassett and Fogelman (2013), Eriksen (et al., 2015) and others, the central problem that this dissertation addresses are the undercurrents of power that shape the politics of adaptation and foreclose or open up potential for political transformation.

Of course, it is impossible to provide a comprehensive analysis of the political power relations as they play out through adaptation processes. Rather, this dissertation focusses on how adaptation itself manifests in and itself is part of processes of power, focusing on four concrete aspects that correspond with the individual chapters of this dissertation. I investigate how different actors across scales and sites understand adaptation in its problematizations, ends and means, and how these competing interpretations of adaptation are managed by different actors, via the three dimensions described in greater detail on the previous page:

1) The establishment and enforcement of adaptation definitions as an exercise of control.
2) The role of institutional organization, rulemaking, and management of decision-making processes and the control of the access to different decision-making spaces.
3) The structural interdependencies constituted in socio-material orders that determine and shape possible imaginaries of adaptation.

This also means that this analysis pays particular attention to the positionality of vulnerability: Attending to power relations and how they change (or do not change) as adaptation manifests in different social, political and cultural contexts and across their scales necessarily requires an analysis that incorporates the positional experiences and knowledges of the vulnerable, marginalized and excluded. As such, this dissertation explicitly draws on a multi-perspective analysis of power in the tradition of post-structuralist and feminist theory. Authors such as Harding (1991, 1993, 1986), Haraway (1988, 2016) and Spivak (1988) challenge the ways in which power is analyzed from places "within." They argue for "studying up" to formulate critiques of power that pay attention to and are informed by marginalized life and experiences. Haraway specifically argues in "Situated Knowledges" (1988) that any form of knowing is necessarily positional and therefore limited, constituting a need to study power from multiple perspectives to effectively analyze and critique it. In other words, it pays explicit attention to the experiences of those who make adaptation decisions as well as of those who have to live in and with them. This means that adaptation is analyzed in a situated analysis, attending to how adaptation manifests within specific sites where power relations unfold.

2.5. Adaptation as Risk Governance

To address the question of power in adaptation, I foreground some key conceptual categories relevant for an integrative and comparative policy analysis approach. First, I discuss the role of agenda

setting and problematization for shaping risk and adaptation governance, before discussing more broadly the social construction of risks and the politics involved in governing climate change in terms of risk.

This constitutes adaptation governance as deeply involved with questions of democracy: Who gets to govern, on what terms, and how are publics and deliberative processes alike managed in establishing adaptation policy? I will draw attention to key concepts from critical policy analysis in STS that investigate how publics, citizenships and participation are governed and how they are related to establishing and maintaining claims of authority, control and power.

2.5.1. Construction and Problematization of Environmental Extremes

Governance styles are closely linked to the ways in which policy issues get designated, identified, epistemologically and ontologically understood, prioritized and evaluated. In traditional policy analysis, the construction and problematization of (environmental hazards as) policy issues is theorized as **agenda setting** and **risk management** (assessment, communication and perception) (cp. Bacchi & Goodwin, 2016; Birkland, 1998, 2015; Nisbet & Mooney, 2007). Interpretative policy analysis approaches push back against realist conceptualizations of risks and their governance. The letter literatures focus instead on how risks and their problematization are involved in world-making-as-governance. Traditional policy analysis perpetuates a rationalized technocratic perspective, problematizing risks as an external (to society) object of concern requiring "mere"[9] identification to ensure preparedness. Traditional environmental risk assessment is concerned with:

> […] the way that scientific and anticipatory methodologies are used to assess risks from human activities, and the objects and the waste that emanate from them, for the environment and for people in the environment; and how this kind of understanding is used in legislation, in the practice of management in businesses, in managing problems in the various major habitats, and in managing development programmes (Calow, 2009, p. 1).

This *realist* perspective essentializes environmental risks as objectively "natural" and that can in principle be unveiled and identified given the right (contemporarily: scientific) method. Accordingly, "Debates over risk in these techno-scientific fields", with Lupton (1999), tend to revolve around issues of "how well a risk has been identified or calculated, the level of seriousness of a risk in terms of its possible

[9] whereby this in and of itself is not to be seen as an arbitrary task itself.

effects, how accurate is the 'science' that has been used to measure and calculate risk and how inclusive are the causal or predictive models that have been constructed to understand why risks occur and why people respond to them in certain ways." (Lupton, 1999, p. 19).

A policy analysis that is situated within the "natural hazards school" is primarily interested in the ways in which risks are taken up as policy issues (particularly as agenda setting) and emphasize that political bargains "obscure" what is seen as "objectively" more or less clearly identifiable "real" problems (a separating out of politics and 'objective" risks). Yet, this problematizes questions at hand as an issue of politicizing what is otherwise thought of as objectify-able and quantify-able. Risks and the sciences that identify them are rarely brought into critical perspective (cp. Jasanoff, 2016). "Risks, according to this model, are pre-existing in nature and in principle are able to be identified through scientific measurement and calculation and controlled using this knowledge" (Lupton, 1999, p. 19).

Analyses regarding the problematization of risks themselves tend to focus on how well potential hazards are defined and catalogued, how their impacts on societies are understood, and in which ways adaptation measures address the impact of hazards onto societies in terms of environmental risks "appropriately." Centrally, these analyses attempt to identify vulnerabilities to external hazards, formulate different adaptation options and assess their efficiency (cp. e.g. Adger et al., 2005; Brooks, 2003; Smit & Wandel, 2006). This critique of the realist perspective on risk and adaptation raises the question about how the technocratic realist approach of evaluation re-establishes scientific authority itself (cp. Poumadère, Mays, Le Mer, & Blong, 2005; Vaughan, 1990).

2.5.1.1. Social Construction of Climate Risks

Constructivist policy analysis brings into perspective how risks and the knowledge about them are co-constructed: here, risks are not objective entities but socially negotiated. This makes it important for the analysis to understand the processes that run into the construction and prioritization of risks not only in the political arena but also through the socio-epistemological structures of the knowledge production as part of the political apparatus. The second proposition states that the authority that modern western societies assign to science in the identification of risks is not a given, but a political-epistemological product and thus must be contested in a critical political analysis.

The central question in a constructivist perspective regards the ways in which societies evaluate, identify and prioritize certain risk over others, who can participate in decision making, and on what terms. An adequate analysis of the governance of risk therefore has to take into account the **different stakeholders involved** (or excluded) in these processes, and the **social and epistemological orders** and **moral value systems** in which they do so (Felt et al., 2013; Irwin, 2008; Wynne & Irwin, 2003).

Jasanoff (2011b), on the case bioengineering and advances in biological sciences and biotechnology, shows how the production of knowledge and the (techno-social) (policy-) solutions they bring about co-evolve with legal frameworks, regulatory oversight of predictable and unpredictable risks and the ontological status of life within moral orders – where these elements mutually shape each other. Science re-shifts how we think about and value life, embedded in larger socio-technical imaginaries of life and social orders, that in turn shape and are being shaped by the legal frameworks that govern life and the ways in which they prioritize and construct risks. MacFarlane (2003) points to the co-constructive interplay of public policy, regulatory oversight and scientific ordering of risks. Silbey (2009) points out how cultures, notions of safety, and risk and knowledge orders are co-emergent. E.g. Kinchy et al. (Jalbert, Kinchy, & Perry, 2014; Kinchy, Jalbert, & Lyons, 2014) point to how dominant knowledge discourses around risk and their identification and evaluation are not only constructed, but entrenched in political, strategic, structural etc. ignorance, unmasked and contested in counter-claims by expertise of local experiences — an argument that emerges in context of the lay-expertise debate building off of Wynne (2003).

This associates the social construction of risks with social and epistemological orders, and key literatures in STS examine their disposition to each other in an act of "world-making." If risks cannot merely be unveiled by science, but their identification is embedded in social processes of selecting and prioritizing (cp. M. Douglas & Wildavsky, 1983), then it is key to scrutinize these very processes as constructive forces of risk with deep political implications. Literatures addressing three key dimensions of constructivist policy analysis are of importance for this dissertation:

1) Agenda Setting, Framing and Problematization
2) Epistemological Order(ing) (Knowing
3) Participation In Risk Governance

2.5.1.2. Agenda Setting, Framing and Problematization

Post-structural policy analysis emphasizes how problematizations are social constructs with political implications, and thus an elementary constituting aspect of the regulatory apparatus. Birkland (2015) introduces the concept of focusing events – sudden, disruptive events that act as mobilizing political action. As attention-grabbing disruptions that become mobilized to justify changes in political agendas, these events disrupt dominant issues in a policy domain, act as group mobilization, and can be strategically used to change dominant policy issues. He outlines for the case of nuclear policy how problematizations of environmental/socio-technical hazards in different ways shape policy agendas, and he further articulates how events such as nuclear disasters act as focal points that allow to shift policy agendas.

Literatures in the field of STS increasingly expand the analysis of problematization to move beyond issue-making in terms of agenda setting (Marres, 2007; Rabinow & Foucault, 1984). The problem of making problems is not new, and specifically framing theory asks for how policy issues and considerations are being shaped and made sense of. Wynne (2002) critiques how risk-framings exclude wider cultural and political discussion (cp. Irwin & Wynne, 2003). Goffman's "collective action frames" expands on how actors mobilize and counter-mobilize ideas, whilst Roth articulates how science works as "master frame" providing a grammar for articulating problems within the political apparatus (Roth, Dunsby, & Bero, 2003), pointing back to discussion on the co-construction of knowledge orders and regulatory apparatus. Hilgartner (2004a) discusses how these framings and problematizations are exercised in public theaters, that allow for building scientific-political-public consensus on important policy issues. Nortje Marres (2007) points out how issues are central means for ordering, proposing, shaping and carrying out political agendas and policies. Jasanoff (2004) articulates how knowledge and social orders get co-produced, and how the regulatory apparatus increasingly leverages scientific authority to exercise control and justify interventions (2009).

Jasanoff, particularly in her concept of "socio-technical imaginaries" (Jasanoff & Kim, 2013), points out that the limiting to certain interpretative framings allow for coordinated action precisely through delimiting the interpretative flexibility of policy issues. For her, shared discursive framings of policy issues allow for a delimiting of potential futures and thus grant coordinated action. This structuring effect of

knowledge order then centrally shapes, but also is shaped by, the ways in which adaptation policy seeks to construct socio-material orders to address social resiliency to risks.

Jasanoff (Jasanoff, 2005b, 2005a) draws attention how epistemological and political-cultural orders co-produce policy, making it an inherently social-cultural affair. She importantly draws attention to civic epistemologies as substantiated across scales in the formation of policy and political regimes alike. Thereby organizational cultures and social and structural orders importantly shape governance regimes. She draws attention to the social and epistemological orders involved in policy making and stabilization. It is in this context, that adaptation policy emerges in cross-scale processes of substantiation within specific socio-cultural settings and their associated orders. In the context of adaptation policy and its localizing, it becomes explicit in this chapter how these concrete orders, as we find them at the NYSDEC, manifest adaptation, structure potential problematizations and delimit pathways for implementation.

Adaptation measures are to be understood as governance interventions seeking to exercise power and establish/maintain power-orders in society. As such they seek to (re-)design socio-material orders as political means for which the definition, understanding and delineating of risks and vulnerabilities becomes a key shaping power. It becomes particularly important to understand how environmental problems get defined, by whom and to what political purpose, explicitly situating adaptation evaluation in the analysis of power. Key concerns thereby are the interaction between hazards and risks, vulnerabilities and exclusion/marginalization/discounting, and the justifications of intervention to the effect of social order and exercise of control. In the context of environmental extremes, this implies that analysis has to attend to how different knowledge orders run into conceptualizing and problematizing environmental hazards, risk and vulnerability within their social and political contexts, and to the political implications they entail (cp. Bacchi & Goodwin, 2016).

In this context, emergent adaptation policies and plans appear as ordering devices that shape and present environmental risks — and establish specific relationships between nature and society. Interventions in the name of adaptation do not only address natural hazard but are engaged with societal orders in response. There are many examples in the literature discussing these relationships. For example, Guthman (2015) articulates the ways in which risks are constructed and governed in a

regulatory apparatus and how they are entrenched in the biopolitics of valuing and *de-valuing* "populations" (as to-be-governed") vs. "people" (as ignored by the regulatory apparatus).

2.5.1.3. Epistemological Order(ing)

Epistemological frameworks are key ordering mechanisms that limit possible interpretations. The notion of "epistemological frameworks for adaptation" are tied to Ludwig Fleck's (1981) idea of **thought styles**. He describes how production of knowledge is embedded in specific ways of societally-culturally organized ways of thinking and problematizing. For Fleck, *ideas* are produced within socio-cultural knowledge structures that shape and delimit how the world is thinkable. A thought style is thereby the dominating style (or logic, principle) in which "the world" is conceptualized and understood within social processes of ordering and sense-making. Existing concepts feed into the production of new knowledge and ideas and shape the ways in which these ideas take form, re-producing themselves. What ideas dominate is negotiated, shaped in/by social and cultural orders and processes. For example, social prioritizations and preferences shape the ways in which knowledge is produced, which problems are attended to, and how they get resolved, thereby re-producing these preferences and perspective through which the world is engaged with.

The problem of making problems is not new in the literature, and specifically ***framing theory*** asks for how policy issues and considerations are being shaped and made sense of. Wynne (2002) critiques how risk-framings exclude wider cultural and political discussion (cp. Irwin & Wynne, 2003). Goffman's "collective action frames" expands on how actors mobilize and counter-mobilize ideas, whilst Roth articulates how science works as "master frame", providing a grammar for articulating problems within the political apparatus (Roth et al., 2003) — pointing back to discussion on the co-construction of knowledge orders and regulatory apparatus. Hilgartner (2004a) discusses how these framings and problematizations are exercised in public theaters, which allow for building scientific-political-public consensus on important policy issues. Nortje Marres (2007) points out how issues are central means for ordering, proposing, shaping and carrying out political agendas and policies. Finally, Jasanoff (2004) articulates how knowledge and social orders get co-produced, and how the regulatory apparatus increasingly leverages scientific authority to exercise control and justify interventions (2009).

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2.5.2. Arena(s) of Environmental Risk Governance: Publics, Polity and Science

Traditional policy analysis focuses on the political arena “proper” — the political institutions in which governance unfolds, or the “polity” (Palonen, 2003). Yet, interpretative policy analysis extends this perspective towards non-governmental actors as part of the regulatory apparatus, for example examining the role of regulatory science (Jasanoff, 2005a, 2009). Similarly, “the public” figures not only as subjects of the state, but also as pro-active actors that are themselves deeply involved and engaged in politics — politicizing what is commonly situated as “civic” and “private” spheres in demarcation to political arenas (Pedrini, 2014). The relationships between polity, science and publics are discussed in context of democratic capacities and deliberative policy making, posing challenges to centralized and top-down policy making, agenda setting as well as knowledge production (Dewey, 1984).

While authors such as Dewey argue for a deliberation of policy and knowledge making, publics themselves challenged the regulatory apparatus. Discussed as “upstream-engagement”, “the public” as an actively shaping force of policy plays an increasingly more important role in political and policy analysis.

STS literatures on science, democracy and publics pay close attention to the ways in which the locations, timings and public-science-polity encounters unfold and shape governance and democracy. Key arguments thereby point to how encounters between polity and public are carefully configured: in terms of who can participate as “invited publics” (Guthman & Brown, 2015), on what terms, and to what extent. This also points to issues around boundary configurations discussed above (Guston, 2001). The problematization of environmental risks plays in an important role in this context as well, as it involves the

prioritization of impacted populations in terms of vulnerabilities and impact (subjects) and who is invited as active participants in shaping policy, and in what settings.

2.5.2.1. Subjects of the Regulatory Apparatus

In this context, Gutham and Brow (2015) examine the construction of subjectivity, citizenship and populations. They outline how policy agendas are constructed to count and discount populations. They describe how definitions of thresholds (and their geographies) become subtle mechanisms to sort *populations* (those who are protected) from *people* (those who are either considered a threat, risky, or do not count at all). Goffman (1968) and Foucault (1991) discuss how the demarcation as population/citizen is a political act of valuing and de-valuing life, and shapes capacities to participate in the regulatory apparatus, designates rights, and constitutes protection through the state. Spivak (1988) extends this argument by pointing to the ways in which populations are being discounted and dismissed as people without rights and representation (building off of Gramsci's concept of the subaltern), while also pointing to the ways in which post-colonial theory carried by Western intellectuals re-enforce this configurations of "voicelessness." In a similar vein, feminist scholars (Haraway, 1988; S. Harding, 1991, 1993; S. G. Harding, 1986; Starr, 1969) emphasize that studies from a place of power remain ignorant of the positions without power and their constraints, drawing attention to the need of an analysis in shifting perspectives (Haraway, 1988) to better analyze the mechanisms that hold power relationships in place by discounting populations and rendering them invisible.

Thereby, adaptation policy focuses predominantly on urban areas when it comes to climate change and public health. Rural areas are primarily discussed as the economic (food-production) sector. For example, Keller as well as Klinenberg draw in studies on the Paris (Keller, 2015) and Chicago Heat Waves (Klinenberg, 1999) to draw attention to the unequally distributed impacts on different population groups, due to the ways in which people can respond to heat stresses based on material and social structures of protection and adaptation. Studies informing (emergency planning and adaptation) policy similarly address how adaptation measures must specifically address vulnerable populations and the socio-material conditions they live in, focusing mostly on the urban sector, or at least not drawing distinctions that would incorporate unique fabrics of rural life (E. M. Fischer, Oleson, & Lawrence, 2012; Kovats & Hajat, 2008; Lobell et al., 2013; Poumadère et al., 2005). These studies draw attention to how

policies, adaptation and protection measures and their socio-material implementation centrally shape the ways heat stressors unfold in these fabrics, and impact different population groups differently.

2.5.2.2. Participatory Policy Making

Increasingly "the public" figures in environmental risk adaptation policy (Few et al., 2016). Participatory events, such as outreach workshops, round tables and citizen conferences, are today a common element in the process of adaptation implementation in particular. These events are ought to be for a for invited publics to take part in the formulation of aims of adaptation strategies, raise awareness of specific concerns related to the issues at hand, and become an integral part of the process of adaptation policy development and implementation. This development is embedded in a larger gradual move from a monolithic science "apart from public" to an open and deliberative engagement of both, science in public and public entering the domains of science. Elam and Bertilsson (2003) describe a development from science in a place of it's own, detached from society, towards a twofold engagement with *the public* (referred to as PUS and – later – PE, or Public Engagement). A range of literatures point to an emergence of a scientific citizenship (cp. Elam & Bertilsson, 2003) that identifies an increased interest in participatory forms of knowledge making in the backdrop of a rising public distrust in science and regulatory regimes alike (cp. Hagendijk; Rob & Irwin, 2006). This is also reflected in a wide range of policy documents, probably most prominently in the House of Lords report. Today, particularly in the EU participatory, engagement and outreach exercises became a key element in the contemporary research and governance landscape, and is especially embedded in EU funded research. Similarly, climate change governance in the US and the EU emphasize the importance of citizen participation in the development of adaptation strategies and their implementation.

Participation in the scientific-political governance apparatus, especially in the governance of environmental risks, emerges with the perception of an increased public distrust in the steering science-driven apparatus that operated in the modernist promise of continuous progress. This is situated in the context of Beck's (1992) diagnosis of a world of globalized risks where their distribution and production becomes a new central characteristic of modernity. Shapin (1990) describes the establishment of rigid boundaries between science and its publics, associated with the increased establishment of scientific

advisory as central input for political action. He problematizes the relationship between public trust in science and its relationship with the legitimacy of science as a steering body.

The increased attention to public participation as a response to a legitimacy problem (Shapin, 1990, p. 1006f) was addressed in a diffusionist (Godin, 2006) approach. Faced with challenges of public distrust and controversies that start challenging the legitimacy of scientific authority in the regulatory body, this approach operates in a deficit logic of science (Bucchi, 2008; Irwin, 2008), where “the public’s” distrust in science primarily explained away as misconceptions and misunderstandings (Irwin & Wynne, 2003; Wynne, 1992) of science. A better communicating and educating of the public would resolve issues of distrust by generating a better understanding of how science produces knowledge, and more particularly, by propagating the beneficial outcomes of science.

Outreach exercises with the intent to educate publics are framed within two problematizations: an increased confrontation with publics that articulate criticisms and distrust in regulatory bodies, and an impression of misconceptions of actual environmental risks, and the legitimacy of concerns of different publics over the prioritizing of risks. In the enlightenment model, both aspects are addressed as misinformed and ill-educated publics, and thus countered with education outreach measures to reconcile trust in the regulatory apparatus of environmental risks on the one hand, perceived misconceptions of what environmental risks are and how they unfold in society on the other.

This approach did not show particularly fruitful outcomes, ignoring larger social contexts in which seemingly “misguided” distrust originates. Beck describes this as a shift of class warfare into the unequal distributions of risks in society (Beck, 1992; K. Fortun, 2004; Irwin, 2008), packaging participatory approaches within a deficit model of primarily downstream communication and education measures (Stirling, 2008). With Bauman (2001), Giddens (1990) or Beck (1992), modernity must be characterized as “a culture within which science is presented as the embodiment of truth and the task of government becomes one of bringing rationality to human affairs”(Irwin, 2008, p. 203). In this perspective, enlightenment models of risk governance and risk communication can be seen as managing disorder by feeding it back into top-down rationales of maintaining social order in the face of uncertainty and risk as “the ‘extermination of ambivalence’” (Irwin, 2008, p. 203).

> In line with the Enlightenment model, it is only natural that communication between science and society is all one-way (Elam & Bertilsson, 2003, p. 238).

The central criticism of the enlightenment model of science communication unfolds along two lines, tied to a category mistake about how public misunderstandings are packaged within these deficit models of risk communication:

> […] [I]t is increasingly accepted that the issues of public understanding of science, and of public risk perceptions, are not so much about public capabilities in understanding technical information, but about the trust and credibility they are prepared to invest in scientific spokespersons or institutions. (Wynne, 1992, p. 282).

Secondly, it is criticized for assuming a passive public "audience" of science communication – passive recipients of information conveyed by science to an unengaged public that is assumed to be ill- or not informed at all. This point is situated in the larger critique of science as authority to speak on issues in an institutionally sanctioned expert position within the regulatory body, whilst "the public" is not much more than a passive subject to the governing body. The enlightenment model of science would re-establish and perpetuate power and particularly the authority of science as knowledge maker (Irwin, 2008, p. 201f). Wynne points out that these linear top-down communication models hinge strongly on an objectivist understanding of scientific facticity, as it is particularly the case for risk (Wynne, 1992, p. 62).

Accordingly, for Irwin, these critiques of the deficit model represent "an attempt to characterize one dominant mode of institutional problem definition and to suggest that there may be alternative ways of thinking and acting" (Irwin, 2008, p. 74). What Irwin points to here is the larger debate unfolding in response to the linear downstream engagement measures that seek to create more deliberative process of participation in knowledge making and policy agenda setting and to diversify the sources of input in understanding complex policy issues such as environmental hazards and risks. This "opening up" of science and the polity thereby emphasizes modes of engagement and deliberative participation that takes seriously the insights STS in particular produced on the relevance for knowledge and experience of local actors in understanding complex problems for policy agendas and science alike.

In response to these criticisms, and in continued confrontation with activist challenges to established regulatory regimes of environmental hazards, upstream approaches engaging publics in

policy making processes and regulatory decisions at all stages are developed and implemented (Stirling, 2008, p. 263). This expansion into more deliberative participatory events seeks to engage publics in a "dialogue" model.

A variety of social movements set out to challenge established regulatory bodies on multiple grounds. Pinch & Collins (1998) as well as Epstein's (1995) discussion of the ActUp! movement describe how activists centrally challenged scientific expertise and authority in the research of new treatments of AIDS, as well as the control over access to medicinal trial studies. Their case studies shed light on how activists not only challenged the authority of scientific expertise in multiple forms, but also highlight how the experiences and expertise of so called "laypeople" become mobilized in challenging the regulatory orders by producing and introducing competing knowledge to the political stage.

Similarly, studies — for example: Woburn, Mass. and other communities in the U.S. (Brown, 1992; Brown, Morell-Frosch, & Zavestoski, 2011), including Love Canal (Brown & Clapp, 2002); the Chernobyl disaster (Wynne, 1992); or citizen science water monitoring initiatives (Jalbert et al., 2014; Kinchy et al., 2014) — articulate how different publics start to challenge scientific and political actors in their authority to set political agendas around environmental risks and their governance. A growing body of literature increasingly articulates that "the public scrutinizes science 'from below,' and, through social movement struggles, is increasingly involved in setting and pursuing research agendas (Hess, 2007; Moore, Kleinman, Hess, & Frickel, 2011)" in a "process of epistemic modernization" (Kinchy et al., 2014, p. 263).

Case studies on the GMO debate (Irwin, 2008), in the field of medical care – and here particularly the vaccination debate, or Brown (1987) or Wynne's studies of the management of radioactive containment in rural areas of the UK following the Chernobyl disaster, show how local and experiential (so-called non-scientific) knowledge provides important insights in how risks unfold locally. Wynne's study in particular portrays how scientific experts repeatedly fail in adequately addressing the unfolding crisis by ignoring key knowledge claims of so called "laypeople." Similarly, Kinchy (2014) shows how citizens can generate key expertise that is not only crucial in providing key data for understanding complex issues revolving around environmental risks, contaminants and hazards, but can utilize these data to influence and shift policy agenda by bringing new dimensions of environmental hazards to the attention of regulatory bodies, or bringing so far ignored disasters to public attention. Irwin (2008) brings this

expansion into the larger perspective of a shift in the logic of managing risks through science and its relationship with(in) the larger social nexus. On the one hand, it must be understood within the larger debate connected to debates of deliberative democracy. On the other hand, “Beck and his contemporaries have emphasized the manner in which conventional political institutions have come under great challenge when dealing with issues of risk. While modernistic institutions might present themselves as being ‘in control’, the evidence from public protests over genetically modified foods, nuclear power and road-building programs suggests that this may not be the case” (Irwin, 2008, p. 204). An opening up of policy agenda setting processes may be understood as a means to counteract this tension. A third aspect is tied to challenges of authority and legitimacy of scientific institutions in governing environmental risks (cp. Irwin and Wynne, 1996):

> The research in how publics challenge existing regulatory orders imply ‘that, rather than simply presenting wider society as an impediment to scientific and technological progress, it is necessary to examine critically the operational assumptions and practices of scientific institutions: the very form of reflexive scrutiny that [deficit] approaches generally evade. Seen from this perspective, second-order thinking may have become a practical necessity if public policy is to be made – and justified – in circumstances of social and technical uncertainty (Irwin, 2008, p. 204).

The emergence of this “second order thinking” refers to a distinction made first by Collins/Evans. “First order” thinking refers to the deficit-model, where public distrust (e.g. in science) is explained with “knowledge deficits” that must be corrected through educational efforts. “Second order” thinking emphasizes public engagement and dialogue around deliberative decision-making processes, including science and its contents. Irwin (2008) critiques this “second order” thinking as a re-appropriating of engagement exercises in the light of challenged legitimacy and authority, and proposes a “third order” thinking “about risk, science and public communication [that] asks fundamental questions about the underlying relationship between first- and second-order approaches, the changes that have taken place (both in theory and practice), and the future direction of scientific governance and science communication” (Irwin, 2008, p. 199). Just as much as engagement/dialogue/second order models of governing bodies relating to different publics emerges in response to these challenges. The solutions it puts forward in this response have to be understood as means to re-constitute the scientific and regulatory authority in governing environmental risks.

A range of studies critically examines the plethora of engagement exercises that took hold in the US and EU as regular practices in the political arena writ large. These studies unfold centrally in three key critiques that feed into the larger argument: First, they criticize control over agendas, access, design and timing of these events. Secondly, a large critique unfolds the construction of what publics are invited and what are not, the general ways in which these events are accessible/open to different kinds of publics, and how they generate closure to debates under the chimera of legitimizing scientific/regulatory authority by getting "public consent" by only a limited section of "the public." Thirdly, consequentially these literatures articulate a critique of such events as means for assuming control over timing, unfolding and participation of public controversies, challenges and strives for shaping policy agendas (cp. e.g. Felt & Fochler, 2010; Felt, Gugglberger, & Mager, 2009; Latour, 2005; Lezaun & Soneryd, 2007; Marres, 2007; Nisbet, 2009).

Overall, this problematizes such events as staged (cp. Hilgartner, 2004a) events that are always shifted in power balances towards existing positions of power and authority. Rather than promoting "real" dialogue and participation, so this critique, such events reinforce the legitimacy of an uneven distribution of power towards the dominating regulatory apparatus. Iris Marion Young (2001) further extends this critique, in outlining numerous arguments for how participatory models are entrenched in uneven power-relationships that favor those in control of those events.

Similarly, new models seek to reconcile this tension through "third order thinking" (Irwin, 2008; Irwin & Wynne, 2003) or a "third wave" (Collins & Evans, 2002) of science studies. It is also important that despite these shortcomings, outreach events as well as engagement events do show successes. They can lend important help to, in the case of top-down communication, provide publics with helpful guidelines, for example, for how to act in cases of emergency by streamlining procedures and providing orientation in dynamically unfolding crisis situations. Similarly, engagement events provide, even if limited, forums for publics to more closely and actively participate in political processes and make their voices heard, setting or shifting agendas and providing important insights into the governance of environmental risks that the regulatory apparatus otherwise potentially misses.

This formulates critiques calling to include alternative and potentially conflicting positions, experiences and expertise. It brings to attention the political dimensions and constraints of such

participatory exercises. Particularly this appears to be the case where regulatory oversight could face blame for environmental disasters — responding often by foreclose, deflect, delegitimize or simply ignore explicit challenges to its oversight. In context of this critique, such events should not be completely dismissed as useless, but rather their deliberative promises not overstated. Within their constraints, they can serve important functions for the management and governance of environmental risks, and even can provide (limited) participatory opportunities for publics.

2.6. Summary and Outlook

Established adaptation literatures problematize climate risks as if they were quasi-"naturally occurring" phenomena, and only more recently has the intersection of adaptation and mitigation received greater attention. In the meantime, an overwhelming majority of research is focused on developing best practices and lessons learned for adaptation, that in principle understand adaptation as a matter of risk assessment and management. However, political economists and environmental sociologists have begun to more critically examine how risks, vulnerabilities and their distribution are socially produced — calling for an analysis of adaptation that recognizes its inherent politics.

These literatures draw attention to the social-political production of risk and vulnerability and understand adaptation itself is involved not only in their mitigation but also in their continuation, exacerbation and (co-)production. Pelling (2011) and Eriksen et al. (2015) situate adaptation towards the political systems in and around which they unfold. "Inherently political" (Eriksen et al., 2005), adaptation then is examined for its role as either maintaining them ("adjustment adaptation") or reforming or transforming ("transformation adaptation") them. The central question for these literatures regards how far adaptation maintains or transforms systems of (political) power and its structural conditions.

However, this young and growing body of critical literatures has yet to provide an explicitly reflexive analysis of the ways adaptation is implied in the operating of systems of power and governance. In other words, while these literatures draw attention to the politics of adaptation in its consequences, they do not incorporate an analysis of how adaptation itself is deployed to govern.

This dissertation sets out to offer a social constructivist analysis of adaptation governance, in order to bring this letter aspect into perspective. Adaptation governance has then two meanings: First, it seeks

to understand the governance **of** adaptation — that is, the ways in which decisions are made about what needs to be adapted to; how; and to what ends. Second, it seeks to understand how adaptation is deployed in order to govern: The governance **through** adaptation.

Drawing on key literatures on power, governance and publics, these two meanings of adaptation governance are proposed to be inseparable: decisions about the "design" of adaptation on the one hand, and what adaptation is "designed" to do cannot be separated but instead should be seen as part of a larger governance apparatus.

The STS literatures on governance and the public are particularly useful here to draw attention to the mechanisms in which epistemological orders, political orders and societal orders are co-produced and governed, reflecting Lukes' three faces of power. For him, power involves three key dimensions: 1) the decisions and rules, and their exercise; 2) making rules of rule-making (that is, who gets to make the rules, on what terms, and with what possible outcomes) and; 3) the hegemony of power (that is, the control of epistemologies; of what is thinkable and what not).

3. NY: LOCAL MANIFESTATIONS OF ADJUSTMENT ADAPTATION

*This chapter and the next discuss the governance **of** adaptation. Chapter three provides a discussion of adaptation governance in New York. It characterizes how adjustment adaptation manifests across scale in New York's state adaptation planning and implementation. It makes the case that the meaning of "adjustment adaptation" manifests in locally situated practice across scales.*

3.1. Introduction

Climate impacts escalate pressures on societies to adapt. The escalation of impacts in the agricultural sector increasingly challenge how food production can be sustained. As adaptations are planned, prepared and implemented locally and through policy, agricultural futures are at stake. New York and Austria bring on their way distinct adaptation policies and implement them in local food-producing communities. Important decisions are made about what to preserve and what to let go, what to change and what to maintain, as adaptation is being localized across scales. In this and the following chapter I trace the distinct decisions that run into establishing and localizing adaptation policy across scales in Austria and New York respectively.

I examine adaptation planning and practice in Austria and New York across scales for how different actors engage in decision-making processes about adaptation, manifesting specific modes for governing environmental change. I argue that differences manifest in how actors across scales and policy contexts draw on and mobilize varying problematization of climate risks to justify specific adaptation objectives and interventions. Making a constructivist argument about how adaptation is co-produced with distinctively local epistemological orders of risk and adaptation, I address problematization as the ways in which environmental hazards get understood, conceptualized as a governing problem, and are made governable (Bacchi & Goodwin, 2016; Jasanoff, 2004; Jasanoff & Kim, 2013; Marres, 2007; Michel Foucault & Rabinow, 1997). These processes manifest adaptation within specific civic epistemology: In New York adaptation manifests in system adjustments to manage external environmental changes threatening the economic output of the agricultural system. This stands in juxtaposition to Austrian

adaptation policy. In chapter 4 I will argue that Austrian adaptation policy explicitly problematizes risk-producing agricultural systems in order to advance sustainability transitions and maintaining small-scale, diversified agricultural systems.

In contrast, this chapter shows how New York's adaptation policy is explicitly adjustive, as it centrally engages in managing a changing environment "out there." Ad-hoc adjustment adaptation emerges as a response to problematizations of climate risks as constituted in escalating natural hazards and that are putting the productivity of agriculture as an economic system in jeopardy. New York's adjustment adaptation policy is squarely rooted in a productionist paradigm: Here, adaptations are primarily focused on maintaining a) the economic output of agricultural systems and b) the existing political orders that support it as environmental changes escalate. Accordingly, adjustments in this paradigm centrally focus on techno-scientific interventions as response to risks that come from an environment that is "out there." From intensification of conventional agricultural practices to techno-scientific fixes, the ways in which climate risks and climate change itself are (co-)produced by agricultural practices become increasingly immaterial within this approach to adaptation. Instead, adaptation is constructed as a matter of increasing resilience in order to weather escalating natural hazards via techno-scientific interventions.

To make this argument, this and the following chapter follow the same structure to enable comparative analysis. I build my argument by tracing the mutual shaping of climate problematization and the localized manifestation of adaptation policy across scales, with each sub-section paying attention to a specific site of adaptation decision-making. As such, the following two chapters centrally focus on the places of power: the key sites of decision-making in adaptation localization processes. Each of the following sections discusses one of these locales for what adaptation means in these contexts, and how meaning is made by some of the actors involved in the processes of adaptation.

In **Section 2**, I discuss how epistemological orders of risks become established in documents constituting an informal adaptation policy in New York State. I show how techno-scientific epistemological orders become established and mobilized in manifesting a natural hazards school approach to adjustment adaptation through these policy documents. In **Section 3**, I attend to the ways in which mid-level administrators at state agencies fundamentally substantiate adaptation policy within the concrete

socio-cultural and organizational orders of the state offices. I argue that, markedly, the epistemological orders of risks constituted in natural hazards manifest adaptation and are made concrete in the specific local orders of the state agencies and their larger political and civic cultural orders. **Section 4**, examines how adaptation policy, substantiated in the local orders of state agencies — such as the DEC — become further localized through adaptation implementation programs such as the Climate Smart Communities program. As local administrators at the Madison County planning offices participate in adaptation planning and decision-making through the program, I make explicit how socio-political and epistemological orders of adaptation become extended into the local, refiguring existing local adaptation practices. **Section 5** examines how local farmers are adapting in a structurally organized disconnect between state planning and adaptation in what becomes explicitly framed as an economic realm — and draw on industry stakeholders with a strictly limited role of the state.

What becomes visible is a specific way of governing adaptation across scales — which I will elaborate throughout this dissertation as processes of *adaptation* localizing. The way in which adaptation is localized in New York produced an adaptation approach that across scales centrally emerges as an ad-hoc response to and in the problematization of natural hazards. This is shaped, substantiated and reflective of local and cross-scale interactions and orders involved in the governance of and through adaptation. This adaptation as ad-hoc system adjustments stands in stark contrast to how Austria problematizes and governs climate risks (Chapter 4) — and is consequential for how adaptation materializes “on the ground” in agricultural communities in upstate New York (Chapter 5).

3.2. Hazardous Experiences on Madison County’s Farms

We begin our journey in Madison County. Idyllically nested south of Lake Oneida in central New York, the southern parts of the county are defined by soft hills and woodlands that form the onset of the Appalachians, with small towns surrounded by farmland in the valleys. This area is thinly populated, rural, and shaped by agriculture. To the north, the foothills drop off abruptly into the northern plains along Lake Oneida. Here, the county is defined by arable soils and the Erie Canal. This part of the county is shaped by larger agricultural industries, thriving off the rich (but increasingly depleted due to overextension) soils of the mucklands. The plains are also home to the population and industrial centers concentrated along

the Erie Canal. In the southern parts of the region, small towns, villages and primarily livestock and dairy farms are scattered across the hills and valleys of a sparsely populated landscape. This makes agriculture an important shaping force of the county's economic, cultural and social fabric. Most land is in agricultural (50%) or forestry (45%) production; and much of the local life revolves around it. The county's diversified agriculture, the Erie canal, and the proximity to Syracuse as the largest urban center to its east and its relative proximity to the state's capital Albany — they all leave their mark:

> In particular, the history, tradition, and economic impacts of the county's dairy enterprise are worth noting. Dairy … remains an important part of our local economy. With it comes a significant number of agribusinesses which supply inputs and service to all kinds of farm operations. Many of these agribusinesses also purchase, distribute and market dairy and other agricultural commodities and products. Together these business owners benefit from the county's central location, providing convenient access to other agricultural outlets and services throughout Central New York (MC Farmland Protection Board, 2005, p. 6).

The imprint of agriculture on Madison County's lands, history and peoples continues to evolve today, with new tendencies for globalized and industrialized production converging with significant demographic shifts of the rural populations and a continued decline of the historically small and relatively diversified agriculture that dominated the past (cp. MC Farmland Protection Board, 2005). Yet, as it is the case across the US, escalating weather extremes, seasonal disruptions and longer-term climatological changes are constituting a significant shift in how and what kinds of agriculture are possible, livable and viable today and in the future — and with an immediate impact on the county's societal fabrics.

New and foundational threats and challenges arise for the farmers of the region. They begin to confront and adapt to major climate disruptions, and the ways in which they do so will impact the future of not only agriculture in Madison County, but the fabric of life in the county that they so fundamentally co-constitute. The impacts of climate change are felt across the county with significant losses during climate disasters as well as in the gradual shifts and disruptions associated with long-term climate change — not only of Madison County, but across the State of New York and the US as a whole.

In Madison County, I meet with Theresa*, a second-generation dairy farmer. I visit her on a tucked-away farm, nestled between soft hills, and overlooking a creek meandering through the pastures grazed by her cattle herd a couple of hundred feet downhill from where we sit. During our interview, she recounts

when the pastures were engulfed by the overflowing waters of what is now a seemingly harmless creek scarcely carrying any water:

> We had problems with flooding here that we shouldn't have. But we get now those really bad gully washer rainstorms. Now it is constant. We had chickens in this field, baby chicks, and I just put them out in their house the day before. We were supposed to have storms come through, but we didn't think much of it. We had them come through before and so we thought we'll be fine. Our butcher is an hour away and we had to go out and pick up the meat, so we drive out there. When we come back, and we are coming over that hill over there, coming home with a bunch of beef and pork in the back. And we come over the hill and it is black, dark as night. The emergency alarms go off. In the town it is raining so hard it goes over the sidewalk. We come home over the hill and all we see is water, it had gone over the road and washed it away. But eventually, we make it over. Two houses down the driveway had blown out because of the rain and had washed through the coop house and flooded out everything. The chickens were half drowned, tried to rescue them and warm them up. The hillside came out. And this was the moment where I realized: this is going to be the norm, we have to prepare for that all the time now.

For Theresa*, weather escalations constitute a new normal — something that "we shouldn't have", but that now "is constant." Floods, she says, that previously occurred once a century or "maybe every fifty years," have become a new norm that already has fundamentally changed how she farms.

There is a "new normal" that farmers repeatedly speak to; a sense that "something has fundamentally shifted", as Olivia*, another farmer who lives nearby, puts it. Most of the farmers from the area that I meet over the course of this research share similar stories about the impacts of flooding and drought, constituting explicit risks and threats to their livelihoods. Their stories are about a changing climate, and a changing world with it, that they attempt to adapt to, cope with, and come to terms with; their stories are about flooded lands and washed out hillsides, about the deaths of their animals and the loss of harvests. Olivia* lives about a 25-minute drive from Theresa*, and shares a strikingly similar experience:

> For a lot of us in the area, the rain as of recently is really killing us on a daily basis, that is really a threat for us. Just look with all the rain recently. We have the chicks in those fenced in areas, and when you don't realize that it is a bit lower, water can accumulate in that ... they drown. We went out this summer and we had this rain and then you find these piles of dead chicks, and that feels really hard. Our with the early frost […], we had that early freeze and just when our sows were carrying […] and then one of the sows, we didn't get her in early enough, enclosed her, and she gave birth in the middle of the night and it really dropped down well below freezing and all her small ones except for one died. And that feels really like a personal failure. Because, when

> you have sows, you are responsible for them, and when you fail to keep them safe, that's on us, even if it is climate change and beyond your control, it feels like, maybe I should not have the sows when I can't keep them safe, and that's where we are now, that is really, really hard.

Dealing with devastations of weather escalations and climate disruptions become drastically obvious here. In many ways, farmers primarily discuss their experiences with climate change in the context of recurrent devastations of natural disasters as well as continuously worsening weather conditions impacting their farm operations.[10] In the unambiguous terms of life and death, and of economic devastation, they present an unprecedented need for farmers to adapt:

> As a farmer, we always deal with weather, we are used to that. So it is a question of really how well can you adapt to this. And increasingly it becomes so bad that you can't deal with it oftentimes. And then you feel like you fail against the weather all of the sudden, just because things become so bad now. And so it is really a matter that is about you, and if you fail or not: can you adapt to that, and how?

Thereby, of central concern for the interviewed farmers is the weathering of climate risks constituted in natural hazards — external threats that impact their farms and livelihoods: floods, droughts, seasonal disruptions and their effects on life, operations, livelihoods, individuals and communities.

3.3. Adaptation Policy in New York State

These escalations of natural hazards, and the impact that they have across the state, also figure critically in New York's efforts to put in place, advance and support adaptation on the state government level. In this section, I review how central policy documents establish New York's adaptation approach as constituted in response to escalating natural hazards. Although New York does not have a formally adopted policy in place, an informal policy manifests in the ClimAID report, which shapes adaptation planning across scales. It becomes the central resource that planners and decision-makers draw on in localizing adaptation policy across scales, as its risk assessments and adaptation guidelines establish

[10] Repeatedly throughout conversations with farmers, policymakers and local officials, these material experiences with escalating natural hazards become a shifting point in how local publics relate to the issue of climate change. The become focusing events (Birkland, 1998) that importantly shift how natural disasters are related to. For most interviewees, escalations in natural hazards, weather extremes and disrupted seasonal patterns are explicitly tied to and problematized as experiences of climate change — and therefore dramatically shift the scope of responses from weathering individual escalations to long-term adjustments of "new normal." The ways in which issues problematized (cp. Michel Foucault & Rabinow, 1997) and are attached with organizational, structural or political changes (or the push for them) (cp. Marres, 2007) becomes here an explicit issue of constructing a crisis in terms of climate change (cp. Estes, 1983)

techno-scientific epistemologies of natural hazards as central to adaptation decisions of the state. I make this case in this section by foregrounding how the ClimAID report constitutes adaptation in the (techno-scientific) problematization of natural hazards (2.1) that establish a specific mode of adaptation as ad-hoc system adjustments (2.2) and facilitates adaptation through localization programs (2.3).

Climate adaptation arrived on New York State's political agendas in early efforts through the Sea Level Task Force, as it warned about high risks of storms; and experiences with hurricanes Irene, Harvey and Sandy briefly thereafter lead to the establishment of the NYS2100 commission to more centrally address and develop responses to emergent climate escalations.[11] Both produced important documents that shape New York's adaptation policy to date and were situated squarely as a response to the disastrous dimensions of climate change, but their efforts waned prior to their completion because of a lack of continued political support.[12] As a consequence, NYS has yet to formally adopt a comprehensive adaptation policy. Instead, state adaptation planning evolved from dispersed initial efforts, creating a loosely connected adaptation planning approach that relies on the informal guidance of international frameworks and definitions, and the efforts of mid-level administrators.

Only the Climate Risk and Resiliency Act (CRRA) — adopted by the NYS legislature and signed by the Governor in 2014 — stands out in this context as it includes concrete provisions that aim to increase the state's resilience exclusively to sea-level and storm-surge related hazards. Otherwise, the state's (informal) adaptation policy is constituted primarily in agency (NYSERDA, 2011b), commission (NYS2100 Comission, 2013) and task force reports (New York State Sea Level Rise Task Force, 2010) that were not formalized as official state policy.[13] One of the documents of particular importance is the ClimAID report

[11] Again, the issue of focusing events (cp. Birkland, 1998) becomes of critical importance here. Repeatedly, policymakers emphasize the experiences with hurricanes around this time as fundamentally shifting how lawmakers and public officials talked about issues of climate change: "It is almost as if it gave them permission to talk about it", one of them explains. Birkland and others draw attention to how specific focal events can shift public perceptions and reframe policy agendas. In the context of New York's climate adaptation policy, these experiences were fundamental in bringing on the way early efforts in adaptation — and in turn fundamentally contributed to the framing of climate change as a matter of escalating weather hazards, as one interviewee puts it: "It all becomes about weathering the next storm."

[12] This was recounted by several mid-level administrators involved with this work or affected by it, describing how shifting political agendas lead to an early conclusion of the Sea Level Task Force, while the NYS 2100 — although never formally suspended — was not re-appointed.

[13] This means that the ClimAID report centrally informs the enactment of adaptation as an informal policy across the state, as policymakers and administrators centrally rely on key concepts that it contains (regarding risk assessment and adaptation planning processes). Yet, it has not been formalized and adopted formally as policy or released as such. Without the political commitments to support this policy on the top levels of NYS government, administrators

(NYSERDA, 2011b) released by the New York State Energy Research and Development Authority (NYSERDA) almost a decade ago in 2011 and updated last in 2014. In a comprehensive risk assessment,[14] this report centrally problematizes climate risks that emerge from escalating natural hazards, providing adaptation objectives that seek to adjust social systems to better weather these hazards. It is to date a key resource for most adaptation activities across the state.

3.3.1. Problematizing Natural Hazards

Adaptation manifests in the ClimAID report with an extensive risk assessment that primarily problematizes natural hazards as the primary focus of state adaptation planning. The report anticipates escalations of specific natural hazards as validating the need for adaptation. These problematizations shape how New York State plans for adaptation and localizes it "on the ground" in specific communities.

Two examples can illustrate this point: The first example is found in Annex II of the ClimAid report, also called "guidebook." This "guidebook" lays out a standard best-practice of adaptation planning, explicitly describing the approach as a risk assessment approach to manage climate risks as quasi-natural hazards. The second example regards local adaptation planning: Developing an adaptation plan is a central recommended action that participating communities in the Climate Smart Communities program (described below) can take. The guidelines for this action draw on established risk assessment processes, focusing on the identification and assessment of risks, the evaluation of potential vulnerabilities, and the adjustive response to better weather these impacts.

speak to the precarious situation that this informal character of adaptation policy constitutes, as will become evident throughout this chapter.

[14] There is a long history of STS research into the governance of risks that points out that techno-scientific epistemologies importantly reaffirm nature-society divides (cp. Lupton, 1999). Foucault problematizes the scientific metrification and its role for governance and agenda-setting (cp. Foucault & Sheridan, 1972). Epistemologies of risk are here centrally constituted in the authority of (quantitative) scientific assessments. This puts into perspective the "disposition of things" (or issues, cp. Marres, 2007) — how issues and the assembly of social, material and discursive/knowledge orders are brought in disposition to each other as to exercise control. For Marres, governance of risk are constituted in and coupled with the problematizations and the ways in which these problematizations are being achieved. Jasanoff articulates a similar argument in broader strokes — describing them as "co-produced" (Jasanoff, 2004, 2011; Jasanoff & Kim, 2013). Poststructuralist policy analysis therefore emphasizes that logics of governance extend into social orders in constituting ways and geared towards the re-production of power. As such, problematizations (the ways in which environmental hazards get understood, conceptualized as a governing problem, and are made governable) are themselves product of a larger apparatus involved in the "disposition of things", to speak with Foucault, and emerge from within its structures, thus both re-enforcing each other and stabilizing the dominating principles of order while rendering alternatives "unthinkable."

Thereby assessments focus on escalating natural hazards, but do not analyze risks as constituted in the structures of social systems, such as the agricultural system. Madison County is projected to face a strong rise in annual average temperatures, whereas relatively marginal change is projected for average annual precipitations. Because of that, the report predicts significant escalations in extreme weather and also brings seasonal distributions into focus (NYSERDA, 2011b, p. 32). Precipitation is expected to occur primarily in heavy downpour events in the spring, and increased risks for droughts and heatwaves are expected for summer months (see Fig. 14, from ClimAID risks p. 29 and p. 17). The authors of the report also warn that "… [w]hile seasonal projections are less certain than annual results, much of this additional precipitation may occur during the winter months. During September and October, in contrast, total precipitation is slightly reduced in many climate models" (NYSERDA, 2011b, p. 30). Accordingly, the ClimAID report — both for New York State as a whole as well as for Madison County — centrally problematizes climate risks in a likely increase in:

- Heat Waves and Cold Events
- Intense Precipitation and Droughts
- (and for coastal areas: coastal floods and storms)

Complementing regional assessments, the report establishes climate risks in escalating climate hazards impacting specific sectors[15] (including the agricultural sector) by assessing hazards and their impacts in quantitative metrics — from climate data to expected economic losses in the agricultural sector due to them. Key hazards are again precipitation, temperature and sea level rise, and related impacts (such as, for example, flooding, soil erosion and land loss, or drought):

> In the case of brief intense rain events (for which only qualitative projections can be provided), both the mean and variability are projected to increase, based on a combination of climate model simulations, theoretical understanding, and observed trends. Both heavy precipitation events and

[15] These sectors — as well as the impacts of hazards on them — are explicitly discussed in economic terms. Estes (1983) discusses how aging as a "social security crisis" importantly sets the terms for what is problematized as risks and what is being affected by them. In her case study, aging is constructed as a burden and problematized for its effects on the social security system. This importantly eliminates potential problematizations of societal valuing of old age and resembles a productionist paradigm in which bodies are assessed for their capacities to produce, or "contribute" to society as able-bodied workers. Similar arguments can be made here, where the problematization of climate change is explicitly framed (Nisbet & Mooney, 2007; Roth et al., 2003; Tierney, 2006) as primarily a concern for the stability and productivity of economic sectors. In that way, possible problematizations of impacts on agriculture are constrained (Fleck, 1981) to those of economics and solidify clear distinctions between what is harmful (nature) and what is harmed (agricultural economics).

> warm season droughts (which depend on several climate variables) are projected to become more frequent and intense during this century (NYSERDA, 2011b, p. 17).

The risk assessment also highlights potential impacts on the agricultural system, expecting that extreme summer temperatures will likely cause damages to yield and overall quality of many crops and will most likely adversely impact health and productivity of livestock. Seasonal precipitation patterns, while harder to predict, are expected to likely shift into new distribution patterns that could deeply impact the agricultural sector:

> There are some climate factors, such as increased frequency and clustering of extreme events, that could potentially have severe negative impacts on the agriculture industry, but our current level of certainty about these factors is low (NYSERDA, 2011b, p. 222)

This makes explicit the central problematizations in which adaptation is constituted: Three forms of escalations of natural hazards — shifts in annual averages, extreme weather and seasonal disruptions — become a central matter of concern as climate change exacerbates their severity, frequency and intensity and are discussed primarily as impacts on agriculture as an economic sector.

These problematizations constitute risks centrally in specific external natural hazards while constructing agriculture exclusively as an economic sector. Accordingly, the agricultural systems are primarily discussed as impacted by natural hazards, and not substantively problematized for its involvement in the production of such risks as a key driver of climate change. Such a problematization gives outsize priority to sciences that identify hazards and evaluate them for their impacts of affected social systems. As a consequence, anticipatory risk sciences become a critical epistemological framer that produces credible knowledges for planners on how hazards act upon systems, how to anticipate them appropriately, how to put in place adjustments that can help better endure system shocks and take advantage of opportunities.[16]

[16] While the authors of the ClimAID report anticipate that these hazards will figure significantly in future adaptation, they also argue that potential opportunities will likely emerge: "[w]hile climate change will create unprecedented challenges, there are likely to be new opportunities as well, such as emerging markets for new crop options that may come with a longer growing season and warmer temperatures. Taking advantage of any opportunities and minimizing the adverse consequences of climate change will require new decision tools for strategic adaptation. Adaptations will not be cost- or risk-free, and inequities in availability of capital or information for strategic adaptation may become an issue for some sectors of the agricultural economy" (NYSERDA, 2011b, p. 218).

3.3.2. Adjusting Social Systems to Natural Hazards

Providing these techno-scientific risk assessments, the ClimAID report plays a crucial role in giving shape to how New York State adapts to climate change. This section shows how adaptation emerges from these risk assessments in the form of system adjustments that seek to maintain the economic capacities of agriculture as an economic sector:[17]

Techno-scientific, anticipatory risk assessments[18] establish the impacts of natural hazards as central climate risks to the economic stability of agriculture. Impacts are primarily problematized in economic terms and expressed in corresponding metrics.[19] Accordingly, climate escalations figure only for their impacts on the economic output of the agricultural system. This section shows that it is in the context of such problematizations that adaptation becomes explicitly established as system adjustments that aim at maintaining agriculture as an economic system — and not, for example, as a social system that involves human and non-human life — impacts the stability of entire ecosystems and has other than economic values.[20] Constituted in the almost exclusive problematization of escalating natural hazards, the ClimAID report establishes key frameworks for adaptation planning and implementation that policymakers and planners across scales importantly rely on in adapting.

Adaptation is established in the definitions and planning guidelines of the report, and lay out adaptation explicitly as a response and adjustment to the quantified risks and anticipated impacts of increasingly escalating natural hazards. It establishes a need for "the potential capacity to address many

[17] This strongly relates to discussions by Pelling (2011) and Bassett and Fogelman (2013), who point out that adjustment approaches to adaptation aim at the maintenance of the status-quo and are thereby inapt to adequately problematize or structurally address the societal production of risk and vulnerability. Problem and response are entangled political acts that are not neutral but order populations in specific ways and thus problematizations themselves become a primary political concern (Michel Foucault & Rabinow, 1997).

[18] The governance of environmental hazards in a "modernist-rationalized" logic co-emerges in the increased need for stronger rational-managerial societal order at the onset of feudal economies (to account for weather patterns in agriculture; to govern agricultural output, etc.). The emergence of first "scientific" managerial methods signifies this co-evolution, as Foucault exemplifies in his discussion on statistics as the association of risks with population management (Foucault, 1988). This replaces a logic conceiving hazards as dangerous outside – "nature"; environmental hazards that impact society as uncontrollable "fate" –by rationalized managerial logics of risk assessment and governance in an entangled relationship of society and nature (cp. Hacking, 1990; Luhman, 1993).

[19] For example, the ClimAID report's chapter on agriculture explicitly discusses agriculture as an economic sector and evaluates it for its economic value and the potential economic losses due to climate risks (NYSERDA, 2011b, p. 210).

[20] This stands in stark contrast to the Austrian adaptation strategy (cp. Chapter 4 of this dissertation), where agriculture is explicitly discussed for its role in maintaining cultural landscapes as a good of the commons, its role for shaping the fabric of rural life, and its function in ecological stewardship.

climate-related risks, thereby reducing negative impacts and taking advantage of possible opportunities" (NYSERDA, 2011b) via system adjustment. These opportunities[21] are thereby again discussed for agriculture exclusively in economic terms. Just consider how climate impacts are problematized in the introduction of the chapter on agriculture in the ClimAID report:

> Agriculture is a significant component of the New York economy that includes large wholesale grower-shippers selling products nationally and internationally, a substantial dairy industry, and thousands of small farm operations selling direct retail and providing communities throughout the state with local, fresh produce. Farmers will be on the front lines of coping with climate change, but the direct impacts on crops, livestock, and pests, and the costs of farmer adaptation, will have cascading effects beyond the farm gate and throughout the state's economy. While climate change will create unprecedented challenges, there are likely to be new opportunities as well, such as emerging markets for new crop options that may come with a longer growing season and warmer temperatures. Taking advantage of any opportunities and minimizing the adverse consequences of climate change will require new decision tools for strategic adaptation. Adaptations will not be cost- or risk-free, and inequities in availability of capital or information for strategic adaptation may become an issue for some sectors of the agricultural economy (NYSERDA, 2011a, p. 219).

Without mentioning impacts, for example, on health and wellbeing, ecosystems, farming culture, or (legal and social) rights, this passage explicitly characterizes agriculture as an economic sector and evaluates impacts economically. As a consequence, no differentiations are made between stakeholders and how they might be impacted differently — excluding, for example: farmers, farm laborers, different kinds of farms, animals and plant life, ecosystems, or surrounding communities. This dissertation will make explicit in the examination of experiences "on the ground", that climate impacts are amongst farming communities and their social and ecological ecosystems need to be examined for more differentiated and exceed evaluations in terms of economic production. Additionally, while the ClimAID report also addresses ecosystem and health impacts of climate change, it does so in separate chapters. Therefore, it is not able to provide a differentiated perspective that thinks climate risks and human

[21] This expands the discussion in STS and related disciplines about how the scientific assessment of risks introduces bureaucratic management of calculated threats and opportunities, extending governance. In this context, the state apparatus is primarily concerned with governing economic relationships between nature, social systems and commodification. What these opportunities are — in this case of further/intensified extraction and commodification of ecosystems — is a highly political matter. Past relationships of extraction remain in the case of NYS policy maintained as the wishful norm and become extrapolated into their future of new frontiers to be conquered and its resources to be mined.

behavior as associated (e.g. discussing the negative impacts of farming practices, their contribution to climate change, and the exacerbation of negative effects through climate change).

Adaptation in this perspective focuses on such transitions that would allow the agricultural sector to weather the risks constituted in natural hazards, while taking advantage of emergent opportunities — the success of which again is evaluated in metrics that assess economic effects.

In the ClimAID report, adaptation manifests in these problematizations in an explicit adjustment-focus, and thereby draws on anticipatory[22] sciences: 1) detailing anticipated and present hazards, 2) assessing climate risks and vulnerabilities and 3) associating them with a range of responses aimed at reducing these risks to be carried out by different stakeholders on the local level and at the state.

> Strategies can include changes in operations, management, infrastructure and/or policies that reduce risk and/or capitalize on potential opportunities associated with climate change (NYSERDA, 2011b, p. 8).

These problematizations then become then mobilized to propose concrete (primarily: techno-scientific) adaptations for the agricultural sector, aimed at reducing risks and impacts and maximizing beneficial outcomes. Adaptation solutions thereby range from:

> […] changing crop varieties or diversifying cropping systems, to improving pest monitoring and pest control measures, to capital investments for expanded irrigation capacity or improved cooling capacity of dairy barns. Some adaptations will involve institutions and agencies beyond the farm gate, such as development of new crop varieties for the region, new information delivery systems and decision tools for farmers, improved crop insurance programs, financial incentives and assistance for adaptation investments, and policies to deal with inequities in climate change impacts and farmer capacity to adapt (NYSERDA, 2011b, p. 227).

This includes (amongst others) the following categories of on-farm and regional adaptation options, such as: to adjust diet and feeding management (in response to a number of hazards, such as drought and heat); increase use of fans, sprinklers and other cooling systems (in response to heat in particular); shifting planting dates (to cope with shifted precipitation patterns over seasons, but also to take

[22] Prospecting; (cp. Felt et al., 2013). A range of authors discuss the politics of future-making and anticipation, pointing to the involvement of prospective sciences in structuring possible socio-technical imaginaries. This relevant in the context of adaptation as it is explicitly engaged in world-building across temporal scales from the present to the past. Adaptation does not only construct society-nature relationships through specific epistemologies of problematization — it incorporates judgements about these relationships in the past, present and future based on the anticipatory measures of scientific assessment.

advantage of longer growth seasons); diversify crop varieties and crops (to respond to new climactic conditions and their effects on yields and crop quality); introduce/intensify chemical and non-chemical control of insects, diseases, and weeds; establish freeze and frost protection for perennial fruit crops (protecting against late frost in particular); or expand irrigation capacities (to respond to drought hazards); and other major capital investments (that can help in weathering natural hazards as well as increase farm efficiencies to take advantage of emergent opportunities). A direct result the report establishes is a shared understanding of the distribution of impacts, risks and vulnerabilities constituted in natural hazards, drawing on techno-scientific risk analysis.

Established as such, the report provides strategies that draw on primarily techno-scientific solutions[23] informed by techno-scientific risk assessments (such as the introduction of new technologies such as irrigation or GMO plants or the change of techniques to increase resilience through efficiency and optimization) — all drawing on, responding to and evaluated for quantitative metrics, particularly in regard to agricultural output and losses. This manifests adaptation in New York State as explicitly focused on adjusting social systems to escalating and increasingly instable natural hazards and makes explicit how epistemological orders of society and nature — with the latter acting onto the former as an external force — centrally shape adaptation. Adaptation options aim explicitly at the adjustment of the agricultural system to better weather natural climate hazards, minimize vulnerabilities and take advantage of emergent opportunities — exclusively conceptualized in economic terms of production and output.

3.3.3. Policy Instruments for Localizing Adaptation

In order to facilitate the local implementation of such adaptations, New York State has begun to establish concrete programs and measures. The Community Risk and Resiliency Act (CRRA) is New York's only adaptation specific legislation adopted by the state legislature to date that provides wide-ranging mandates to agencies that are explicitly targeting adaptation. Adopted in the aftermath of

[23] STS problematizes the politics of the techno-scientific fix (Rosner, 2013). Importantly, Huesemann & Huesemann (2011) problematize the inherent ideological buy-ins of technological fixes and the persistence of ideologies of progress. Ultimately, they critique techno-scientific solutions as perpetuation of the social systems that produce the risks in the first place and allow established (oppressive) orders of power to persist as their consequences increasingly call them into question. In the context of New York's paradigm for adaptation the epistemological problematizations and the technological interventions are contingent and reinforce each other. Both produce the same disconnect between a dangerous nature and a vulnerable, impacted societal system which needs extending and perpetuation.

hurricanes Irene, Lee and Sandy, CRRA includes important provisions for dealing with flood-related hazards; the consideration of sea level rise and storm surge in terms of risk assessments in permitting processes; the development of smart growth public infrastructure criteria; a guidance for natural resiliency measures through the DEC and the development of model local laws through DOS (Department of State) and DEC. Yet, it is notable that the ClimAID report itself has not been formally adopted as policy, nor has any other policy replaced it that would constitute direct mandates for agencies that would move beyond the narrowly focused provisions of CRRA.

CRRA itself is at the time of writing the only substantive adaptation legislation in New York state, and it only underscores the failure of New York policy to adequately address the experiences with climate escalations in many rural local communities. As an administrator at the DEC, responsible for coordinating the implementation of CRRA, explains:

> It is focused exclusively on sea level rise storm surge and flooding […]. But beyond that, the list of permits that are actually affected, listed in the law, is pretty small and it does not include for example the state closing discharge elimination system permits under which DEC regulates storm-water runoff, so it doesn't even cover extreme precipitation independent of flooding in that context.

As such, agency mandates that are concretely focused on adaptation derive primarily from this act within a strictly limited scope. As administrators and policymakers explain during interviews, the act only regulates certain permitting processes and is inadequate in 1) providing adequate mandates to foster adaptation preparedness within the realm of its scope, as one interviewee explains:

> CRRA itself is a non-binding guidance that includes recommended flood evaluations and how to calculate that, that's out for public comments, and then gets integrated in permitting. But CRRA does not imply responsibility for municipalities.

And 2) is strikingly limited to a very small set of hazards related to sea level rise and storm surge. One administrator at the DEC explains that the act falls short in addressing any hazards other than those related to sea level rise — such as heat waves and droughts — or to address sea level rise beyond its impacts on storm surge. Its narrow confines make it effective in a very limited scope and as such show little impacts on local communities dealing with other hazards, such as the increasingly escalating impacts of flooding due to extreme precipitation that persist in Madison County:

> Not even extreme precipitation. It is focused exclusively on sea level rise storm surge and flooding and so it doesn't even … What CRRA does is to require that applicants in specified permit and funding programs demonstrate that they've considered sea level rise storm surge and flooding in their project design, whatever these demonstrate considerations of. But beyond that, the list of permits that are actually affected, listed in the law, is pretty small and it does not include for example the state closing discharge elimination system permits under which DEC regulates storm-water runoff, so it doesn't even cover extreme precipitation independent of flooding in that context.

This manifests adaptation as squarely focused on natural hazards, while the lack of policy leads to a patchwork of programs and initiatives implemented — with the exception of CRRA — on the agency/department level. Existing mandates constituted in the limited adaptation legislation available focus on a strictly constrained set of natural hazards. It is in this context that the integration of other hazards becomes a priority for mid-level administrators, seeking to leverage a variety of existing policy instruments to support local communities in adapting to climate change within the narrow paradigm of adjustment adaptation to escalating natural hazards. This manifests adaptation through the state primarily as a patchwork of individual programs and initiatives that substitute a coordinated adaptation approach. The following chapter details how mid-level administrators seek to foster local adaptation in this situation. I thereby focus on, perhaps, one of the most important instruments to support local communities in adapting: The **Climate Smart Communities program,** administratively housed at the DEC.

3.4. Localizing Adaptation at State Agencies

This section illustrates how the risk assessments and general frameworks for New York's adjustment adaptation, centrally established in the ClimAID report as an informal policy, are substantiated within the organizational structures of state agencies.[24] It is mid-level administrators who materialize New York's informal policy into concrete adaptation actions, drawing on the ClimAID report as they facilitate

[24] Jasanoff (Jasanoff, 2005b, 2005a) draws attention how epistemological and political-cultural orders co-produce policy, making it an inherently social-cultural affair. She importantly draws attention to civic epistemologies as substantiated across scales in the formation of policy and political regimes alike. Thereby organizational cultures and social and structural orders importantly shape governance regimes. She draws attention to the social and epistemological orders involved in policy making and stabilization. It is in this context, that adaptation policy emerges in cross-scale processes of substantiation within specific socio-cultural settings and their associated orders. In the context of adaptation policy and its localizing, it becomes explicit in this chapter how these concrete orders, as we find them at the NYSDEC, manifest adaptation, structure potential problematizations and delimit pathways for implementation.

adaptation through programs such as the CSC program — substantiating a policy of ad-hoc adjustment adaptation in a productionist paradigm (3.1). The primary objective is to facilitate adaptation initiatives and projects in specific local communities, drawing on limited existing structures, programs and resources. It is there, where informal policy — constituted especially in the ClimAID report and similar documents (the NYS 2100 and Sea Level Task Force reports) — is stabilized in concrete policy efforts on the agency level.

The ClimAID report provides a general, yet non-binding framework for adaptation that is squarely situated within adjustment adaptation approaches. At the same time, the ClimAID report does not constitute any direct obligations, mandates or legally binding adaptation objectives and goals for state agencies or other stakeholders; and is also not associated with concrete budgets that provide funding for adaptation implementation. Policymakers explain how they are generally left to their own devices in advancing adaptation through the state.

Repeatedly, their descriptions make explicit how (informal) policy becomes substantiated and materializes — even if in highly politically unstable ways. Mid-level administrators work on advancing and maintaining adaptation initiatives at DoH, DoS, NRC and DEC:

> Generally, there was no direction from the top. With that lack, […] it is we really it falls back to us a lot and so we try to do it within the existing limited resources and in what we can do.

This means that administrators centrally draw on the available tools for risk governance, squarely rooted in the techno-scientific epistemologies of hazard management. Michael*, an administrator at the Department for Environmental Conservation (DEC), describes it this way:

> New York State does not have a climate adaptation plan. So, there has not been an effort managed at a high level from the governor's office to really understand comprehensively the risks that climate change poses to all environmental and economic sectors including agriculture in the state. […] So we're left with what is pretty much an ad hoc approach to dealing with the last storm, the last disaster […] and it's been very difficult to get decision-makers to pay attention to other hazards that might present risks to different economic sectors. So again, there's been a real focus on flooding and how it affects communities and infrastructure, but not a whole lot beyond that. There's some push, there are some programs to address other hazards, but they are not as well resourced as some of the flooding programs.

Consequentially, key determinations about what needs adapting to, how, and to what ends are made at the mid-administrative level. As the statement above makes explicit and other interviewees

confirm, the focus in adaptation planning is the response to natural hazards and the determination of how hazards impact individual social systems, such as agriculture. This is consistent with the recommendations of the ClimAID report, and not coincidentally so: interviewees repeatedly emphasize the report as a key resource for planning, as they draw on a number of established resources, particularly said ClimAID report, as well as the NYS2100 report and CRRA — all of which are squarely focused on managing natural hazards. In doing so, administrators and planners substantiate general frameworks by introducing their own interpretations and specific readings of adaptation needs and possible responses, its meaning and purpose — as, Michael* explains:

> One of the things that we do here out of New York is my office has coordinated for number of years an ad hoc group that has no official charge but it is about 12 or 14 different agencies participate in this inter-agency adaptation work group that meets quarterly and exchanges information and makes recommendations for research and other programs. But again, that's fairly low-level staff making recommendations from the bottom up. I think that's where most of the programs that we implement here in New York have originated.

Ultimately, it is in these efforts, led by relatively low-level staff, where the state's adaptation response manifests in more tangible contours as an ad-hoc response to needs that emerge across scales while navigating political and resource confines and a lack of top-level leadership. Often administrators speak to this in explicit terms, describing their work as one that at times amounts to, as Michael* put it, "maintaining and preserving [from shifting political priorities and agendas] existing programs that move adaptation forwards" instead of scaling programs and efforts up.

3.4.1. Manifesting Adaptation through the CSC Program

At the DEC's Office for Climate Change many of the central strategic decisions for local adaptation are made through the administration of programs where adaptation priorities can be integrated. One of these programs is the Climate Smart Communities program. It is perhaps the most prominent example for how administrators seek to compensate for the lack of top-level planning by drawing on already existing program structures, administrative mechanisms, funding goals and evaluation criteria.

The program aims at facilitating mitigation and adaptation activities on the municipal and county level.[25] The program seeks to locally implement climate mitigation *and* adaptation in a combined approach and via a tiered process. Participating communities can "earn" different status levels by completing actions. After passing a resolution with ten "pledge" elements through the local legislature (county or municipality), communities earn the status of "registered Climate Smart Communities", which 1) grants them access to important program services and resources, 2) makes them eligible for grants supporting actions associated with the program, and 3) improves their ranking in other state grant programs. This kicks off the process towards achieving different certification levels. A top administrator in the DEC heading the CSC program explains how the tiered program works:

> In 2014 we launched the climate smart community certification program and this program is organized around the 10 elements of the pledge. The manual and the online portal list a large number of individual actions that communities can take. Once they document that they completed those actions, they get points toward being recognized as bronze, silver or gold certified smart communities.

The emphasis on local[26] implementation facilitated through prescribed actions that earn credits constitutes an important vehicle for policymakers to compensate for the lack of higher-level policy. New actions can be integrated into the program, allowing a relatively quick-turn around towards local implementation and the integration of new priorities as hazards emerge, as Michael* explains:

> … When I talk about working with DoH [New York State Department of Health]: if they have a finding, maybe there is no access to a cooling center, and then we would build an action into the certification program to get points for advertising their cooling center. So, one thing it does, it raises awareness. What the communities, they go through the lists and figure out what is doable, and we point them to resources, funding sources, technical guidance documents, and if they do

[25] These two initiatives do not stand on their own and are complemented by numerous other activities, programs and initiatives across state agencies and from the federal level, addressing individual adaptation issues and problems. Particularly important adaptation measures are further constituted in the NYS Water Infrastructure Improvement Act (of 2015) and NYS EO 24(of 2009) and a number of state agency plans: NYS Ocean Action Plan, Wildlife Action Plan, NYS DoH BRACE (through CDC grant), DoT Transportation Asset Plan, NY Rising, NYS Climate Action Plan Interim Report of 2010; (cp. Georgetown Climate Center, 2010)

[26] It is important to note that local has a specific framing in this context. STS literatures elaborated on the relationships between various publics, science-as-truth-speaker and the regulatory/governance apparatus of the state (Felt, 2014; Felt & Fochler, 2010; K. Fortun & Cherkasky, 1998; Marres, 2007; Wynne & Irwin, 2003). Their call for attention to the local and situated, and the value of local expertise are prominent examples. Yet this stands in contrast to the ways in which the idiom of the local is deployed here. While STS calls for attention to the concretely local, it remains abstract in the repeated emphasis of adaptation as local. Instead it serves as device for delegating responsibility and accountability (Felt & Fochler, 2010; Hagendijk; Rob & Irwin, 2006; Hilgartner, 2004b; Irwin, 2008).

that, and documented completion and apply to us, and then they get points for the action, and once they reached a certification threshold they reached bronze, silver, gold.

The CSC program serves as an important vehicle for policymakers to manifest adaptation within the larger political, resource and organizational constraints they find themselves in. It allows for adaptation policy to become materially and organizationally substantiated. Adaptation — explicitly delineated from mitigation efforts[27] —manifests in an ad-hoc, geographically local response to escalating natural hazards.

3.4.1.1. Adaptation as Ad-Hoc Response to Natural Hazards

Informed primarily by the quantitative metrics of risk assessments, interviewees articulate the major focus of adaptation is responding to natural hazards, "dealing with the last storm, the last disaster," (Michael*) but lacking a long-term strategic and coordinated approach across agencies. Meanwhile, structural or systemic changes remain off the table during interviews ("We talk about this in the context of mitigation, but not adaptation," as one administrator explains).

Policymakers across state agencies use the CSC program to routinely incorporate additional hazards,[28] expanding[29] adaptation in its scope and within the limited, existing mandates and top-level

[27] The issues of compartmentalization, the maintenance of authority and the structural production of ignorance (Frickel & Vincent, 2007; Hilgartner, 2007; Vaughan, 1990) are at display here. Adaptation as societal transformation to bring about changes to the risk-producing structures of societal systems is essentially taken off the table by re-framing it and silo-ing it off as a matter of mitigation. This has been extensively problematized in recent theoretical discussions about the relationship between adaptation and mitigation (Biesbroek, Swart, & van der Knaap, 2009; Buob & Stephan, 2011; Preston et al., 2015; Revi, 2008; Tol, 2005).

[28] This is making explicit how existing epistemological orders constitute a narrow framing of what risks are and where they are constituted in. Administrators are concerned with limits in existing political commitments as far as they do not encompass other emergent hazards, but they are not problematizing insufficient capacities to change the societal-structural conditions that (co-)produce these risks, vulnerabilities and their uneven distributions. At the same time, these epistemological orders are reinforced by the societal and organizational structures that they are deployed in: The organizational structures at the DEC provide specific mechanisms for raising issues onto the agendas while existing risk management infrastructures reflect epistemological orders of the natural hazard paradigm. There are simply no effective mechanisms in place to facilitate adaptation in terms of more structural interventions — as administrators make explicit repeatedly in interviews by pointing to home rule and other institutional constraints that would "not allow us to tell them who or what they should be."

[29] The modernist logic of the rationalized-science driven governance apparatus – in a fruitful collaboration between state and science — is seen/constructed as bearing the means and tools necessary to govern an environment that although increasingly uncertain and risky can be steered and controlled for (cp. Bauman, 2001; Beck, 1992; Giddens, 1990; Lupton, 1999). It does so in the claim of continuous progress of uncovering "objective risks." In the late modernity of the 20th century this promise is increasingly seen left unfulfilled. The "fruitful" collaboration of science and polity turns out to be just as productive in bringing about environmental risks as it is claiming to overcome them. Weber points to this tension in his notoriously misrepresented notion of "dis-enchantment of the world" (Jenkins, 2012). For Weber, this dis-enchantment is a misleading promise that gives rise to the bureaucratic, accounting governing apparatus (cp. Weber, 1922).

support. Top adaptation policymakers at the state, such as Mike* at the DEC and Bill* at Ags and Market, concur during interviews that raising and implementing responses and planning to an expanding set of hazards is a key dimension of their work:

> We tried to raise concern over other hazards that are also out there, but the major focus continues to be on preparing to major storm events and it is even hard to discuss sea level rise beyond that area. I can't say that any group apart from DoH have focused on extreme heat for example. I think DoT have begun thinking about effects of extreme heat on raw materials, such as bridge expansion joints, etc. but I am not sure that we are getting active top-down direction to work with.

This means that policymakers are primarily engaged in raising other hazards onto the political agendas of top-level decision makers, while using existing mandates to compensate for this deficiency.[30] And policymakers repeatedly warn in interviews that this might have dire consequences. This means that beyond specific provisions in CRRA, adaptation remains primarily an ad-hoc response to such escalating hazards.

The program becomes in this context a central vehicle to allow for an expanding integration of hazards and their management within an otherwise lacking structural support to do so. Most of the actions related to adaptation are specific and formulated in response to emergent needs: As agencies articulate the need for e.g. cooling centers, many of them emerge in response to the recognition of increased threats due to natural hazards — such as the increased frequency and intensity of heat waves.

This constitutes an ad-hoc approach to adaptation: solutions are often integrated as primarily techno-scientific measures to decrease impacts of natural hazards through system adjustments and as they emerge. Similarly, the two major adaptation planning actions that are part of the CSC program explicitly draw on the risk management approaches for adaptation planning detailed in Appendix II of the ClimAID report (NYSERDA, 2011a). This "guidebook" offers a risk management planning guide that follows the principles of traditional, techno-scientific approaches of the natural-hazards school — further

[30] This reemphasizes how regulatory science importantly structures the prioritization of governance interventions by constructing risks in specific epistemological framings and governing how and on what terms risks can become problematized. The specific political, cultural and organizational structures strongly regulate and structures the ability of administrators in what may be problematized in the context of escalating climate risks. Jasanoff (2011b), on the case bioengineering and advances in biological sciences and biotechnology, shows how the production of knowledge and the (techno-social) (policy-) solutions they bring about co-evolve with legal frameworks, regulatory oversight of predictable and unpredictable risks and the ontological status of life within moral orders – where these elements mutually shape each other.

extending an ad-hoc and natural hazards focus adaptation planning into the concretely geographically local.

3.4.1.2. The ClimAID Report as Epistemological Ordering Device

This makes the ClimAID report and its planning guides formative for adaptation planning at the state agencies, while being substantiated by its integration into programs such as the CSC program. The ClimAID report emerges in interviews repeatedly as key resource and is (along with the NYS2100 interim report) consistently referred to as central resource. These reports offer key structures, priorities and concepts for policymakers as they develop and substantiate adaptation through the administration of such programs, as Michael* explains:

> The ClimAID report is a key source, and then there is the NYS2100 commission report that provides really important guidance and also directly translates into the program, although it remains a draft report.

Additionally, interagency collaborations — particularly through the interagency working group — allows to identify and assess emergent needs brought up through other agencies, as Michael* explained. For him, the advantage would be that the group allows to incorporate recommendations that come from other agencies, or from participating communities and integrate them in the CSC program.

This makes explicit how administrators draw heavily on a variety of resources — and centrally risk assessments and impact analyses — shared through non-institutionalized interagency collaborations and are centrally shaped by the epistemologies of techno-scientific risk management established in the ClimAID report. Explicitly, the ClimAID report is referred to as providing key conceptual and organizational tools to a risk-management approach for adaptation that fundamentally shapes how adaptation gets substantiated and executed through the CSC program.

The ClimAID report and the work at the interagency group deeply foster the focus on ad-hoc and adjustive adaptation approaches in the work of administrators. Together with the structures of the CSC program, important ideas of the ClimAID report get taken up and implemented, drawing on the epistemological frames[31] of traditional risk management, and constituting a system adjustment

[31] See discussions above. It becomes again clear how epistemological and social orders are involved in and co-produced with adaptation, and specific civic epistemologies become explicit. The hegemonic function of assessment sciences that overshadow other claims to knowledge about risk are of fundamental importance here. Planning relies

management[32] approach. So do administrators centrally prescribe through the CSC program concrete (techno-scientific) responses to climate hazards, while local adaptation planning activities constitute two of the most important actions associated with the program in the realm of adaptation — both of which draw heavily on quantitative risk and vulnerability assessments, using concrete frameworks that are provided in the ClimAID report (NYSERDA, 2011a).

Translating these recommendations and resources into state initiatives remains difficult and dispersed, leading to a number of hard to coordinate parallel initiatives to respond to these challenges detailed in the ClimAID report. This is exacerbated by the structural and organizational conditions associated with a lack of top-level long-term adaptation planning: limited resources and mandates constitute ad-hoc planning instruments and risk assessments — such as the ClimAID report — as additionally important for administrators. A double-bind emerges; in the lack of a top-level adaptation policy, it is administrators who have to stabilize adaptation in concrete programs and mechanisms. Yet, at the same time this means that they have limited capacities to do so and rely on existing resources (programs, funds, personnel, mandates) which ultimately re-enforces the adjustment approach that existing resources establish and organizational structures reinforce.

3.4.1.3. Adaptation is Local

The importance of the CSC program for substantiating adaptation in New York is constituted in an explicit commitment to geographically local adaptation. Adaptation is understood and talked about as geographically local, meaning that the concrete decisions for individual actions and the shaping and implementation of adaptation all should, our need to, unfold on local levels.

This is in parts constituted in the scope of the CSC program as focused on local governments, and in part due to the mandate of administrators as they advance adaptation. The program is designed to facilitate local climate action, and as such allows administrators to integrate concrete actions related to

heavily on these specific framings, thereby reinforcing nature-culture divides persistent in the informal frameworks provided through the ClimAID report — and re-enforced through the cultural and socio-political orders in which policy is substantiated and localized at the NYSDEC.

[32] Explicitly the relationship between techno-scientific risk assessment and the operating calculations of hazards in the perspective of the natural hazards school of risk governance are at work here. Risks emerge from hazards that are situated outside society, but at the same time become operable through bureaucratic management principles in the anticipatory calculations of technocratic scientific approaches.

adaptation but not to mandate them. Several administrators emphasize in this context that adaptation is of increased importance, yet also acknowledge that aspects of adaptation need significant strengthening within such programs:

> There are certification actions, things that they can do to earn points that fall in the adaptation realm but relatively few of our communities have done much in terms of adaptation.

Michael* adds that this means that the capacity through which the program can help advance adaptation is itself limited by available resources, organizational and administrative structures and the scope of the program. Consequentially, Michael sees a continued gap in realizing adaptation "on the ground":

> From the bottom up, we are not giving them enough direction on adaptation planning, which is something that we now begin to talk about. We do fund adaptation planning, 16 of those 120 or so actions in the CSC are where we actually provide funding for the municipalities to do them. Some of those are vulnerability assessment, mitigation plan, adaptation plan. Usually they use the money to hire a consultant and we rely on them to do a good job with the money, we do point to various sources on how to design that, but we have not put together our own standards and recommended processes.

At the same time, there is a restriction to how explicitly prescriptive the state can become, Margareth* from the New York State Department of Agriculture and Markets explains:

> We were talking about, you know, the incentive programs and the opportunities the state makes available to communities and relatively low amount of interest especially in rural communities maybe looking into something. [We are limited in taking a more proactive role because] in New York State, we have the home rule which basically means that the state can't dictate, or it is very, very limited in its ability to dictate to communities, you know, what they really ought to be or what they must be looking at, especially in regards to resiliency, adaptation, and things like that. So, you know, just as many of our programs, all of our programs, I have to say, are voluntary and incentive based.

This establishes a specific format in which adaptation planning and its local implementation ought to unfold through government processes — one that designates a highly specific and strictly confined role for local communities[33] in participating in collective decision-making about adaptation. As Jasanoff explains,

[33] Felt and Fochler (2010) discuss how the governance of spaces of decision-making and the construction of publics — what counts as local, who are the relevant stakeholders, and on what terms can they participate in decision-making practices — are themselves importantly political. As claims about the local are made in adaptation planning, these

> The contexts in which public knowledge […] is produced and validated are constrained in each nation by established institutional routines. This has meant, in the United States, a primary reliance on interested parties — industry, academic researchers, environmentalists — to generate relevant facts and claims (Jasanoff, 2005a, p. 260).

She explains that it is important to consider how institutionalized processes of world-making importantly shape the ways in which collective decision-making is achieved. Similarly, Lukes (1974) argues that the ways in which rule-making and their exercise are institutionally-politically organized importantly shapes the contours of exercising collective decisions.

In the context of decision-making in New York, this centrally establishes a strictly moderated and mediated relationship between policy, its administration and the roles that local communities and actors are designated to have in decision-making and implementation processes. Explicitly, administrators describe a large ad-hoc decision making power on the local level for taking specific actions (home rule), yet at the same time, constrain their ability in making structural and framework decisions about adaptation. In an incentive based approach to ad-hoc adaptation responses, local publics are conceptualized as highly monolithic, and primarily address lower-level political actors — specifically county and municipal governments.

3.5. Localizing Adaptation in Madison County

Adaptation policy places an outsize emphasis on local adaptation planning — the manifestation of concrete adaptation measures "on the ground." Constituted in home rule, and with limited policy support, adaptation unfolds geographically local, at least in the telling of administrators as well as in explicit commitments to local adaptation in policy definitions of adaptation and planning processes. The emphasis on programs to support local adaptation further supports these claims of authority to be situated explicitly in the local. In this section I show how local decision makers participate in the CSC program at the Madison County planning offices.

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decisions remain black-boxes and unproblematized. Instead, what "the local" is remains obscure until the processes of participation in governance become more explicit. The CSC program for example imagines "the public" as local levels of political government, not as the involvement of the publics — which becomes highly problematic as the next section will reveal.

This section explores how adaptation policy, substantiated in state agencies, further becomes localized in rural communities through and outside the CSC program. Thereby, I argue that the program facilitates a restricted concept of adaptation that corresponds with the frameworks of ad-hoc adjustment adaptation (4.1) and thus, strongly limits what kinds of adaptation decisions can be made locally (and who is included as local decision-makers). in facilitating or shaping more wide-reaching and structural adaptation processes already unfolding locally (4.3).

Adaptation manifests in municipalities and counties in a multitude of pathways as they increasingly extend their responses to climate change. There are a plethora of programs, funding streams, public-private partnerships and other ways in which municipalities implement various forms of adaptations, from structural changes to conservation measures or emergency planning. Many programs have a non-adaptation intent — such as ecosystem restoration grants or conservation programs — but still can have important adaptive functions (such as renaturalizing flood zones and revising comprehensive plans to incorporate hazards). Diana*, a planner at the Madison County planning offices who also oversaw the participation in the CSC program, describes these efforts:

> We work on a lot of different projects, we do reviews, we help communities with their comprehensive planning processes, we do the county parks planning, where we have a huge project going on right now, and we do a lot of grant writing, and help the local communities we work with in their grant applications. We do a lot of … our philosophy is to strengthen the villages, to make the population centers more sustainable, self-sufficient. We are involved in that regard in the Erie canal project, always operating with the idea — trying to re-densify population centers. With the goal of greater sustainability, better quality of life, for example: use non-motorized transportation between pop-centers. Ensure to re-grow the local structures to become sustainable.

On the county level, crucial mechanisms to advance adaptation are the Farmland Protection Plans (MC Farmland Protection Board, 2005) and municipal comprehensive plans that integrate flood risks in their planning.[34] And it is accordingly carried out through different local level departments — such as the Water Conservation Districts, individual commissions and planning boards — but not embedded or

[34] often incentivized through State initiatives such as the Smart Development Goals.

guided through a local strategy. It is here where adaptation is substantially put in place through disperse and often non-focused initiatives embedded in larger programs and policy objectives.[35]

3.5.1. The CSC Program as Catalyst and Re-Framing Device

The CSC program on the other hand, according to Diana* plays a limited role in advancing adaptation specifically: “Many of the efforts are more focused on mitigation, although that is often not so easy to separate out. Even those, many of them we were already doing.” Instead, many of the actions accredited for certification through the program were already underway. The CSC mainly provides for Diana* a means to make these commitments explicit and get credit for successes and leadership. The CSC program allows political officials (on the county level as well as for mayors and local politicians) to point towards initiatives and promote successes:[36] “It really helps them to point to things, to say ‘we do things’, which is an important political capital.” The CSC program provides an opportunity for local governments to gain recognition for actions already underway or completed (and reinforces projects that allow ribbon-cuttings, in particular): “And it helps us say we are really good stewards.”

> For us a lot of it was going through the lists, demonstrating that we had done a lot of these projects listed in the individual actions. When we entered the program, the way we approached it — we knew we had already enough projects that would get us some kind of certification by working through the checklist ahead of time. At the same time, the CSC program also helped us assess where we were lacking and provide us inspiration for additional projects we could do. That was a big project for us, and involved a lot of coordination with other departments, and took us probably around one and a half years to complete.

As becomes also explicit in this quote, Diana* uses the program to identify new needs and develop additional projects — primarily through administrators who draw on state level risk assessments — albeit in more limited ways. Diana* also explains that the program allows her as well as local political officials who approve and support projects politically, to show success and allows the argument for new projects:

> [It allows us to say] we should do more of this. And that can help us get projects through on multiple levels. […] We applied for a lot of grants as consequence of participating in the program,

[35] Madison County’s comprehensive plan, Farmland Protection Plan and other similar planning instruments have a wide range of priorities within which adaptation figures only marginally — usually in terms of emergency prevention planning (e.g. in dealing with flooding risks through zoning plans in the Comprehensive Plan or preserving economically important farmland from natural hazard risks).

[36] Particularly in terms of “ribbon-cutting successes” that are an important political capital with election seasons in mind.

> and clean energy communities came from it too. The reason for that is that it helps to argue for doing certain actions, because it allows us to say two things: We can point to an action being a priority for the state. It helps us to argue for an action because we get better access to grants.

Thereby, the program becomes instrumental for advancing further projects by helping with access to grants as well as in garnering political support locally. Diana* explains that mostly the lists associated with the program were used to build a better argument for a project that was already planned anyways, and — as she explicitly states — less so to develop something new:

> [Instead,] if there is something we already want to do, then it helps us to argue for that through that. In general, if there was something on the list that we want to do anyways, it helps to build a stronger argument — towards the state and funders, but also locally, politically as well as towards the public. It also helps gathering local political support, pointing to the plaque mounted in the building, that shows and helps argue, we already did things like that, this is a state priority, it provides recognition, if we did more, we could get xyz. Supervisors remember the ceremony.

While the program primarily gives credit to previous accomplishments, it also facilitates some new projects within the country, while supporting other initiatives through additional grants:

> We did this in 2011, certified 2017. CSC is for us a lot of it is going through demonstrating we had done a lot of these projects, got inspired to do a little bit more, helped us assess where we were lacking, continue doing more work in terms of climate-sustainability goals within the county.

In this way the program provides incentive for new projects, especially in combination with attached funding. It also helps the communities in assessing ongoing projects and resituates them in the context of climate change — facilitating awareness for adaptation in other routine planning activities (such as the development of comprehensive plans). In doing so, the program provides important mechanisms to drive additional action through reward structures and clear lists of possible activities that participating communities can take up and apply for funding, as they work towards a specific certification level to gain further recognition and through that political reward.

3.5.2. Adaptation as Adjustment

In this context, the CSC program acts as a coordinating and assembly device in the context of adaptation. Focusing on facilitating adaptation, it provides a mechanism to assemble activities within the framing of adaptation — based on bureaucratic and administrative organizational structures and accounting practices. In other words, while the CSC program has only limited effect on triggering new

adaptation activities in the region, Diana's* and other interviewee's accounts make explicit how activities in the region become re-situated as adaptation and mitigation activities, respectively, as they become reframed for accreditation. This means that the CSC program importantly serves as an epistemological technology of governance that re-assembles issues and activities within a specific framing of adaptation — and thereby also reinforces key ideas about what is and counts as adaptation, and maps onto state priorities. It is a device for epistemological and political ordering — what Foucault calls a technology of governance to produce specific "dispositions of things."[37]

Where Madison County implemented adaptations in the context of the CSC program, it did so in reference to the prescribed actions, making explicit the limited role designated to local governments in decision-making. While decisions about what to adapt to are made on the state level, local municipalities can merely decide between the catered options. The practice of "going through the lists"[38] — long rows of data tracking activities pursued by Madison County in general and matching them with actions covered by the CSC program — is an essential part of participating in the program. These lists represent important parts of the work associated with the program: identifying past actions that can be matched with the program and then producing the required documentation, usually involving substantial amounts of inter-departmental coordination and organization. Or, if new activities get pursued, grant writing needs to incorporate the concrete criteria provided by the program, and local alliances are built. In this context, Madison County completed two actions explicitly credited as adaptation actions through the program: the

[37] Foucault, and later Agamben (2009), detail the apparatus as a heterogeneous set that a) articulates urgency [in this case of governing heat] and b) positions the means for governing and steering the issue of urgency [heat] in cosmopolitical and de-central ways. The apparatus consequently is "a thoroughly heterogeneous set consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions […] Such are the elements of the apparatus. The apparatus itself is the network that can be established between these elements" (Michel Foucault, 1980, p. 194).

This concept puts into perspective the "disposition of things" (or issues, cp. Marres, 2007) — how issues and the assembly of social, material and discursive/knowledge orders are brought in disposition to each other as to exercise hegemonic control.

[38] These lists appear as central ordering device. Foucault explains how statistics become an important mechanism to establish and govern normalcy — and with that epistemological orders. In a similar manner, the going through lists resemble practices of comparing and matching local activities and resituating/reframing them to "match onto" epistemological-political orders local communities commit to through state programs. This directly associates compliance with state orders about adaptation with access to key resources — political, economic and cultural capital that are crucial to local decision-makers, politicians and the larger communities.

development of a vulnerability assessment and the adoption of a climate adaptation strategy, both of which centrally focus on the impacts of natural hazards —in particular risks associated with flooding.

Thereby clear guidelines and structural prescriptions in what constitutes vulnerability assessments[39] and adaptation strategies[40] are provided via the state level program administration, and are centrally focused on risk management. This is the overall case for how actions translate and are realized in context of the CSC: while local communities pursue projects, the program provides prescriptions on concrete actions that these projects can be matched with. Generally, CSCs receive technical and expert-support through NYS,[41] the DEC and other partnering institutions, particularly in regard to developing individual actions that map onto the ten pledge elements and associated actions that earn credits towards certification. It is through this mechanism that concerns of adaptation get increasingly taken up locally — in the specific language of adjustment adaptation facilitated through the provided actions that are pushed in compensation for a more formal adaptation strategy by policymakers on the state level. Experiences with climate escalations, drawn attention towards through the state programs such as CSC as well, figure prominently here as well.

3.5.3. The Limited Scope of the CSC Program

Yet, at the same, Diana* also casts doubt on the extent to which the CSC program shaped local adaptation efforts. For her, this is due to the limited involvement in decision-making about what to adapt to. “There is simply no space for that”, and a state policy maker concurs that there is not enough room and guidance given to support local adaptation planning. Instead “this comes from elsewhere”, as is also reaffirmed in her accounts about how the program primarily catalyzed projects and initiatives that were

[39] https://climatesmart.ny.gov/actions-certification/actions/#open/action/85, Accessed November 21, 2019

[40] https://climatesmart.ny.gov/actions-certification/actions/#open/action/88, Accessed November 21, 2019

[41] This further emphasizes the point made in this section, where the CSC program interacts with local orders in a reframing of adaptation and the promotion of state policy priorities. The providing of technical and expert support in this context becomes a central mechanism for “training” local planners in what appropriate actions are and how they may be realized — importantly, as these epistemological resources are directly tied to the CSC program, their direct association with producing adequate compliance comes to the forefront. This is strongly related to important arguments Jasanoff (2009) makes about the crucial, hegemonic function of science in political decision-making and governance processes. Rice, Burke and Heynen (2018) investigate how scientific epistemologies becomes hegemonic that discredit local experiences and knowledges — and the important role of scientific advice, expertise and assessment in shaping adaptation underscores this dynamic in the context of the CSC program as well as across scales as adaptation in New York is centrally grounded in scientific epistemologies of risk.

already underway. Diana* identifies three main reasons for why this is the case: 1) the limited role adaptation plays in the program; 2) an implicit end-point to the program after which communities stop seeking credit; 3) the adjustment focus in the programs' adaptation approach that designates a limited role for municipalities in adaptation planning and implementation.[42]

The first reason why the program has limited effects is due to mitigation playing an outsize role in the program compared to adaptation. Only one of the ten elements incorporate more explicitly adaptation (in **PE 7**; and with some elements in **PE6** focusing on land-use policy and practice, particularly via an overhaul of the comprehensive plan). Thus, actions for the respective communities to choose from, are designed to increase resiliency and are very explicitly prescribed and pre-defined in reflection of the state-level adjustment approach. This is also acknowledged by administrators at the state-level who seek to expand the adaptation component.

Although this research did not focus on mitigation actions incorporated in the program, some more reformist actions can be found in the mitigation-focused elements of the program, particularly regarding energy transitions. The development of a land-use plan with sustainability elements is particularly notable. However, transitions of agricultural production regimes also find here only limited incorporation. Ultimately, planning adaptations — or mitigations, for that matter — that advance more structural transitions towards sustainability in agricultural production are not considered to fall under the purview of municipalities beyond zoning and land development planning. This is well illustrated in the case of use and application of chemicals such as pesticides and fertilizers which are more generally regulated on the state and federal levels — and where climate impacts also find only limited consideration to date.

[42] Here becomes explicit a central discrepancy between what Diana* describes as narrow and constrained and as standing in juxtaposition to more broadly conceptualized epistemologies of climate risks. In many ways it is a contention of techno-scientific epistemologies of risk promoted by the state and incorporated/inscribed in its planning, policy, and incentive programs. Diana* on the other hand heavily references local experiences with risks and their interactions with local zoning, development patterns and larger structural conditions and transformations in the rural, designed landscape. She thereby draws explicitly on localized professional epistemologies of a planner (clearly framing adaptation in a planning and system design perspective) juxtaposing the metric-quantified epistemologies of natural hazards school risk assessments. Agrawal and Perrin (2009) draw attention to the importance of local institutions, their expertise and organizational and cultural role in effective adaptation processes, but also point to their role as potential lies in localizing state policy priorities. Wynne (2003) in contrast draws critical attention to these relationships between regulatory science and expertise and local and lay knowledges, and a large body of literatures critically problematize how local experiences, cultural orders and political practices of doing things enter in conflict with and are often undermined by interventions that do not incorporate but hegemonically intervene in them (Elam & Bertilsson, 2003; K. Fortun & Cherkasky, 1998; Irwin, 2008; Jalbert et al., 2014; Kinchy et al., 2014).

However, this is changing with the new climate legislation adopted in 2019 — which falls outside the research period of this project.

The second reason has to do with the structure of the program that gives limited room to communities to continue participating after reaching a specific status, as Michael* at the DEC explains. After Madison County completed its activities and achieved bronze certification, the program played only a limited role in developing new projects:

> We probably could refer back to it more. It helps to determine what else to do, but that is strictly limited with available capacities and time resources — we have too many other things to do. So, while I always think about going back and picking it up again, I don't have the capacities to do so. And beyond individual commitments — There is not a huge incentive to be silver instead of bronze.

This means that once certification is achieved, communities often do not take further actions in direct association with the program.

The last reason has to do with the primary focus on adjustment responses to natural hazards within the program. For Diana*, the program provides limited mechanisms to develop a strategic approach that allows to effectively address structural conditions that produce risks within adapting systems — and that become more and more explicit as escalations increase in scale within the county:

> Once you have re-occurring disasters you start to think differently. In Oneida, where we have those particularly severe and recurrent flooding disasters, people really began to move out of the flood plains. We have an area, where half the buildings were abandoned and torn down. But, these are the big questions for us, how do you deal with that, do you move entire communities? What are the alternatives, how could we really change the structures of how we live, where we live — and how would you possibly do all of that?

Diana* mentions this as the strongest limitation in the CSC program:

> And I feel like the CSC program has big limitations on that end. It really does not provide us with good frameworks to deal with the big questions that we are now really increasingly dealing with. Sure, we can get projects through and better financed that help us address individual problems, but we really deal with the big problems through other means and more locally.

And this is also recognized at the DEC, as Michael* confirms, where solutions are currently being discussed:

> From the bottom up, we are not giving them enough direction on adaptation planning, which is something that we have now begun to talk about. We do fund adaptation planning, 16 of those

> 120 or so actions, where we actually provide funding for the municipalities to do them. One of that is vulnerability assessment, mitigation plan, adaptation plan. Usually they use the money to hire a consultant and we rely on them to do a good job with the money, we do point to various sources on how to design that, but we have not put together our own standards and recommended and process. We have talked about that for how to do that, and we also talked about providing direct training.

For now, Diana* as well as two of the three mayors interviewed for this research explain that there is little support in dealing with climate escalations structurally. Increasingly, for many of the interviewees these challenges are "associated with momentous questions on how to address that." Because of that, adaptation responses are often developed independently from the program:

> The simple questions where we are building, are we building in flood plans, why. How do we approach communities that are already there?

While Diana speaks to adaptation as an explicitly overwhelming challenge that persists within the planning office as a central topic, actions in Madison County in relation to the CSC program were clearly focused on mitigation and some limited adaptation activities, whereas a majority of planning for climate escalations happens outside the program's confines — for example, the ongoing work on the agriculture and farmland protection plan that, in particular, will address risks associated with flooding events. For the development of local adaptation in Madison County this means that there runs a consequential disconnect between adaptation prescriptions incorporated in the CSC program and larger adaptation activities underway across the county, and especially its agricultural sector that perhaps would aim at more substantial changes to risk-producing structural elements of the adjusting systems.

A disconnect becomes explicit that regards the relationship between local orders and political priorities and the associated epistemologies of risks and local vulnerability. For Diana*, the state fails in adequately problematizing the local concerns and/or taking into account local experiences with escalating climate risks. Instead, "on the ground" experiences, even with weather escalations as natural hazards, are routinely described as highly personal affairs (see section 1 of this chapter), and as tightly coupled with land use practices, where people live (and lose their homes and — in the worst case — lives), and the economic and socio-demographic transformations of the rural. In short, while the CSC program works on a premise of adaptation that separates out nature and society, for Diana* and other interviewees, it is precisely this separation where it fails.

3.6. Localizing Adaptation on Madison County Farms

As a consequence, coordinated adaptation remains unsuccessful locally, while major disruptions impact the farming community. This section shows how adaptation policy is seen as mostly irrelevant by farmers famers as they navigate and adapt to the experiences with escalating climate risks. Instead, as farmers adapt, other actors importantly shape their adaptations — particularly industrial stakeholders. This reflects a longer history of the role of industries in policy implementation and coordination in the US (5.1) — and corresponds with the extension of the productionist paradigm of New York's adjustment adaptation. I will argue in the conclusions that this is not a failure of NY's adaptation policy, but part of how it currently is designed to unfold. In 5.1. and 5.2. I discuss the consequences of such adaptations, as they unfold on the ground on local farms, detailing how adaptations become extensions and intensifications of current modes of agricultural practice and system orders.

These impacts are tied to experiences of economic loss, of mourning of animals' death, and constitute fundamental challenges to the livelihoods and viable futures for farmers, farm workers and their communities of humans, animals and plants. This stands in stark contrast to the sharp distinctions of impacts in the ClimAID report, NY state policy and how the CSC program approaches adaptation — where economic impacts outweigh material experiences of loss and disruption. It is for this reason, and for the associated structural organizational focus on municipalities and other political unites, that there appears little to no interface with the state's CSC program as local farmers adapt. While farmers find limited funding opportunities for individual projects — the introduction of irrigation systems or the financing of tunnels to protect against weather and pest pressures — the interviewed farmers consistently see the state as mostly irrelevant[43] in their adaptation efforts. Instead, farmers identify during interviews three key resources that are particularly important for adaptation. So does Haley*, a conventional dairy farmer, explain what is consistently reflected in other interviews as well:

> The state not so much, but we talk a lot with other farmers, exchange experiences and in general, farmers at least here in the region, we help each other out, although of course there remains this

[43] With the exception of subsidies for individual technological interventions or insurance systems. That state and federal programs are significant in other ways, particularly through indirect regulation, conservation initiatives or farm subsidy programs may be the case but does not receive any significant consideration in interviews and is contrasted by a sense of being "left to our own devices" as the US historically relies on industry partnerships in shaping and implementing policies.

> general suspicion at times. And then the industry, the suppliers, they all offer us consultancy — what fertilizers work best in what conditions, what you can do when there is a drought or when water is becoming a problem, and of course they are extremely important when we deal with pests. And then there is the extension, and some are really involved and work a lot of them, and they help also a lot out where they can.

This is also the case for sustainable farmers, such as Oake*, who lives about 20 minutes from Haley's* farm and runs a meat and vegetable CSA.

> We don't really interact with the extension so much, but certainly our suppliers play an important role: They help us really figure out, what organic tools are available that can help with dealing with things like pests, what bio-sprays can you use, and how do they work. But most important is definitely the community, not only our neighbors, but the organic and regenerative farming community in general. Polyface helped us a lot and we went to a lot of trainings, and there is just a lot of — we draw on research, we have all that exchange in the larger regional but also national and international organic communities, go to conferences, and that informs us on how we do things.

As farmers adapt, they do not see the state as an important element of support, nor do they find an explicit role in decision-making processes through the state. Instead, they draw on existing partnerships in their communities and within the agricultural production system.[44] One of them, the Cornell Cooperative Extension, plays an important role in this regard; it supports farmers through their everyday operations and local extension managers such as Michaela*, who explains what her work with farmers involves:

> So within Cooperative Extension, a lot of what I do every day is I pick up the phone calls or I, you know, go out to the farm and I help farmers with issues, what I do on a daily basis various of the time of year, right now farmers are looking to start getting into their fields in the next three weeks to start planting seed and then once they get everything planted, they are going to, you know, start looking at harvesting and climate has a significant impact. […] So I'm working with farmer right now to sort of figure out what and how they can plan to sort of adapt to the fact that, you know, our springs are cool and wet and they used to not be that way, how do we, how do we work with that towards the end of the summer, so there's also been a shift in the timing of rainfall

[44] As Jasanoff puts it, "this has meant, in the United States, a primary reliance on interested parties — industry, academic researchers, environmentalists — to generate relevant facts and claims. The U.S. regulatory system, like that of other Western countries, depends on manufacturers to supply information related to risks […]" (Jasanoff, 2005a, p. 260). Industry actors play an outsize role in adaptation amongst farming communities, whereas state planning is focused on supporting municipalities (and larger publics in terms of public health). Agriculture in state planning primarily matters as economic sector but does not involve explicitly the life of human and non-humans nor does it address ecosystems. This is an organizational-cultural distinction but also a historical civic-epistemological differentiation between the roles, authority and purpose of government and industry stakeholders, as also Jasanoff explains.

> and drought is becoming more of an issue up here […] so working with farmers as they stick through till the end of next season, you know, how do they either stockpile or whatever, enough water so that they're able to water their animals or their crops and, you know, do what they need to do that way. So working on sort of building resilience to drought is another thing that I do. There are a lot of really cool tools available online. […] and so working with farmers to really implement these tools so they can make more informed decisions based upon what the weather is prone to be and while weather is not climate. Climate change does have an impact on what our weather is.

Consequently, the extension offers a series of means for farmers to better anticipate climate hazards such as drought or spring precipitation, and provides them with possible tools — from crop rotation to no-till, to pointing them towards funding sources for new irrigation systems, or optimized pest control tools.[45] The extension team — particularly through the Climate Smart Farming program as part of their efforts to increase resilience — draws on a range of tools that aim at increasing farm resilience on the one hand, and better incorporating practices that reduce the climate footprint of agriculture on the other through incremental changes:

> I think that's really what we're seeing with farms is, you know, they're making small changes, but over the course of decades, those small changes turn into big changes and so while they might be, you know, changing where their lean way is, for instance, if they graze to better manage extreme runoff after a rainfall events, you know, over a course of years that also then have different impact. I guess the biggest change I've seen has been by increased awareness of soil health and the importance of organic matter in soil.

The extension program, particularly through the CSF initiative, facilitates the incorporation of planning tools and saw an incremental incorporation of more sustainable practices such as no-till and crop rotation or rotational grazing. Yet, at the same time, as Haley* explains, conventional tools also play an important role as a adaptive strategy:

[45] It is in this context where the Cornell Extension plays an interesting role as knowledge broker and boundary organization (Guston, 2001) acting as ally and peer to farmers while being strongly embedded in scientific authority of knowledge making and acting as key advisor for the state in environmental planning. So did extension experts co-author important parts of the ClimAID report. And while specific Cornell extension programs push for a broadening of adaptation tools — importantly the introduction of no-till and crop rotations as “climate friendly” practices — it explicitly frames adaptation in the natural hazards school, as becomes clear in interviews and in the deployment of advice. So are “climate friendly” practices explicitly deployed in the context of adaptation to enhance production-resilience and not to structurally transition agricultural systems towards sustainability. As Wang explains: “U.S. agriculture continues to experience structural and organizational changes. Over time, farmers have relied more heavily on contracting to manage their risk and agricultural production has shifted to larger and more specialized farm operations” (Wang, 2014, p. 8).

> Really, they help us a lot with also what is the best pesticide, what are good fertilizers to use, to keep your farm producing.

The extension services bring about some marginal changes for Haley*. However, the outsize role of industry actors (e.g. suppliers) overshadows the comparatively incremental support the extensions can provide to farmers as they adapt. Most of the interviewees state that such industry actors play an outsize and critical role as a resource informing them in their choices on how to best cope with climate pressures. As Haley* states:

> And it's also really, you have certain tools on your farm that you know, and how they work, and you have your suppliers that you worked with for often decades that know you and the farm, and so they really help you in fine-tuning the resources that you have to better deal with all that, and bring also new tools.

She explains that these tools are often new crop types, pest management tools and instruments to work on soils in order to better compensate for losses due to adverse climate/weather conditions. For Oake*, this is similarly the case when she speaks about the role that the "larger organic community" plays, although — as she explains — a lot of it is "self-taught":

> You go with your questions to your community online, during conferences and at workshops, and you get great tools and what people have experience with and then you figure out what works best for you.

Similar relationships have been articulated by other interviewees as well. Tim*, a dairy farmer, explains during a workshop on "climate smart farming" organized by Cornell Cooperative Extension that it would be his colleagues that really are the most important resource:

> These workshops are helpful, and you might think about what you could do, but it is really when another farmer has used it, and maybe stand here and explains that it works and how it works, that you think more seriously about it

Indicating a distrust against "experts", Tim* explains that shared experiences and knowledge of farmers are more important than expert advice — something the local adaptation experts hosting the workshop are also aware of:

> We really rely on and try to bring in farmers that have for example already experiences with ground cover, no till, crop rotation — because people take it more serious when it comes from their peers.

And Raya*, another local farmer, explains that this has to do with a perception of "detachment" from what "real life for a farmer is":

> Really, it needs to come from the peers for many, so they really listen. And so farmers and working with your neighbors is really a key aspect. And the suppliers are seen in a similar way, they also have the 'know how' and it really comes down to this sense of does this come from the community and has this been tested and applied?

The outsize role that industry actors — particularly suppliers — play in informing adaptation transitions on farms has been observed in the literature (Gray & Gibson, 2013). Consistently, farmers explain how suppliers provide services for their decision-making. Some examples are consulting on pesticide and fertilizer use, farming techniques, and/or providing instructions on the best growing conditions for specific seeds they provide.

It is in drawing on these resources that local farmers primarily adapt, as they state during interviews. Often rejecting hegemonic expertise of science and political actors as "detached" (cp. Rice, Burke, & Heynen, 2015), shared experiences between farmers and the know-how from suppliers are central resources. Otherwise, they are relying on existing tools and practices that are already present and well-established on their farm — be it at an organic farm or a conventional one. As one interviewee explains: "there is rarely room for risky experiments." It also underscores a disconnect between adaptation policy and local farmers that emerges from a lack of direct interfaces to shape decision-making and an associated sense of "detachment" and distrust. It is in this context that, as Jasanoff argues, adaptation policy deeply relies on industry actors to shape and inform local adaptations.

3.7. Conclusions: Localizing Adjustment Epistemologies

Adaptation in New York manifests at different locales across New York in response to escalations of natural hazards and in reflection of local socio-political organizational structures. Adaptation thereby manifests not as a monolithic and fixed concept established in policy and executed through implementation. Rather, adaptation manifests in epistemological problematizations of risks and their interaction with social, political and material orders across scales. In the case of New York, the problematization of natural hazards impacting societal systems as an external force can be traced across

scales as constitutive for adaptation — but become refigured, resituated and materially, socially and politically substantiated across and within the different sites of decision making.

Critical NYS planning documents — especially the ClimAID report — establish adaptation policies by centrally problematizing exposures to escalating natural hazards. Constructed as "external" forces that act-upon social systems, **Section 2** shows how the ClimAID report establishes an adjustment approach to adaptation that focuses on increased resilience to allow agricultural systems to better weather environmental changes. These problematizations constitute a specific ad-hoc approach to responding "to the last disaster." Focused on maintaining agriculture as an economic system, it extends societal orders in the primacy of a productionist ideology. **Section 3** foregrounds how low-level administrators at the offices of state agencies substantiate adaptation policy by making crucial decisions about the objectives and scope of adaptation. I argue that in the lack of politically sanctioned and legislatively adopted policy, key decisions about adaptation are made by fairly low level administrators as they run concrete adaptation programs, respond to emergent adaptation needs and as they navigate the socio-cultural and political orders of the political institutions they are part of.

Adaptation manifests in problematizations of escalating hazards informed by key policy documents, notably the ClimAID report, the institutional orders at the DEC and the larger polity of NYS. These problematizations are centrally informed by these specific socio-epistemological orders and their interaction, as they converge at the offices of the DEC. What emerges is a substantiation of the adjustment approach to adaptation: with limited resources and political commitment available, adaptation options are relegated to responses "to the last disaster", unfold ad-hoc and are centrally focused on problematizations of how to deal with escalating natural disasters within strictly limited political orders.

In consequence, the Climate Smart Communities program centrally focusses on supporting local communities in the preparation for and adaptation to such escalations. **Section 4** traces how adaptation decisions made at the DEC shape and reorder local adaptation decisions at the Madison County Planning Offices as the county participates in the CSC program. I make explicit how the organizational-administrative structures of the program reinforce problematizations of natural hazards — but also exposes central restrictions that limits the impact of the program. As a consequence, New York, only in strongly limited ways, shapes adaptation practices "on the ground" at local farms in Madison County. In

Section 5 I discuss the consequences of the limited reach of adaptation planning as embedded in a political culture that emphasize the role of economic and industry actors. Farmers, centrally constructed as part of an economic system, rely primarily on non-state actors to inform their adaptation planning and practices — and primarily with industry actors. The lack of coordinated planning for adaptation — and the outsize influence of industry stakeholders — converges with a central problematizations of natural hazards as risk-constituting establishes an extension of existing societal-political orders. This manifests a specific mode of adaptation that also for farmers, is also centrally constituted in ad-hoc responses to escalating "natural" disasters.

These processes of iterative adaptation localizing in specific sites of decision-making, and across scales, reveal an adaptation that is centrally shaped by epistemologies about nature, society, risk and adaptation, grounded in the situationally concrete problematization of escalating natural hazards. There are several key consequences of understanding adaptation as materializing situationally across scales.

First, it makes explicit that decisions-making about adaptation is **always local regardless of scales**: The socio-political structures of the NYS agency offices shape the ways in which adaptation policy gets substantiated in their concrete socio-political materiality and orders as well as in their relationships with material conditions of policy, leadership commitments and local communities. Similarly, local adaptation planning in Madison county is strongly shaped, not only by the epistemological frameworks of adaptation policy and programs for implementation, but the material and political problematizations of climate risks and realities outside these programs. Local farmers are similarly confronted in adaptation by the situated socio-material orders of agricultural systems and the (designed) limited-reach of adaptation policy.

Secondly, this makes explicit that the characteristics in which adaptation manifests in New York are strongly related to the conditions in which it unfolds, politically, socially and materially. What adaptation is, can be — and cannot be — is deeply structured and shaped by the social, political and epistemological orders in which it unfolds and that it engages with; and which ones it doesn't. The lack of political commitment to structural adaptation decisions, the maintenance of and operation within political boundaries of adaptation programs such as the CSC program, and the outsize role of industry actors in

shaping on-farm adaptation must be explicitly understood as not only the consequence of, but the political aspects of adjustment adaptation itself,[46] as Eriksen et al. (2015, p. 523) argue.

Third, this makes explicit the ways in which New York State governs adaptation and its localizing across scales: It can best be summarized as one that:

a) Is a problematization of and response to climate risks as constituted in natural hazards;
b) Unfolds primarily as an ad-hoc response to escalating natural hazards;
c) With the objective to adjust agriculture as an economic system, can maintain or increase its economic productivity in the face of escalating environmental changes that threaten its stability.

It is in this context that the characteristics of New York's adjustment adaptation become explicitly interrelated with the ways in which it is localized; As an ad-hoc adjustment approach to weather risks to economic losses in the agricultural system, adaptation measures rely heavily on the market power relationships it is reflective of — and the outsize role of industry stakeholders in shaping local adaptation decisions. On the other hand, policy interventions are sharply delineated from market interventions and focus on municipal adaptations and adaptation responses to support similar responses to escalating natural hazards. Ultimately, this constitutes an adjustment approach in a productionist paradigm that is highly reflective of the social, political and economic orders in which adaptation develops and unfolds.

Fourth, this means that the management of problematization, epistemological orders and adaptation pathways coevolve across scales. State policy is localized through their management and by navigating and regulating decision-making places. As the state policy becomes substantiated across scales and implemented through programs, policy is localized by prescriptions of problematizations and the epistemological ordering. This becomes particularly clear in the ways in which planners in Madison County engage with the CSC program and where they find its limitations and disconnects. At the same time, the construction of publics and decision-makers — with the focus on municipalities and counties and

[46] A central concept here is that of the apparatus. Foucault and later Agamben (2009) detail the apparatus as a heterogeneous set that a) articulates urgency [in this case of governing heat] and b) positions the means for governing and steering the issue of urgency [heat] in cosmopolitical and de-central ways. The apparatus consequently is: "a thoroughly heterogeneous set consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions […] Such are the elements of the apparatus. The apparatus itself is the network that can be established between these elements" (Michel Foucault, 1980, p. 194). Here, an apparatus that governance environmental change through adaptation becomes explicit that heavily relies on specific epistemological orders, hegemonic tendencies of techno-scientific risk assessments as truth-speaking device, and the governance of who participates in decision-making on what terms and to what ends.

the exclusion of local farmers in key planning and decision-making processes — notably reflects a civic epistemology that is grounded in managerial orders of state governance of environmental change.

Fifth, local adaptation on farms and through the agricultural system on the one hand, and adaptation planning and localizing through the state on the other, are compartmentalized organizationally, politically and epistemologically. The problematization of risks and their impacts on agriculture in economic terms co-produces separated orders and authorities of state and economic actors and distributes governance responsibilities; States govern local adaptation with a focus on municipalities, counties and publics-as-citizens, while economic institutions — significantly, the industry itself — plays an outsize role in informing, shaping and governing adaptation within and on farms-as-economic-entities.

At the heart of this discussion is the problem raised by political economists such as Bassett and Fogelman (2013), Pelling (2011) and Eriksen (2015), who warn that adaptation — as adjustments to natural hazards — runs the risk of merely cementing in the societal-structural orders that produce climate risks and vulnerability. In many ways, the design of adaptation policy in New York, and the ways that structural and political orders limit certain adaptation pathways and substantiate/stabilize others are deeply consequential for the adaptation as a transformative project:

> In this context, perhaps the most profound act of transformation facing humanity as it comes to live with climate change requires a cultural shift from seeing adaptation as managing the environment 'out there' to learning how to reorganize social and socio-ecological relationships, procedures and underlying values 'in here'. This in turn demands a strong component of conceptual and social reorganization. How far this might precipitate political and economic regime change is unclear (Pelling, 2011).

In chapter 4, I will investigate Austrian adaptation policy as one that more fundamentally engages with adaptation as "a cultural shift from seeing adaptation as managing the environment 'out there' to learning how to reorganize social and socio-ecological relationships […] in 'here'." It stands in contrast to what I argued in this chapter; that adaptation policy in New York is adjustive, as it engages in "managing the environment 'out there'." I investigated how epistemologies of adjustment adaptation manifest across decision-making sites, as policymakers, local planners and farmers respond to intensifying climate escalations. I examined the institutionalized practices in which collective decisions about agricultural adaptation are made, and who is involved in these processes on what terms — determining what is being adapted to, to what ends, and with what means.

4. AT: STABILIZING REFORMIST ADAPTATION EPISTEMOLOGIES

This chapter focusses on how Austria governs adaptation. It characterizes a "reformist" approach to adaptation that manifests in local practice across governance scales. It details how this approach stands in stark contrast to New York's adaptation approach — revealing the political dimensions of problematizing risks and constituting governance apparatuses.

4.1. Introduction

The previous chapter examined how adaptation of the agricultural sector in New York is stabilized as ad-hoc responses to natural hazards in a resilience framework to adaptation. In an adjustment approach, adaptation in New York aims at maintaining the productivity of the agricultural economic sector. I argued that adaptation manifests across different sites, and through interactions between them. However, the structural-political organization of adaptation localization revealed a disconnect between state planning of adaptation and adaptations on farms: They were treated as part of two separate spheres, disassociated through the political organization and distribution of authority in adaptation decision-making and planning.

On the one hand, state adaptation policy and planning is found to be localized across scales, but strictly confined within the institutional boundaries of the polity. Adaptation manifests in state policy planning documents, in decisions at state agencies and is substantiated through localization programs that target local and regional governments. On the other hand, adaptation practices on farms draw on non-state actors, namely industry/economic stakeholders, reflecting the broader organization of policy implementation in the US following the same structural distinctions between political and economic spheres. This is reinforced as agricultural adaptation is considered in state planning as the adaptation of an economic sector.

In this chapter I will argue that Austrian adaptation policy explicitly problematizes risk-producing agricultural systems in order to advance sustainability transitions and maintain small-scale agricultural systems. This constitutes a policy localizing approach that stands in stark contrast to policy planning in

New York; In Austria, adaptation manifests in stabilized adaptation frameworks that allow for a strongly state-led coordination of adaptation across scales and extending deep into the socio-cultural and economic fabrics of local agricultural adaptation on farms. The goal is to facilitate a reformist adaptation (Pelling, 2011) approach that aims at adjusting risk-producing agricultural systems and pursue long-term sustainability transitions of the agricultural sector.

To make this argument, this chapter follows the same organization of chapter 3 — allowing to foreground how adaptation is localized in Austria's reformist paradigm compared to localizing New York's adjustment paradigm of adaptation. As in chapter 3, I build my argument by tracing the mutual shaping of climate problematization and the localized manifestation of adaptation policy across scales. Each sub-section attends to how adaptation manifests at a specific site of adaptation decision-making: Local farms, federal and state policy, governmental agencies that support the localization and implementation of policy, and the local municipal and farming stakeholders involved in the localizing processes.

I set the stage for this chapter by foregrounding in **Section 1** the emergent experiences with climate disruptions in the Unteres Traisental region. In **Section 2**, I discuss how epistemological orders of risks become established in the Austrian National Adaptation Strategy (NAS) and National Adaptation Plan (NAP). Thereby I show how the Austrian NAS/NAP associate adaptation with long-term transformative objectives. Adaptation epistemologies emerge that recognize adaptation as moments of societal re-design and transformation instead of adjustment. The adaptation frameworks act as coordinating and ordering devices for localizing. In **Section 3** I show how adaptation is localized through the KLAR! program. I discuss how program administrators on the federal level at the Climate and Energy Funds strongly focus on localizing the epistemological orders constituted in the NAS/NAP frameworks. The regional KLAR! managers thereby act as crucial knowledge brokers between local stakeholders and decision-makers and federal planners and farmers. The epistemological orders, derived from the NAS/NAP and substantiated in their implementation and dissemination across scales, become crucial ordering devices for local adaptation planning and practice. In **Section 4**, I discuss how farmers deliberate different concerns on adaptation options to drought and heat. Thus, it becomes explicit how adaptation may create different social orders: In the workshop farmers envision different scenarios for possible climate futures, reflecting on the role adaptation plays in creating these possible futures.

Consequently, farmers problematize techno-scientific interventions (in this case irrigation) for their capacities to extend and exacerbate social inequalities (e.g. unequal access to water resources) or create new disparities and inequalities — and negotiate the consequences for the larger rural communities surrounding agricultural lands.

4.2. Experiences with Climate Change in Unteres Traisental

The rivers Fladnitz and Traisen define the landscape of the Unteres Traisental region in Lower Austria culturally, geographically and socially. The two rivers run through vast valleys framed by soft, rolling hills before the two rivers meet the Danube in the north. Their waters have been used for human cultivation throughout the centuries — for irrigation, milling, and to generate electricity. The rivers and their waters form the lifeline of the county. Along the gravelly banks of the rivers lie Herzogenburg and Traismauer, the population and industrial centers of the region. The wide valley and its sandy soils grew out of and intertwined with the rivers as well, including the region's agriculture that thrives off the favorable climatic conditions — with flourishing wine, vegetables and fruit agricultures.

It was and is a small, diversified agriculture that dominates the region and shapes its character and landscapes. In-between, small, rural towns are nested as islands atop the elevations, with their histories directly intertwined with agriculture: The towns and farming grew together, as farms are often located in the towns, while the fields surround them — constituting a physical and social proximity between agriculture and social life that also shapes the cultural life of the region.

Much of this history has been preserved today. The towns themselves are still sustained by the agricultural architecture and landscape drawing tourists that seek recreation and locally produced foods as delicatessen. A local food and recreation economy emerges, with farmers marketing their products directly to the visitors at the famed on-farm seasonal eateries called "Heuriger", while the agricultural landscapes invite tourists to traverse by foot and bike.[47] The wine industry — local/regional and mostly

[47] A growing body of literature draws attention to the effects of shareholder driven agriculture, local agricultural supply chains and the cultural value of maintaining close relationships between food-production and the surrounding communities (Berry, 2015; Cone & Myhre, 2000; Wells, Gradwell, & Yoder, 1999). A stark difference in how agriculture is valued and organized emerges throughout this dissertation, where a material disconnect between rural communities and agricultural communities becomes explicit in the US: reflected in the growing spread of gated developments, the so-called decline of rural American small-towns and the increasingly material isolation of large-scale, toxic agricultural systems that need literal-physical disconnection for rural communities. The small-scale, tightly coupled socio-

organic — draws large numbers of visitors into the area every year, with the centuries old “cellar-alleys” as intriguing backdrops.

Climate change increasingly reshapes the region. Seasonal disruptions, annual shifts in average temperatures and precipitation, intensifying floods, and a recent, significant uptake of severe droughts and heatwaves threaten the region, its farmers and the waters as their lifeline.

These impacts of the climate crisis become personally explicit for farmers. While flooding remains a historically persistent weather hazard, particularly during spring (Simander, Schoberleitner, Burgstaller, & Geck, 2017), over the last decades, droughts and heatwaves emerged as unfamiliar hazard, setting new records almost every year.[48] Karl* is a local organic dairy farmer. He explains that climate change today is a major concern that impacts farmers across the region:

> It impacts our quality of life, it impacts our work, it impacts our health, and especially us farmers are confronted with the challenge that we have to work with that, so we have to counter it, as much as we can.

New threats emerge. Drought, heat and flooding events are expected (and already have begun) to gradually displace agriculture — particularly in exposed areas. Temperature and seasonal disruptions threaten local farmers’ livelihoods. Vintners especially view recent climate disruptions as making it increasingly difficult to successfully grow types of grapes that have been cultivated in the region for centuries. Particularly the “Veltliner” has become engrained in the region’s identity as a wine growing region — and is today crucial to local economic and social identities. As one local vintner puts it, these shifting climate conditions put the region and its cultural heritage at risk:

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topographic landscapes of cultural-agricultural land in Austria stands in stark contrast and is reflected in adaptation policy, as Chapters 4 and 6 will discuss.

[48] A major difference in escalating hazards emerges between Austria and New York. Historically, both regions have been centrally focused on the problematization of flooding events as major threat. Yet, while in Madison County flooding disasters still are the primary object of problematizations, in Austria increasingly a large scope of threats — especially newly emergent heat and drought risks — become problematized. This represents a significant shift for Austria, where strong water security and high water quality are historically tied to a national identity of “pure” environments. Statistically, shifts in climate risks can be observed, with a significant increase in drought and heat events in Austria. Yet is not the case that drought in New York State does not constitute a major concern in New York as well (NIDIS, n.d.). Instead, differences in problematization may perhaps be better explained through the concern over experiences with disaster and ad-hoc adaptation planning in the U.S, as ACR4 explicitly describes (cp. Minura et al., 2014). This stands in contrast to a precautionary planning that more strongly integrates anticipatory sciences. Additionally, local structural conditions of food-production perhaps could play a major role in explaining these differences, especially the availability of irrigation technology and the role of different resources in informing risk management on farms. This cannot adequately be explored in this dissertation and perhaps will become the subject of a separate publication.

> If it continues like that, and if we don't do anything to adapt … we might not exist in fifty years anymore, at least not in the way that we do now.

Farmers in the Unteres Traisental region are raising similar problems as it is the case in Madison County: droughts, floods, and heat waves in particular are described as major hazards to their farming operations and the region overall. Yet, there is a notable difference in how these problems become associated with climate change.

On the one hand, the impacts of escalating natural hazards are discussed by farmers in Austria as impeding the agricultural productivity and viability of small-scale diversified farms — in similar terms to New York. Farmers problematize the impacts of drought, rain, heat and seasonal disruptions on the viability of farming and farm productivity:

> Three weeks without precipitation is tough. But it is for us vintner easier than for the vegetable and corn farmers around us, especially as they are deep rooters. But with the young plants, we felt that. And then … it's consecutive from year to year. Another summer like that could easily break our neck.

Another farmer explains:

> The quality of the corn was low, the yield was moderate at best — it was just enough so it did not prematurely ripen. But in general, the beets, especially the sugar beets, it was too dry and they were cemented in, you couldn't harvest them.

A vegetable farmer explains similarly that uncertainties impact productive capacities:

> The weather, hail, drought, too much water. [That's what becomes] more and more a problem. […] We start to think that's what it's going to be now. The field farmers are feeling that explicitly. In the production and output quality. … And even if the output works out, the price is completely insane. That crashed. If there is more on the market the price collapses. If there is nothing, you can't afford anything. That's a big deal. Especially when you are small. And then it gets hot as it does now, and if you are not state subsidized or protected then you go under.

Yet, in Austria, climate change is also problematized to impact farming as constitutive to regional identities, as custodian for local cultural landscapes, and more generally, as an important vehicle for prosperous rural communities more generally, as one conventional farmer in the Unteres Traisental region explains:[49]

[49] A more careful discussion of the role that local cultural identity plays in the problematization of risks and food-production systems is provided in Chapters 5 and 6.

> And it is really this responsibility, we are custodians of our landscapes and how it looks and it really would be impossible to have those giant monocultures here, because you would just destroy these communities and that is impossible.[50]

In the context of climate change, Austrian conventional farmers begin to re-think the systematic conditions of industrial agriculture involved in the production of climate risks as well as in its effects on the larger rural societal and ecological fabric. As the farmer explains:

> And now you see, this is not only a generational change, it is a paradigm shift, it all begins to change, and they recover old knowledge, and that was not knowledge that was sensible and sensing and gut feeling, and they relearn that, and folks start to teach that also from the state.

Explicitly, Austrian rural agricultural landscapes are considered as a commons integrated into a public consciousness. Austrian agri-landscapes are considered recreational spaces (Sinabell, 2002) and at the same time — in convergence with agriculture that is grown around rural town centers — are considered constitutive to the intact rural social fabric. Austrian adaptation policy emerges in the context of a historically grown valuing of rural agricultural landscapes, their socio-cultural entanglements and an identity of farmers as cultural and ecological custodians. This deeply shaped and was shaped by historically grown policy, local identities and cultural practices that couple agriculture, ecosystems and local cultural identities. Adaptation policy therefore draws on and emerges from a strong coupling between agriculture and society, instead of unfolding — as it is the case for New York — in a sectoral compartmentalization of agriculture-as-economic sector.

4.3. Stabilizing Frameworks for Adaptation Through Policy

In this section, I argue that Austrian adaptation policy significantly diverges from New York's approach: the Austrian federal-level adaptation strategy plays an outsize role in manifesting adaptation across locales. In it, key epistemological frameworks for adaptation are stabilized — establishing adaptation ends, mechanisms and what is being adapted to in a centralized manner.[51] Thereby,

[50] Paraphrased from interview notes

[51] This is a major element of how adaptation is localized: The epistemological stabilization of adaptation — its social construction — importantly shapes what is "thinkable" within a specific ordering frame. The differences between the epistemologies of adaptation in New York and Austria make this particularly explicit: For example, adjustment adaptation centrally limits possible problematizations of risks, emphasizing a focus on impacts of externally originating impacts. The problematization of risks as socially (co-)produced, as it is the case for Austria, on the other hand allow

adaptation epistemologies incorporate a systems perspective to climate risks and adaptation, reflecting the larger societal perspectives on agriculture-as-more-than-economics. What emerges is an explicitly transformational-reformist approach to adaptation, seeking to facilitate system transitions towards equity, social justice and sustainability. This reflects epistemologies of risks as constituted in their societal production of inherently risky agricultural-extractive systems.[52]

The Austrian federal parliament adopted a formal national adaptation strategy and response plan in two parts — the National Adaptation Strategy (NAS) (or: "context") and the National Adaptation Plan (NAP).[53] Formally adopted by the Austrian Parliament as well as the Conference of Provincial Governors in 2012, the Austrian adaptation policy has been explicitly institutionalized, establishing central adaptation frameworks, and providing implementation plans and concrete adaptation options for individual sectors that were pre-vetted for compliance within these frameworks.[54]

This makes the Austrian NAS/NAP a powerful ordering device that deeply structures adaptation and its localizing across scales. Decision-makers across sites draw heavily on the well-established adaptation frameworks. The Austrian NAS and NAP provide concrete adaptation frameworks and establish implementation infrastructures designed to inform and coordinate local adaptation implementation. The NAS and NAP 1) establish overarching adaptation concepts, frameworks and associated guidelines and criteria (e.g. for good adaptation, maladaptation, and associated concepts such as equity, vulnerability, risk, etc.). These allow for coordinated and system-focused adaptation processes

to bring into perspective societal orders. This strongly relates to arguments made by political economists about how the natural hazards school renders invisible the politics of adaptation (cp. Bassett & Fogelman, 2013; Pelling, 2011).

[52] Compare the discussions on risk in the literature review. For Douglas (1966, 1985) what gets designated as "risk" should be understood as cultural-political constructions emergent from the social and epistemological orders in which they are produced, understood and applied. In other words: the style in which risk governance unfolds, the knowledge orders that construct understandings of risks, the areas in which they do so, and the risks themselves are inextricably entangled and mutually constitutive for each other. In Austria, the problematization of the social production of risks — through risk food-production systems — therefore incorporates implicit value judgments about what constitutes "good" or "bad" modes of food production. Problematizing the risks of food-production becomes therefore a major justification for government intervention for the purpose of adjusting the production of these risks by governing how food is or should be produced.

[53] In the following I refer to both the NAS and NAP together as the Austrian "strategy"; If I refer to individual parts, I do so by naming them directly as NAS/National Adaptation Strategy or NAP/National Adaptation Plan.

[54] This is another major difference between Austria and New York. A formally adopted policy constitutes a mechanism to hold governmental planning accountable, and makes progress in adaptation more tangible.

across sites. To support the incorporation of these frameworks in local adaptation, the NAS and NAP 2) establishes organizational and program infrastructures and structures.

Adaptation is thereby stabilized in concrete epistemological frameworks of the NAS/NAP and their dissemination and incorporation across scales, as adaptation policy is localized: This national strategy 1) provides a concrete definition of adaption; 2) defines objectives and sector-goals; 3) establishes criteria for avoiding maladaptation and for good adaptation practice; 4) and lays out mechanisms and mandates that aim at coordinating adaptation implementation and serve to ensure compliance with these objectives and criteria. This provides a relatively consistent[55] adaptation approach across sites.

In other words, these definitions, criteria and mechanisms constitute a specific "disposition of things." Adaptation measures are to be understood as governance interventions seeking to exercise power and establish/maintain power-orders in society. As such they seek to (re-)design socio-material orders as political means for which the definition, understanding and delineating of risks and vulnerabilities becomes a key shaping power. It becomes particularly important to understand how environmental problems get defined, by whom and to what political purpose, explicitly situating adaptation evaluation in the analysis of power. Key concerns thereby is the interaction between hazards and risks, vulnerabilities and exclusion/marginalization/discounting, and the justifications of intervention to the effect of social order and exercise of control. In the context of environmental extremes this implies that analysis has to attend to how different knowledge orders run into conceptualizing and problematizing environmental hazards, risk and vulnerability within their social and political contexts, and to the political implications they entail (cp. Bacchi & Goodwin, 2016).

[55] Consistency appears to be a key concern in how adaptation is managed in the Austrian context, and the establishment of key criteria, standards and metrics for "good" and mal-adaptation play a critical role. Key literatures in STS discuss different ways in which cohesion, stability and coherence in governance are achieved — or rather: performed. Gutham and Brow (2015) build off of Foucault's term of biopolitics to outline the ways in which policy is engaged in the counting and discounting populations through the politics of standards, problematizations and criteria. Similarly, Jasanoff (2009) also draws attention to the role of scientific knowledge and its involvement in stabilizing governance regimes. And Foucault (1984, 1988) extensively discusses the relationships of normalcy, coherence and the disposition of social, material and epistemological orders to exercise control and power. For the case of coherence in adaptation policy in Austria, the management of coherence as a central focus is tied to the dissemination and management of epistemological orders, especially drawing on standardization processes (criteria, checklists, etc.). In this context, adaptation localizing is explicitly entrenched in the politics of ordering and management of epistemology, problematization and regimes of governance.

4.3.1. Defining Adaptation and its Objectives: from Adjustment to Reform

The contours of Austrian adaptation thereby first manifest in the defined policy objectives and is constructed as transformative in scope — explicitly stating that "adaptation is a societal challenge" of unprecedented scale, and that adaptation responds to risks constituted in natural hazards as well as in the structures of social systems. The latter is framed as at least exacerbating risks through their material, social and political organization and structures. This constitutes an approach to adaptation that focuses on a) system adjustments to natural hazards, and b) reforming systems that (co-)produce risks.[56] Adaptation draws on problematizations of climate risks that incorporate societal dimensions next to the problematization of escalating natural hazards.[57] Adaptation is defined as avoiding:

> […] negative consequences of climate change for environment, society and economy while utilizing emergent opportunities. The adaptation strategy aims at strengthening natural, societal and technological adaptation capacities. Adaptation measures should not have negative social consequences, but rather minimize risks for democracy, health, safety and social justice (Federal Ministry for Sustainability and Tourism, 2012, p. 25). [58]

Similar to New York, the Austrian strategy seeks to avoid negative consequences of climate change and utilizing emergent opportunities. Adaptation is strongly involved in risk management as an

[56] Here the relationship between problematization and governance become explicit, connecting to key arguments by Foucault (1984) and Agamben (2009).

[57] An important distinction: In New York, problematizations focus on escalating natural hazards and their impacts. In many ways, risk assessments regard the identification, anticipation and therefore management of impacts and vulnerabilities, but do not directly engage with the production of risk (the relationship between risk and managerial techno-scientific governance was discussed extensively in the literature review; cp. e.g. M. Douglas & Wildavsky, 1983; Luhman, 1993). In Austria, on the other hand, governance is heavily involved in the calculation and assessment of multi-dimensional risk-production — but in key moments moves importantly beyond the problematization of climate change in terms of risk entirely. Instead, in many instances climate change is considered as a transformative force, embedded in discussions of cultural values and identity, relationships between society and nature and the discussion of adaptation as rethinking these relationships. In this perspective, techno-scientific discussions of risks play a very limited role, and other empirical and experiential knowledges become important. While scientific knowledge still plays important roles, the relevance of experiential knowledge and its integration in decision-making processes (see last section of this chapter) and the reliance of qualitative empirical data in planning underscore this dynamic and are their effect.

[58] German original: "Anpassungsaktivitäten zielen darauf ab, die Verwundbarkeit gegenüber der Klimaänderung zu reduzieren bzw. die Widerstandsfähigkeit (Resilienz) zu erhöhen sowie mögliche Chancen durch veränderte klimatische Bedingungen zu nutzen. Anpassung kann auf vielerlei Art und auf unterschiedlichsten Handlungsebenen erfolgen: vorausschauend (proaktiv) oder auf bestimmte Klimafolgen reagierend (reaktiv), auf privater oder öffentlicher Ebene sowie autonom oder geplant."

adjustment to external threats — and includes initiatives and measures aiming at mitigating or counteracting vulnerabilities of natural or human systems against presently occurring or anticipated impacts of climate change on an ad-hoc basis (Federal Ministry for Sustainability and Tourism, 2012), quoting (IPCC, 2007).

Climate scenarios identify how anticipated shifts in climate patters potentially exacerbate a variety of risks, informing what the state needs to adapt to. Average temperatures and participation take a prominent place in the Austrian strategy, being — just as in the ClimAID report — presented in an introductory chapter.[59] The NAS/NAP anticipate similar risks associated with escalating natural hazards as the ClimAID report does for New York, and provides an overall, regional and sector-specific risk analysis. However, the NAS provides risk assessments in abbreviated form in one chapter.

However, these discussions of external impacts of natural hazards remain limited, while greater room in the strategy is dedicated to the problematization of "social dimensions" of adaptation, climate risks, and their production — discussing social vulnerability, equity and social inequality, as well as gender equality across several chapters of the NAS.

Explicitly, commitment to "minimize risks for democracy, health, safety and social justice" (NYSERDA, 2011b, p. 25), questions of social justice and equity play an important role in Austrian adaptation policy.[60] This manifests in the emphasis on utilizing the moment of *crisis* (Austria as well as the EU declared climate emergencies) to re-think and redesign the fabrics of society in which these risks emerge in, are exacerbated, and are (co-)produced.[61]

The strategy explicitly constitutes adaptation objectives as reformist in scope, emphasizing that adaptation aims at advancing a sustainable and equitable society:

[59] Sea level rise is not taken into account due to Austria being a landlocked country.

[60] However, what "social justice" and "equity" concretely mean is not made explicit. In fact, while considerable space in the NAS/NAP is dedicated to these questions, they are not associated with concrete criteria and metrics compliant with the overall bureaucratic apparatus that enforces policy and constitutes Austrian state governance. Accordingly, these questions successively move further in the background and ultimately disappear in adaptation planning and decision-making as policy becomes localized across scales. Instead, matching criteria regarding mal-adaptation and best practice become increasingly center-staged (underscoring again the politics of prioritizing and valuing involved managing epistemologies in concrete ways).

[61] "Briefly stated, co-production is shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it." (Jasanoff, 2004, p. 2f).

> What is needed is a 'politics of incremental steps' with continuous incorporation of aspects of climate change in all domains of planning. But it also needs a long-term reconstruction of society and a renewed recognition of sustainability in its fullest meaning (Federal Ministry for Sustainability and Tourism, 2012, p. 5).

Adaptation manifests in the strategy's objectives as intervention into "human and natural" systems. Austrian adaptation aims at a systematic re-adjustment, calling for the "long-term reconstruction of society." While the adjustment to escalating natural hazards (the primary focus of adaptation in NY) plays an important role in Austrian adaptation as well, the reform of risk-producing social systems becomes its explicitly stated primary objective:

> Human mankind is on one hand the main cause of climate change, but on the other hand increasingly feels its effects and investigates possibilities to adapt. Climate change mitigation and smart adaptation serve not only to protect ecosystems. In the best case, they also provide definite social advantages, as they anticipate potential social effects and seek to minimize risks to democracy, health, safety, and social justice, drawing upon social integration and cohesion, respecting fundamental rights and cultural diversity, guaranteeing the equality of men and women, and fighting against discrimination of any kind (BMLFUW, 2012b, p. 43).

Adaptation is understood as a vehicle to support "societal objectives",[62] particularly equity, social justice and gender equality.[63] This means that a risk management approach is integrated in and converging with other political objectives, particularly those established in international treaties and frameworks (c. p. BMLFUW, 2012b, p. 17). As such, the Austrian adaptation approach integrates reformist objectives. The strategy manifests adaptation-as-reform and system re-design.

However, what "social justice" and "equity" concretely mean is not made adequately explicit. In fact, while considerable space in the NAS/NAP is dedicated to these questions, they are not associated with

[62] The relationship between nature and society is constructed differently here: Whereas natural hazards are an external force impacting society, distinctions between nature and society are less clear in the Austrian problematization of societal-natural risks. The idea of the Anthropocene plays an important role here, where causes for environmental change transcend climate change and are directly coupled to larger relationships between humans and their ecosystems. Distinctions between nature and society become problematic, and this extends into the organization of adaptation: How can risks be mitigated solely by adjustments to external impacts, if the risks themselves are produced by the systems that need preservation and adaptation?

[63] Gender equality (in a binary-concept) is discussed in a separate chapter in the NAS/NAP. This is unique internationally, at least at that time. Yet, as this chapter moves across scales to different sites of adaptation decision-making, the discussion of gender equity and its connection to adaptation does not come up even once. That all farmers interviewed in Austria turn out to be male is more than a coincidence: While women are heavily involved in farming, gender stereotypes persist. In the coincidence of a data-artifact, most farmers in Madison County that participated in this research were women running the farm.

concrete criteria and metrics compliant with the overall bureaucratic apparatus that enforces policy and constitutes Austrian state governance. Accordingly, these questions successively move further in the background and ultimately disappear in adaptation planning and decision-making as policy becomes localized across scales. This is particularly the case for issues of gender equality that are more broadly discussed in the policy, yet not adequately incorporated into associated guidance and criteria (e.g. for maladaptation). Instead, matching criteria regarding mal-adaptation and best practice become increasingly center-staged (underscoring again the politics of prioritizing and valuing involved managing epistemologies in concrete ways).

More generally speaking, concepts of equity, social justice and equality are discussed at relative length in the NAS, receiving more attention than is the case for most national level adaptation strategies at that time. The NAS heavily relies on concepts, definitions and criteria established in the Sustainable Development Goals, while attending to gender inequality in particular. Other issues — especially racism and immigration — are, however, fairly underdeveloped; and global inequities remain almost entirely absent. This means that, while the NAS and NAP emphasize equity and social justice, it does so in underdeveloped ways — and lacks in translation into concrete action across scales also for that reason. Additionally, decisions about what contents of the NAS and NAP are translated into criteria that inform or evaluate adaptation actions across scales are themselves political acts — as discussed in the following sections of this chapter. That these dimensions receive less attention is therefore also owed to varying political commitments across scales as the NAS and NAP are localized.

Explicitly, the NAS claims a striking research gap that could inform policy development to better integrate these questions, explaining (Federal Ministry for Sustainability and Tourism, 2012, p. 43) that:

> Currently, no detailed scientific assessments of the social consequences of climate change or the social effects of adaptation measures are available. However, the following questions should be considered:
>
> How are people in Austria affected by climate change and potential adaptation measures on the basis of their location and socio-economic situation?
>
> How will everyday life, especially working conditions and lifestyles, be altered through climate change?
>
> How are national aspects of adaptation to climate change connected to European and global aspects?

What measures are required in order to minimize or prevent the vulnerability of social systems and the adverse effects of climate change?

That being said, the emphasis on social justice more broadly speaking remains unusual for adaptation strategies of that time — particularly compared to the US context. While their translation into action remains lacking in important ways, their integration also constitutes an emphasis on these issues in Austrian adaptation planning and practice — and importantly constitute a more interventionist approach to planning. This is particularly the case for three topics that get more effectively integrated in adaptation planning across scales: access to adaptation solutions, adverse impacts of adaptation solutions on ecosystems and society, and advancing sustainability transitions through adaptation. Explicitly, sustainability transitions are prioritized for their effects not only on social but ecological justice and are established as political priorities more generally in Austria through two separate sustainability strategies — the NSTRAT[64], ÖSTRAT[65] — and international commitments through the UN, particularly the SDGs[66].

4.3.2. Reformist Adaptation of Austria's Agricultural Systems

This also translates into sector specific adaptation objectives. For the agricultural sector, adaptation manifests as explicitly reformist, and aims at re-designing the sector towards sustainable futures:

Agriculture — Ensuring sustainable, resource-conserving and climate-friendly (agricultural) production and maintaining and improving the ecological services of agriculture under changing climatic conditions.

Figure 1. The sector-specific overarching objective for agriculture; the text is quoted from BMLFUW (2012b).

This constitutes a significant difference to the NY ClimAID report, where climate impacts are problematized centrally in a productionist paradigm.[67] In the Austrian strategy however, adaptation manifests in the problematization of system-produced risks and the role of agriculture for larger societal cohesion. In response, the NAS establishes adaptation objectives that manifest it as a vehicle for long-

[64] National Strategy For Sustainable Development

[65] Austrian Strategy for Sustainable Development – Scope of action for the Federal Government and the States

[66] UN Sustainable Development Goals

[67] The valuing of agricultural landscapes as more than economic-industrial areas is discussed in further detail in chapters 5 and 6.

term system reform with an explicitly interventionist character.[68] As such, adaptation is seen as a political project, seeking to facilitate transition of the agricultural system towards “climate-friendly agricultural production” in order to maintain and improve “the ecological services of agriculture under changing climatic conditions” (BMLFUW, 2012b).

Embedded are problematizations of climate risks as constituted in extractive agricultural patterns that would have negative consequences for ecosystem resources, environmental conservation and the fabric of rural societies. The NAP — or “action plan” — associates these objectives with 1) sector specific vulnerability assessments; 2) defines specific adaptation principles that incorporate ecosystem service and social inequality, and 3) provides adaptation recommendations that have been pre-vetted to reflect the overarching criteria for good adaptation, contributing to the overarching aims described above, and ensuring compliance with criteria for good, socially just, equitable and sustainable adaptation.[69] The following three principles apply for the agricultural sector:[70]

- To ensure the development of robust adaptation actions that support flexible and fast reactions; an integral system-perspective needs to take into account the relationship of soil-plant-water/irrigation within the connected ecosystems;

[68] Again, this relates to previous discussions on the relationship of governance and problematization. The “disposition of things” (Agamben, 2009; Michel Foucault & Rabinow, 1997) through problematizations, and the constitution of specific governance apparatuses through them, becomes explicit here. An interventionist governance apparatus relies on different tools, organizational structures and political commitments, than it is the case for an apparatus that focuses on maintaining specific aspects of society — especially in the case of economic productivity, as it is the case in New York and constituted in the problematization of impacts on output: The latter (maintenance in a productionist paradigm) can more easily limit the scope of the state governance apparatus by relying on non-state actors to centrally enforce, inform, structure and guide adaptation. The parallel existence of state adaptation policy and market “self-“governance in New York State are a good case in point.

[69] **I**ndividual recommendations in the NAP are presented with the following information. 1.) Objectives: Details what specific objectives of the NAS/NAP it supports; 2.) Relevance: justifies the recommendation and details usefulness. 3.) Details on coupling with other sectors and action fields, especially intersections for synergies and to avoid negative coupling; 4.) State of Art (of Implementation); 5.) Recommended further steps; 6). Resource needs; 7.) Potentials for conflict (Equity; mal-adaptaiton); 8.) Responsibilities and potential cooperations; 9.) Timeframe.

[70] German original (BMLFUW, 2012a, p. 24): ALLGEMEINE HANDLUNGSPRINZIPIEN IM AKTIVITÄTSFELD LANDWIRTSCHAFT

– Für die Entwicklung von robusten Anpassungsmaßnahmen, welche flexible und rasche Reaktionen unterstützen, ist eine integrative Betrachtung des Gesamtsystems Boden-Pflanze- Wasserhaushalt (Bewässerung) und der anliegenden Ökosysteme gefordert.

– Der Leitgedanke eines ressourcenschonenden und nachhaltigen Umgangs mit Betriebsmitteln und natürlichen Produktionsgrundlagen ist bei der Entwicklung von Anpassungsmaßnahmen für die Landwirtschaft zu verfolgen.

– Anpassungen an veränderte Rahmenbedingungen infolge des globalen Wandels – wie langfristig steigende Preise für Produktionsfaktoren (Energie, Düngemittel, Wasser) und Veränderungen am internationalen Agrarmarkt wie die globale Nachfrageentwicklung – müssen mitberücksichtigt werden.

- The principles of resource conserving and sustainable application of operating material as well as a natural production base are to be followed in developing adaptation measures;
- Adaptation to changing conditions as a result of global change — such as long-term pricing increases for production elements (energy, fertilizer, water) and changes on the international agriculture market, such as global demand — need to be taken into consideration

The recommended adaptation actions in the agricultural sector are outlined in (BMLFUW, 2012b) and include: so-called green, grey and social adaptations (BMLFUW, 2012b, p. 16); provides direct recommendations for individual stakeholders; and identifies responsibilities for key decision-makers, potential partners and other key stakeholders.

4.4. Mechanisms for Localizing Adaptation

In a mixture of adjustment and reform (Pelling, 2011), the Austrian strategy establishes a robust framework that is associated with defined objectives, guidelines and criteria for maladaptation and best practice. As such, it not only manages climate risk epistemologies, but is as heavily engaged in the explicit management of adaptation epistemologies and societal orders.[71] In this section, I argue that the strategy establishes, maintains and manages epistemological frameworks for adaptation. These get mobilized in localizing adaptation across scales, allowing the coordination of a multi-sited and multi-pronged strategy in support of actors across scales implementing adaptation. This is achieved by ensuring compliance of localized adaptation activities (planning and practice) with adaptation objectives and evaluation criteria. As such, epistemological orders are translated into bureaucratically governable and measurable criteria for evaluation[72] — enforcing, disseminating and re-producing epistemological

[71] By constructing specific ideas about a wanted future, that in turn relies on problematizations of the past and present. Prioritizations and value judgements become inscribed. Explicitly, the NAS/NAP promotes a future of sustainable agricultural production. This means in turn, that specific modes of food-production get rejected and adaptation emerges as a means to realize sustainable food-production futures. Felt et al. associate this relatively new interest in futures with recent contemporary dynamics, where "we witness a 'colonization of the future'" that "[...] has become visible through massive investments in the development of anticipatory methods such as technology assessment and foresight exercises" (Felt et al., 2013, p. 16). Following the growing concern with futures – and particularly their anticipation and prediction – research in STS increasingly focuses on these futures as well, in particular asking for what they are, how they are made, by whom, and to what ends: Who is this we* that cares for and makes "the future"? And what are the political roles of futures in contemporary (so- called) "innovation" societies, especially particularly in the development of the sciences and in technology.

[72] The role of bureaucracy, evaluation and statistics in governing (e.g. populations) is a prominent theme in STS. They are discussed as heavily engaged in the materialization of political and societal order. At the same time, they are

orders. Ultimately, this means that adaptation is localized in Austria via mechanisms of compliance that are embedded in the governance of adaptation epistemologies.

This becomes explicit in the broad claims of governance, expressed in the scope of adaptation policy as "even more complex and multi-dimensional than it is the case for climate mitigation policy and law" (Pelling, 211, p. 28). Adaptation policy in Austria is heavily engaged in management of adaptation epistemologies across sites, scales and levels, explaining that:

> The need for adaptation affects different decision-making levels, from public administration units with their various responsibilities over different economic sectors to individual people. Adaptation is a challenge that involves the entire society, requiring a well-coordinated approach that mediates between affected areas and between actors (Federal Ministry for Sustainability and Tourism, 2012).

The Austrian adaptation policy is centrally focused on the management of adaptation epistemologies that span from the management of climate risks to the management of societal order and their transformation.[73] This becomes explicit in the means for policy localizing, as they are explicitly focused on disseminating frameworks across scales and by addressing various, differentiated stakeholders. Three play a particularly important role here:

1. Adaptation Mainstreaming
2. Communication and Dissemination of Frameworks and Concepts
3. Adaptation-Specific Funding/Incentive driven Programs (e.g. KLAR! and ACRP)

The first— adaptation mainstreaming — is explicitly addressing government actors. At the Federal Ministry for Sustainability and Tourism I meet with Hanna*, a top-level administrator involved in

associated with specific modes of governance (especially of risk) and the management of knowledge claims and their legitimacy (Asdal et al., 2007; Boezeman, 2016; Frickel & Vincent, 2007; Irwin, 2008; Longino, 1990; Silbey, 2009)

[73] In other words, by problematizing the production of risk through societal orders constitutes an expansive governance apparatus and its legitimacy to intervene in broad segments of society, as it terms them "risky." A plethora of studies detail on a wide range of subjects (from toxic contamination to the governance of heat) how designations of risk and "being risky" have severe implications for the subjectivity of governance and the justification of governance intervention into physical bodies and social identities (Guggenheim, 2014; Guthman & Brown, 2015; Keller, 2015; Michel Foucault, 1991; Tierney, 2006). It therefore becomes important to examine designations of risk within and outside society, and the consequences for who is safe, who is at risk, and who is risky. By designating large-scale agricultural production regimes, key determinations are made about — for example — which kinds of farmers are valued, and which ones are determined problematic, risky or unwanted. Similarly, determinations are made about what elements of society are (negatively) impacted by industrial/extractive agriculture — and therefore prioritized and valued. As an example: problematizations in Austrian adaptation policy do never talk about the situation of migrant farm workers in different regimes of food-production yet does centrally problematize the impacts on agricultural landscapes as recreational spaces for (amongst others) the urban middle-class who regularly vacations in these spaces.

coordinating the strategy's implementation. For her, the strategy provides important core principles to shape legislation and regulatory initiatives and becomes a mechanism for disseminating concrete epistemological orders that structure policy in other issue domains. Explicitly, she explains in this context that implementing the strategy's adaptation frameworks is the central objective of her work:

> We are now in the process to really get the core principles into new legislation, guidance, ordinances and regulations — and that is also the main message of the strategy: mainstreaming into all relevant areas. […] Also, long term programs and projects are increasingly incorporating this now, and people really use it to reflect if what they are doing at their departments fits into our climate futures. But that is only in the beginning and so that is a main focus for us to push further, build also the political awareness amongst policymakers. […] Through the strategy what already works well is the coordination with the provincial climate coordinators […] and we see this present in all provincial governments […]. What is needed more is the municipalities, and there is where the KLAR! is certainly the big deal right now, and thank good we seem to be on a good track there.

However, she also explains that when it comes to formalizing adaptation mainstreaming "much is left to wish for." For Hanna*, a major problem is that mainstreaming the strategy has not been established by law. This leaves the NAS/NAP as a strong framework for work across federal ministries, but without explicit mandate leaves it vulnerable to shifting political priorities:

> It always needs this extra push to make sure it finds its way into the next government program and that is hard to shape. We would need a higher priority on the agendas to translate more effectively what is well established on paper into concrete actions, particularly on the top-level. But it also allows us to really push it a bit under the radar across ministries.

As such, mainstreaming adaptation unfolds mainly in the informal coordination between stakeholders, where "we really work hard and build alliances to makes sure that the partners at different departments and ministries also are focused on putting the strategy into action."[74] And while adaptation policy in Austria does not directly constitute mandates, policy mainstreaming is seen as the central vehicle to integrate adaptation as new laws, programs, evaluation mechanisms or other legislative or administrative actions on the federal level are adopted and implemented. For Hanna*, the goal is obsolescence of adaptation as a separate policy domain:

[74] See discussions in STS regarding the role of organizational structures and civic epistemologies in the production of governance (Jasanoff, 2005b, 2005a; Vaughan, 1990)

> If we always think about climate change, think about adaptation and mitigation, and make sure we do so in an integrated perspective, then we don't need adaptation policy anymore

The idea is to integrate adaptation — and climate policy more generally — in all aspects of governance, with the ultimate goal to make adaptation as a separate policy domain obsolete.[75] Austrian agricultural policy is already integrating many of these dimensions embedded in a long history of policies designed to support small and diversified production, and increasingly expanding the subsidy of ecological and sustainable agriculture also in the context of climate and environmental policy mainstreaming.

A mid-level administrator managing economic incentive programs in the section for agriculture at the federal government concurs:

> I think that mainstreaming is of utmost importance. That is the goal … that each action includes a risk and climate analysis — and if that is done then we don't need the program anymore, and that is the goal.

The mid-level administrator explains how adaptation increasingly is a key second pillar next to mitigation in many of the programs they work on, drawing on the adaptation strategy in planning regulations, legislation and funding programs. Through mainstreaming, agricultural adaptation frameworks centered on sustainability converge with already existing programs and create synergies. Adaptation and sustainability in agriculture are therefore promoted cohesively, expanding a federal agricultural policy that is increasingly focused on sustainable agricultural system transitions:

> We have the ELER and ÖPUL — very important elements where we not only… of course there is investment funding and funding purely on acreage, but we really emphasize and center-stage the kind of cultivation, for example sustainable and organic, in our funding decisions, really pay attention to how things are grown and to reward that. The ÖPUL in particular is a success story there. That we there also focus on maintaining cultural landscapes, biodiversity, and that we take that into account in adaptation also in agricultural policy in general, and that would get lost otherwise, if we would not integrate that in larger policy, and the ÖPUL is in particular important, that is a very important pillar in our adaptation strategy, to maintain and support that.

[75] Emphasizing the idea of the dispositive, as well as the role of social organization and prioritizing. To paraphrase the interviewee, mainstreaming has the purpose of "organizing out" the need for policy and a regulatory apparatus specifically designated to adaptation. Instead, the objective is the organization of the state regulatory apparatus to re-focus on enforcing mitigation and adaptation "in everything it does." This is associated with processes of enlistment, problematizing and agenda-setting to convince decision-makers across scales to equally prioritize adaptation considerations.

ELER and ÖPUL are two important funding and development mechanisms. ELER is a European agricultural financing mechanism and development program for the development of rural areas, and ÖPUL is the Austrian Agriculture and Environment program, also primarily a funding mechanism. Funding is directly tied to specific measures and actions around rural development and environmental protection and sustainability.

Thereby, mainstreaming leverages a history of sustainable agriculture policy that paved the way for important transformations while also mitigating industrializing tendencies beginning in the 1970s. An expansive regulatory and self-regulating landscape laid early groundwork for the expansion of ecological agriculture (Austria was one of the first countries globally to regulate biological and sustainable farming on a national scale, and today has one of the highest rates of agricultural area in organic production):

> A lot has changed, but we really place a focus on funding quality and how we produce food, fund sustainable practices, instead of acreage.

The administrator emphasizes the importance of mainstreaming adaptation in these existing programs to strengthen local farmers and their communities by mitigating climate change and increasing resiliency, while at the same time strengthening and expanding the sustainable agricultural economic sector.

4.4.1. Localizing Adaptation: Managing Epistemology

Mainstreaming is but one element in a broader effort to localize the Austrian Adaptation Strategy across scales, primarily drawing on the management of adaptation epistemologies to control for possible outcomes of decision-making processes, amongst other by determining and prescribing objectives and criteria, and therefore structuring what may be deliberated in decision making processes. More broadly speaking, adaptation policy localizing in Austria strongly revolves around framing and ordering deliberative processes to enable what is otherwise described as a relatively “bottom-up” processes of adaptation — calling into question the extent to which bottom-up processes occur in terms of agenda-setting and participatory capacities (compare Chapter 6 for further discussion). The following details how criteria and frameworks, integrated in localizing programs, are used to achieve this.

4.4.1.1. Managing Adaptation Epistemologies: Frameworks and Criteria

To disseminate the strategy's adaptation frameworks, heavy emphasis is placed on "educating publics" about the purposes, ends and means of adaptation.[76] This makes further explicit the weight placed in the strategy's frameworks as a means to stabilize adaptation coherently across locales by managing adaptation epistemologies. A variety of governmental adaptation programs reflect this in their emphasis on awareness-raising and -building measures. For Hanna*, the goal is to "really build up understanding amongst policy makers and the wider public, to really establish adaptation and why it is important, what its purpose is." This would be important to ensure that adaptations match with the principles established in the NAS, as individual stakeholders implement adaptation measures locally.[77] And this involves different kinds of publics, both within the polity and outside, as Hanna* explains:

> [We] did a lot of work there, and especially amongst the involved actors in political resorts and in the provincial administrations — there is generally a good understanding about the problem and its justifications and needs, and why this is an important and necessary topic, and how to think about it.

According to interviewees across departments, the NAS plays an important role, as it formalizes "good" and "bad" adaptation — or in Hanna* words: "how to think about it." The Austrian NAS establishes concrete frameworks — associated with evaluation criteria — that seek to avoid *mal*adaptations and establishes key criteria for what is considered failed/bad adaptation ((BMLFUW, 2012b, p. 50).

These criteria centrally address the social structures in which risks are co-produced, while others explicitly govern potential conflicts between adaptation and mitigation or address social and

[76] STS literatures point to the relationship of public trust, maintenance of authority and diffusionist models of knowledge (Godin, 2006). The management of knowledge orders play a critical role in governing the relationship between governance and its subjects (Bucchi, 2008; Irwin, 2008). Literatures point to a deficit conception of public understanding of since, problematizing a notion that "the public's" distrust in science [is] primarily explained away as misconceptions and misunderstandings (Irwin & Wynne, 2003; Wynne, 1992). Related, the "education" of different publics (which includes law-makers A better communicating and educating of the public, so the premise, would resolve issues of distrust by generating a better understanding of how science produces knowledge, and more particularly, by propagating the beneficial outcomes of science.

[77] The role of thresholds, criteria and standardization in adaptation localizing is critical. The effects of normalization have been broadly discussed for their effects on (self-)disciplining populations as subjects (Michel Foucault, 1991). Relationships between creating standard bodies, normalizing identities and the construction of deviance are important literatures to think through the ways in which epistemological ordering across scales materially unfolds (Brown, 1992; Canguilhem, 1989; Goffman, 1968, 2009; Pleasence & Balmer, 2012). The mechanisms of normalization and standardization play a critical role in stabilizing adaptation across scales and become deployed significantly in adaptation localizing in Austria.

environmental sustainability. The criteria also incorporate path-dependencies, explicitly addressing "technological lock-in"[78] — for example, by discussing the effects of Air Conditioning as technological adaptation that is explicitly framed as **maladaptation**.

Maladaptation is a critical concept in adaptation policy, first developing as a concept that concretely makes reference to the term around the 1990s. Recognizing that adaptations themselves can have adverse impacts on society, ecosystems and climate change, the concept is meant to address the "problem of increasing risks" (Barnett & O'Neill, 2010, p. 20). It thereby is closely related to the precautionary principle, an approach to environmental governance that is, today, well-established in Europe, yet not in the U.S.. Similarly, the concept of maladaptation is today in relatively widespread use, especially in Europe. It is not referenced and mobilized in the NYS policy, constituting an important distinction[79].

For the case of agricultural adaptation, the concept of maladaptation is deployed, for example, to problematize the increased use of extractive practices in response and adaptation to climate and economic pressures, which would undermine sustainable agriculture and erode ecosystems that are seen as crucial for mitigating risks.[80] However, these criteria also "boil down" many aspects of the transformative adaptation claims in the NAS/NAP and translate them into bureaucratic instruments for quality control — often not mapping onto the larger claims of transformation proposed in the NAS/NAP.[81] As such, criteria alone perhaps will not be sufficient to fulfil the transformational capacities and live up to

[78] See discussions on the politics of the techno-fix: (Huesemann & Huesemann, 2011; Wright, 2013)

[79] An examination of the undercurrents of precaution and risk-taking environmental governance and their role in the formation of adaptation governance in the U.S. and Europe would be an important avenue for further research. All that can be said here is that the use of maladaptation as a prominent part of Austrian adaptation policy indicates a broader and substantive distinction in environmental governance in Austria and New York that appears to also importantly shape how adaptation to climate change is governed in the two contexts.

[80] Valuing orders become explicit here in the dismissal of extractive agricultural practices and the emphasis of sustainable agriculture. Instead of prioritizing economic output, sustainable agricultural processes are prioritized in a valuing of land and identity (see chapter 5 and 6) and become — as their conduit — directly associated with equity, social justice and democracy (as explicit objective of adaptation). This makes perhaps most dramatically explicit how adaptation is a practice of material world-building, as New York and Austria promote agricultural adaptation that creates competing material realities of food-production, with Austrian policy explicitly rejecting the outcomes of New York policy (i.e. industrial agriculture)

[81] For example: Gender equality does not find reflection in the criteria. While commitments and definitions in policy documents are important and have key effects, they substantiation across scales through localizing processes critically re-configures the scope, meaning and purpose of adaptation. Especially, the "operationalization" of policy commitments in to (evaluation) criteria shifts critically the scope and transformational capacities of adaptation in Austria. Gone are many more complex notions of equity and social justice.

the claims of the NAS/NAP; So do existing criteria — as will become additionally explicit in the next section — often reduce complex societal concepts of risk-production to relatively simple “check-lists.” However, they also are deployed as epistemological “hinges” for disseminating complex concepts more broadly, especially when they are mobilized in more broad planning and implementation activities “on the ground”, as discussed in the next section, as well.

4.4.1.2. Programs for Adaptation Localizing

The Austrian strategy facilitates adaptation frameworks and concepts, establishes evaluation criteria and guidelines, and puts in place organizational infrastructures. As adaptation policy in Austria is localized, epistemological orders are governed in policy mainstreaming and via communication strategies to facilitate engagement and foster concrete epistemologies across scales, sites and amongst a variety of actors. These measures are concretely placed in the context of adaptation unfolding locally and in decentralized ways — making necessary to build material, political and epistemological infrastructures to ensure sustainable adaptation that match policy objectives of the NAS/NAP. Austria has put in place programs that are specifically focused on supporting and fostering local adaptation activities locally, importantly the “KLAR!” Program.

Austria’s **“KLAR” program** („**KL**imawandel-**A**npassungs **R**egionen“, or Climate Adaptation Regions) is a process-oriented program, explicitly focused on adaptation (mitigation is embedded in a similarly structured and closely coordinated program). It aims to foster local adaptation regions by supporting the implementation of concrete actions embedded in a strategic planning approach.

It thereby takes a regional approach, where at least two municipalities come together to constitute a KLAR! model region. A regional KLAR! manager is tasked with the management, coordination and execution of the various program objectives and to make sure that local initiatives comply with the frameworks established in the NAS/NAP.

The program unfolds in 3 phases (plus a pre-application phase 0). In phase 0, municipalities collaborate as region in developing a draft for regional adaptation strategy and submit to the federal funding agency (the Climate and Energy Fund). This draft is evaluated for certain quality criteria and standards by an expert jury. A positive evaluation allows the region to become a KLAR! region and enter into phase 1 of the program. In this phase, communities refine and finalize their regional adaptation

strategies, along with outreach and participatory processes and with support of experts, the CEF, advisors and embedded in service and funding resources provided via the program. After one year, the regions submit their final strategies for another round of evaluation — and in case of positive evaluation enter into phase 2 where regions implement concrete actions, as described and justified in the strategy and set-up in conjunction with participatory, engagement and outreach activities. After two years this phase is completed via evaluation and reporting, moving the communities into a continued revision, expansion and formalization of adaptation processes in phase 3.

4.4.2. The Climate and Energy Funds and The KLAR! Program

Austria implements adaptation in a regional and bottom-up approach that emphasizes support for action on the local level through the KLAR! program.[82] Explicitly, the program is designed to develop local decision-making processes[83] that directly translate into concrete adaptation actions:

> With KLAR! we support regions in an explicitly concrete approach in addressing regional challenges and risks [...] The model regions develop concrete adaptation strategies for the regions in collaboration with experts. These act as foundational basis for decisions made in the municipalities and communities, as it provides the means to prepare for a climate future through targeted investments.[84]

The approach is unique, as one the KLAR! program director explains in an interview:

> The KLAR! is internationally unique. Germany and Switzerland have a similar approach, attempting to bridge research and local adaptation. But we are unique in the way we emphasize a bottom-up approach to adaptation practice and implementation in a regional approach. […] That's why we designed and delineated the program that way, with its regional approach, the three phases that really focus on strategy development, and that bring bottom-up processes into connection with research and experts.

[82] This is where the "public" is first defined, primarily via a geographic-regional demarcation.

[83] A plethora of literatures problematizes designed engagement processes, their accessibility and the control over agenda setting. Three key points of critiques are brought forward: 1) Often, designed participatory processes have predesigned beginnings and ends as forms of control (Felt & Fochler, 2010; Stirling, 2008), 2) the ways in which these processes draw specific sections of the public — usually specific invited groups and groups of the public that have the cultural and political capital to participate in these processes (Bogner, 2012; Lezaun & Soneryd, 2007; Marres, 2007), and 3) the processes in which agendas are set — usually by the organizers — and how other topics can be brought to the "floor" of deliberation (LeDantec & DiSalvo, 2013; Marres, 2007; Young, 2001).

[84] As the head of the coordinating funding agency, the Climate and Energy Fonds Austria, explains in the press release announcing the KLAR program in 2016 (Klima Und Energie Fonds, 2017)

This constitutes the KLAR! program as a central mechanism to bridge top-level policy priorities and local adaptation.[85] The KLAR! is administratively "housed" within the Climate and Energy Fund (CEF), a state-adjacent agency. Therefore, the CEF primarily fulfills a coordinating role that is focused on translating federal policy into local action, where federal-level administrators are centrally focused on translating federal adaptation objectives and frameworks into concrete program guidelines and evaluation criteria, and coordinate and structures local planning through concrete program guidelines that directly derive from the NAS/NAP.[86]

The CEF is involved in the localizing of adaptation policy via three mechanisms: First, it translates NAS/NAP frameworks for adaptation into program structures that support adaptation planning and implementation in a "technology neutral" approach (leveraging the phases of implementation that centrally focus on strategy development and implementation on the regional level). Secondly, the CEF localizes adaptation policy via the evaluation of local actions regarding their compliance with key adaptation criteria that are derived from the NAS/NAP frameworks. These centrally guide the individual regions in developing their strategies. And, third, regional adaptation managers serve as knowledge brokers between the CEF, NAS/NAP and the local communities: They work directly in the individual communities to coordinate activities, design the strategy and manage the implemented actions in close coordination with local officials, public stakeholders and the administrators at the CEF.

[85] This importantly points to key literatures that discuss the maintenance of political, institutional and organizational boundaries as a means for control, managing (and deflecting) responsibility and accountability, and controlling for (and limiting) democratic-participatory capacities (Vaughan, 1990). Individual actors and organizations can thereby have key roles in managing these boundaries, their permeability, the communication across them and between organizations and the maintenance of one-sided capacities to make knowledge-claims (Egmond & Bal, 2011; Gieryn, 1983; Guston, 2001). It is in this context that the KLAR! program and the manager constitute an important political re-engagement with the institutional boundaries of the polity and in turn how key adaptation determinations are made by different stakeholders in engagement with the polity. Moving key managing functions outside political institutions enables an "opening-up" of decision-making processes and increases accessibility for wider publics (limited by material, political, cultural and economic constraints to participate in these processes). However, it also can have consequences for the direct accountability of political institutions and decision-makers by externalizing the management of adaptation processes that still are — as this dissertation shows — tightly managed by decision-makers within the institutions of the polity.

[86] The concept of the "dispositif" (Foucault) can help understand how governance emerges in the network of different things (institutions, individuals, material entities, concepts and ideas, etc.) and how the CEF is integrated in this. Yet, different to a structural-functionalist perspective, each of these "elements" have agency and are intrinsically (socially, geographically, materially, politically) local themselves. Adaptation localizing is therefore best understood as a highly liquid/fluid re-ordering, and stabilizations become only concrete in the specifically local, yet dramatically shaped by other interacting locales.

4.4.2.1. "Technological Neutrality" and Local Autonomy

Austria implements adaptation in a regional and bottom-up[87] approach that emphasizes support for action on the local level through the KLAR! program. Explicitly, the program extends the NAS/NAP emphasis on developing local decision-making processes that directly translate into concrete adaptation actions. I meet with Robert*, the program director at the CEF, who explains the purpose of the KLAR! Program as bridging local planning and federal policy priorities:

> With KLAR! we support regions in an explicitly concrete approach in addressing regional challenges and risks [...] The model regions develop concrete adaptation strategies for the regions in collaboration with experts. These act as foundational basis for decisions made in the municipalities and communities, as it provides the means to prepare for a climate future through targeted investments.

At least two municipalities (with a maximum of 60.000 inhabitants) constitute a KLAR! region.[88] A heavy emphasis is placed on regional, community-based adaptation *planning* as foundation for concrete adaptation actions. This is achieved by a top-down[89] dissemination of conceptual frameworks and guidance — constituted in the NAS/NAP — that establish "good" adaptation planning, delineate it from maladaptations, and leverages a program that is explicitly designed to bring these federal adaptation frameworks into local adaptation planning in order to enable autonomous[90] planning.

And Robert* explains the key priority that informed the design of the KLAR! program: allowing local communities flexibility in developing specific solutions while ensuring a coordinated, long-term planned

[87] For a discussion of bottom-up and top-down processes and their politics, including the mobilization of the notion of bottom-up in processes that still are strongly structured in top-down hierarchical structures on the one hand, critiques for the continuation of hierarchical decision-making as a whole see for example.

[88] This is an important moment of constructing regionality via population and geography. The idea behind this limitation according to interviews is to counteract the (population)-power of urban centers in relation to the rural, in an explicit rural development focus.

[89] The differentiation of top-down and bottom-up is an important one here, as it plays the two against each other. Sinwell (2012) unpacks the implicit politics of "bottom-up" processes as they are deployed in hierarchical structures from the top down as a means for maintaining authority and control over those processes. On the case of citizen science, Kinchy (Jalbert et al., 2014; Kinchy et al., 2014) critically examines implicit politics of control, and argues in an unpublished manuscript how citizen science is used as a PR tool by corporations. In a similar manner, "bottom-up" processes embedded in the top-down management of epistemologies to shape their outcomes can be understood as a mechanism to legitimize adaptation decisions, while deflecting potential criticisms about the ways in which adaptation is pursued.

[90] The term "autonomous" planning is repeatedly used in interviews to describe local planning in what is described as "technology-neutral" approach. However, claims of autonomy appear strongly limited considering the emphasis of control local decision-making outcomes through the management of adaptation epistemologies.

approach that is compliant with federal level policy objectives. He particularly emphasizes that the local autonomy is by design, as it allows — as he says: "creative and often surprising solutions" to emerge out of unique local contexts:[91]

> We call it a technology neutral approach: We don't prescribe technologies and don't say which technology is better for which sector and rather seek to maintain neutrality in the mission statement and calls for participation.

This instead focuses on stabilizing local adaptation through federal level frameworks and objectives that ensure compliance with federal level priorities and objectives:

> Instead, we provide objectives and goals, and the applicants develop their own solutions for how to achieve those objectives, including the problematizations and prioritization of themes and issues.

In other words, the administrators at the CEF seek to design a high degree of flexibility for participating communities on individual adaptation decisions while governing local adaptation through the incorporation of evaluation criteria that directly derive from the NAS/NAP frameworks.

What these criteria and objectives precisely are is determined by the CEF administrators, drawing on the NAS/NAP in developing guidelines for "good adaptation", evaluation criteria for the adaptation strategies, etc. Here, particularly the criteria for maladaptation play a crucial role, while individual regional strategies are required to be (and evaluated for being) coherent with the NAS and NAP and the contained definitions, objectives and criteria.

As such, the NAS/NAP provides the CEF program administrators with important mechanisms — guidelines and frameworks — to structure the KLAR! program and govern local decisions. It allows for addressing the need of coordinated action while facilitating locally autonomous planning.

[91] This emphasizes a recognition of the value of local decision-making and (limited) control of the terms in which adaptation unfolds in the concretely local — although within strictly controlled possibilities of these outcomes. By managing epistemologies about adaptation, a control of individual actions becomes less important. This maps onto Foucault's work on governance and its relationships with knowledge, emphasizing that control over knowing and knowledge claims can be more powerful in exercising power than the minute governmental management of individual decisions. Generalizing and simply put, controlling how people think allows to control the outcomes of this thinking (Michel Foucault, 1991).

4.4.2.2. Coordination, Evaluation Criteria and Guidelines for Local Planning

As local communities participate in the program, they develop local adaptation strategies that situate individual actions long-term planning.[92] The CEF evaluates individual activities and the overall strategy on a yearly basis, thereby implementing key principles of the strategy through evaluation criteria. Importantly, participating communities apply to the program by submitting a regional adaptation strategy and spend the first year in the program refining and further developing that strategy. This means that any local actions supported through the program are embedded in the strategic long-term planning along the national strategy's core principles, criteria and guidelines.

To ensure that individual activities incorporated in the regional strategies comply with federal adaptation frameworks, the criteria for maladaptation[93] detailed in the NAS/NAP are translated into criteria for good adaptation through the CEF administrators, as Robert* explains:

> We really emphasize to set up adaptation in this context, to really avoid maladaptations and negative consequences and counterproductive outcomes. That's why we really place an emphasis on making sure that the communities in adapting plan ahead and focus on these priorities, to make adaptation sustainable and robust.

Participating communities develop a regional adaptation strategy that acts as a foundation for all activities carried out in that region. The goal is to establish frameworks and structural conditions for continued adaptation via the strategy (and its control).

To ensure that individual activities are part of the overarching strategy, the CEF also defines evaluation guidelines (Klima Und Energie Fonds, 2018, p. 18) for the reginal strategies overall — again reflecting the core principles of the national adaptation strategy. These determine that each strategy has to include ten concrete adaptation actions in a mix of green, grey and soft actions and in reference to the NAS and NAP. Communities are also required to reflect in their strategies also interactions of adaptation with mitigation, aspects of social equity, the avoidance of maladaptation, and the development of

[92] This argument of governance of epistemology is reflected in how the CEF focusses in its oversight on the overall strategies instead of individual actions (although the latter is evaluated as well). The idea seems to be to ensure that overall strategies match with priorities of the polity, and by extension structures then what is constructed as "autonomous" planning of individual actions.

[93] Fischer and Foster (1987) discuss the normative politics of criteria and their role in governance.

structural conditions that support continued adaptation beyond the program. Adaptation mainstreaming and public engagement in planning and implementation play a prominent role in the strategies (Federal Ministry for Sustainability and Tourism, 2012).

These guidelines ensure that autonomous local planning at the level of the KLAR! regions complies with and is building off of the federal frameworks. Regional adaptation plans detail how identified and planned measures are situated within and impact the larger socio-regional contexts, describing impacts on the region overall, on specific individual sectors, and on vulnerable and marginalized population groups. Particularly important, each adaptation measure must meet criteria[94] for "good adaptation" described in the CEF guidelines and derived from the NAS/NAP criteria for maladaptation and good adaptation practice.

4.4.2.3. The Regional Adaptation Manager as Knowledge Broker

A particularly important role is assigned to the regional KLAR! manager. As will be discussed in greater detail in the following chapter, the managers act as knowledge broker[95] between the individual involved stakeholders on the local level (public officials, local stakeholders) and different government levels (interacting with the state climate coordinators, federal lawmakers, and the administrators at the CEF). On the one hand, this involves the translation and alignment of different adaptation needs and interpretations of and knowledge claims about adaptation (discussed further in the following chapter). On the other, it involves organizing and moderating local decision-making processes, including deliberative and co-creation processes, and ensuring compliance of outcomes with the overarching epistemologies constituted in the NAS/NAP, and further established through evaluation criteria and planning guidance provided by the CEF.

Although this is not always the case, usually the regional manager is already involved in adaptation processes at the stage of writing the first draft strategy — in the case of the Unteres Traisental region taking the lead on this project — during phase 0. Subsequently, the KLAR! managers coordinate and

[94] All these criteria thereby directly transpire from the national adaptation strategy.

[95] The idea of the knowledge broker refers to individuals and organizations that engage in managing knowledges and knowledge exchange. Key literatures in STS (Justyna & Lyall, 2017; Meyer, 2010; Pielke, 2007) discuss the role of knowledge brokers in gate-keeping and governance.

manage the processes for the participatory adaptation strategy designs, outreach activities, and the implementation of the measures outlined in the strategy while remaining in close coordination with the administrators at the CEF. One of the mayors puts particular credit to the role of the manager within the overall program design:

> This approach, to develop the strategy and implement the actions collaboratively and in co-creation approaches, that is really key, and the KLAR! allows for that, and it is just key that the KLAR! manager takes on the role of coordination, that this is an external position, that is really important.

With the CEF responsible for providing frameworks and resources, most of the work on concrete adaptation actions is done locally and from the bottom up through local political processes. The KLAR! manager translates local initiatives into the program frameworks and criteria, and translates top-down frameworks into their local application. As such, local adaptations appear as stabilized in the coproduction of epistemological orders of federal frameworks and local social, political and material orders. As Morgan Mayer writes:

> Within our so-called knowledge society, there is nowadays an increasing number of - and need for - knowledge brokers, that is, people whose job it is to move knowledge around and create connections between researchers and their various audiences.(1) However, the ways in which scientific knowledge is transported and translated across the boundaries of different worlds has not been much explored. 'We need to understand not only how knowledge is made in specific places but also how transactions occur between places', Shapin (1998, pp. 6-7) argues (Meyer, 2010, p. 118).

The KLAR! manager plays an important role in translating adaptation epistemologies between the different locales where adaptation is stabilized: Rather than relying on prescriptions for "*what* to do", the KLAR! regions determine the "what" (i.e. concrete decisions on adaptation actions and their purpose) themselves, building off of frameworks that provide guidance on "*how* to do" adaptation disseminated top-down from the NAS/NAP via the CEF. Conversely, this means that the individual regions are making decisions on concrete adaptation realities locally — and the KLAR! manager emerges as central to guiding these decision-making processes about adaptation.

4.5. Localizing Adaptation in the Unteres Traisental Region

This also makes explicit a striking difference to New York's adaptation localizing. In New York, adaptation policy is focused on managing adaptation decisions within the institutional boundaries of the polity, and with very limited interactions between the state and famers in shaping adaptation on an epistemological level exist.[96] Instead, the state is heavily focused on providing financial subsidies to maintain the overall economic viability of the agricultural economic sector. This is different in Austria: in its transformation-objectives, the Austrian state apparatus is heavily engaged in the management of adaptation epistemologies also on the farm-level. It promotes an explicit vision of farming and agriculture, embedded in larger "political decisions" about sustainable agricultural futures that transcend the governance of agricultural economy, and instead intervenes in agriculture as constitutive to rural societal culture.

In this section I describe how adaptation epistemologies are managed through processes of localizing, focusing on the interactions between farmers and the adaptation manger within participatory decision-making processes. I argue that, while local farmers and other local stakeholders mobilize complex problematizations of escalating climate risks, yet that these are brought into alignment as they participate in the KLAR! program.

I make this argument by first, attending to how local farmers problematize escalations in natural hazards. On the concrete case of one adaptation response, I foreground how the introduction of irrigation systems reflects the problematizations of escalating drought and heat threats — and get re-framed in their participation in the KLAR! program (4.1). I then show how, in the participation in decision-making processes about adaptation, different epistemologies of risk and adaptation enter in negotiated within

[96] More precisely, New York State's approach requires a different approach to managing the boundary of the polity — one that is designed to minimize its permeability for larger public discourse and instead emphasizes direct lobbying; whereas in Austria, boundaries are managed in their increased permeability. As they become more permeable, they require increased management of the different participants, the forms of engagement and their processes, constituting their own form of business. The KLAR! manager emerges as a professional for managing boundary crossings in the engagement of political and deliberative processes and becomes an important element of controlling democratic processes while not being part of political institutions. In many forms, it represents a unique form of privatization and professionalization/corporatization of democratic processes. This is different in the NYS context, where the polity confines deliberative processes to the polity, but in-turn also confines itself to within these boundaries, which becomes important in the following discussion of the extend of governance in adaptation and its relationship to economic spheres (chapter 5).

tightly managed spaces (4.2). What becomes explicit is (4.3) the active role of the regional manager as broker, strongly re-shaping the mobilized adaptation epistemologies and therefore making Austrian adaptation governance highly interventionist into the practices “on the ground.” I argue that participatory adaptation planning become a crucial site where the regional adaptation manager is heavily engaged in localizing and framing concrete adaptation epistemologies.

4.5.1. Local Experiences with Drought and Heat

As I first arrived in the region to conduct interviews with farmers in September 2018, a severe and prolonged drought and heatwave held the region in its spell. At that time, farmers were confronting significant losses in harvest, and a shortage in livestock feed brought about the emergency slaughter of cows across the country and the continent.

At that time, farmers were beginning to confront more severe summer heat waves and droughts as a new normal, reconciling the fact that these events began to occur in reliable frequency and with significant impact. I meet Karl*, a local farmer who introduces me to his colleagues at a local public event. They share stories about recent droughts, and their persistence over years. The last several years brought recurrent temperature and drought records, with devastating effects:

> This last summer was exceptionally warm, but it still was less extreme than in the previous year, where it also did not cool off at night. I think that will become one of the larger challenges in agriculture. Because at that point you cannot do anything anymore. The plant stops building up new cells. And then you can irrigate as much as you want, it doesn’t matter what you do, you gonna loose that year.

Karl* agrees about the persistence of this challenge. For him, the droughts and heat waves of the last years pose a lethal combination, where the heat imperils labor while accelerating water evaporation — escalating the impacts of the drought:

> The last three years, heat, drought, flooding, everything. I mean, it’s stressful for our plants, it’s stressful for us. It is hard on a physical level, it changes what we grow, when we grow it, it changes the whole resource base of the farm. It is … it is existential, and it is unprecedented, is what it is.

In many ways, the impacts of the drought are described by farmers as system threatening: The combination of drought and heat leads to premature ripening of many of the fruits and harvest, while other plants cease growth to weather the stresses of the drought. This combination, according to Karl*, would

strain the capacities of many local farmers: Premature harvest requires additional labor in shrinking windows in which work can be carried out. At the same time, labor — often still performed by hand in the region, due to its small-scale agriculture and the region's focus on wine cultivation — becomes impossible as temperatures soar during the day:

> There is this tension. Our nerves were eroded to put it mildly, during harvest, everything had to go so fast, reading, preparing the machine-based harvest, coordinate people, it all has to happen fast and on short-notice, so much so that we had almost no time for the harvest itself, and that really brought one's nerves to the limits.

Hubert*, a conventional farmer and neighbor of Karl's*, explains how this changes on-farm practices:

> We used to do the vintage during the day, and we had a lot of volunteers, our neighbors, even our costumers helped. That is impossible now. We had to stop harvesting at 10 in the morning, you can't do that with volunteers. And at the same time, all of the sudden everything is ripe, and you don't expect that in August, and you have to get out and do it, and how do you do it?

And another interviewee explains:

> My birthday is early October, and back in the day we used to begin to harvest after that. But then, at some point, it started to shift, and then was my birthday during harvest. And I started joking, at some point we will be done at my birthday. And this year, it happened. What that means? You have to work faster. There is no way around it, what can you do?

Additionally, as fruit bearing trees — an important crop of the region — enter into drought, they often drop their fruits as they "enter survival mode"; as Karl* puts it:

> Our biggest concern was the heat. Our trees were so full of fruit, and way to early. And they can often handle that, but when you get a drought, they drop the fruit in order to preserve themselves. So, we lost, we lost almost all of our apples this year.

And the available technological tools to promote growth and prevent increased pest pressures — fertilizer, pesticides and irrigation — do not adequately work either, as Karl* explains:

> With the heat now, that is a challenge, to get the timing right, also with the pesticide application, because if you do it when it is too hot out, then you burn the plant.

He continues:

> And of course, the plant at some point, especially in certain temperatures, it just shuts down, stops transporting to preserve it self and then — the system based pesticides and irrigation, that

> all doesn't work then, because if the plant doesn't transport it, you can spray and irrigate as much as you want.

Interviewed farmers consistently conclude that the present combination of heat and drought comprises today the most significant threat to the livelihood of local farmers in a region that is historically used to severe precipitation, not drought:

> Three weeks without precipitation, that is enormously challenging […] The quality of the corn was low, and the quantities moderate at best — we just scraped by and it thankfully did not come to premature ripening. It appears we had the largest problems regionally with beets and turnips, they were small, and the soils were basically cement because of that. It was impossible to harvest them, and they remained on the fields until Christmas.

It is in this context that farmers in the region increasingly begin to weigh their adaptation options, negotiating possible pathways for adapting. For many farmers, as climate disruptions escalate across the region on a yearly basis — experiencing the impacts of spring flooding and their convergence with summer drought and heat — adaptation becomes a matter of economic survival. Consistently, interviewees describe this situation as ultimately constituting a paradigm shift, as something that "changes everything." Conventional and organic farmers alike increasingly reflect on the viability of farming practices in a "new normal." Hubert* explains:

> Initially we were very skeptical, but now it really becomes clear that there are significant impacts. It impacts our quality of life, it impacts our work, it impacts our health, and especially us farmers are confronted with the challenge that we have to work with that, so we have to counter it, as much as we can.

In many ways, farmers in the region problematize these impacts similarly to those in Madison County, reflecting upon the impacts on their farming operations and their production viability in a changing climate. As drought and heat waves constitute new pressures on farmers, conventional farmers increasingly rely on the intensification of existing practices and the introduction of new technologies — such as harvesting machines and irrigation systems — that allow to better cope with pressures and maintain the productivity of their farms.[97]

> It gets too hot, it gets too hot for the product, it gets too hot for the folk out in the field. It can get really dangerous. The stress was enormous for me personally. I mean, we had to be so fast, and

[97] This emphasizes how infrastructures and technological lock-in become determining and constitute specific material and epistemological pathways that become persistent (Lee et al., 2012; Winner, 1980).

> everything was extremely short notice. That was a huge challenge for me personally, because it was something completely new, and you didn't know how and what. And I still don't know how we did it.

In response, a group of well-connected vintners in the region began to push for a large-scale project to secure their survival in the face of this climatological escalations. Today, most farms have individual wells that supply them with water for personal use from the ground water, while crop is primarily grown without irrigation systems: "It's something that barely any of us, if any, have. We just didn't need it." Instead, as Hubert* explains, historically, the major concern of the region was focused on flooding:

> It was always, how do I drain well, how do I get all that water off my fields, out of the region quickly. All that water now runs into the Danube. And now that changes, because we still get the water, but in the spring, and then when we need it, it's all gone, because we don't have the infrastructure to keep it here.

That is changing now, as a group of local vintners has begun exploring new ways of retaining water in the region on a large scale, contemplating retention basins to store water or discussing the creation of an artificial lake in the region's elevations to build up irrigation capacities for the agricultural sector. Hubert* describes these efforts:

> We really begin to push this, because right now we don't really have a good handle on that problem and there is any help welcome. In the water management, the water would be here and it would be doable from a financial standpoint to get it to the right spot. Vintner are now thinking through, how to do that. And the problem is that the water rights of the river Traisen are granted to the full legal limit, although we only exhaust it by 50%. So we think now, how can we permanently irrigate, to bridge drought and to increase the quality — not so much the quantities, but certainly the quality.

The cascading[98] challenges that impact the regions figure prominently for the local mayors as well. I meet Sebastian*, the mayor of a smaller municipality in the region, who describes a multitude of challenges that arise in context of escalating climate extremes. In doing so, he explicitly draws connections between different sectors, including the role of agricultural practices, land use, and building practices as he explains the mounting impacts of climate hazards:

[98] See discussions in Disaster STS about the politics of multiple-exposures and the convergence of disasters (Birkland, 1998; K. Fortun & Frickel, 2011; Masco, 2010; Quarantelli, 1998; Smith, 2006) as well as the tendencies to produce cascading effects (K. Fortun, 1998; M. Fortun et al., 2014; Hilgartner, 2007; Vaughan, 1990).

> We now have flooding problems where we didn't have them previously. There was one village that just got completely washed out, and that is also because of the topography and the hillside, so upstream we have the agricultural fields, and that washed all right into our villages. And then that's not only water, but it carries all that material with it, the soil and the fertilizers and all that. And that's a problem now across the board.

In the interview he not only problematizes flooding risks, but associates their impacts as exacerbated by different forms of land-use and land management. He similar problematizes the convergence of agriculture and water security in times of drought, where

> […[[we] now really see, that the farmers begin to really struggle with the water and have to rethink. And that's of course also a problem for us because we all tap into the same water. Where it just really, that matters for the ground water levels as well. […] And so, we really have to start thinking about, how do we deal with that also on a structural level."

For Sebastian* this is a consistent problem that other interviewed mayors articulate as well: How to deal with climate risks that challenge existing infrastructures and require adaptations? As drought becomes an increasing risk, and farmers being to push for new adaptations, mayors describe how an infrastructure that historically was designed to deal with excess waters ("get it out as fast as possible"), exacerbates many climate related challenges and themselves become risky, while exposing limits to available technological adaptation solutions:

> I mean you have those standard retention pools to hold back the water, but one they need to be maintained, and two they just can't hold all that water. So we really go over to re-think, how that all comes together, how can we change that runoff problem, and make sure that we have ... for example we try to change our roads to stop that runoff and install natural strips where the water can be absorbed, instead of just pushing it out.

Particularly in the context of drought, mayors begin to problematize such "grey" (technological) adaptations as well. As agricultural irrigation systems become increasingly discussed openly amongst farmers, many fear this may only exacerbate problems:

> It's the same mistake as with the flood management. It's really, it just further going to strain our ground water levels, and that's just not going to work, we really have to change how we think about such solutions.

Another mayor adds:

> You have a lot of people hanging on that water line, not just the farmers. The fishery plays a big role in the region, so do the dozens of small hydroelectric power stations along the Traisen. The

> forestry sector is also dependent on it, as are the industry. And that all leaves aside just the public need and the right to water as part of life. So all of this, it makes things very complicated, very quickly.

What emerges are complex and entangled problematizations of climate change that are constituted not only in escalating natural hazards, but within the very structural conditions of individual social systems. This is in addition to the larger region overall, and adaptations become increasingly entangled in these complex interactions across sectors, stakeholders and interest groups as they begin to gradually reshape the region's structures and infrastructures.

4.5.2. Negotiating and Brokering Adaptation Epistemologies

As the group of vintners pushed for irrigation systems in adaptation to drought and heat escalations, the region's KLAR! manager was addressing these hazards. As adaptations are being considered by different actors across the region, the manager centrally works as broker between federal adaptation policy priorities, the KLAR! program structures and the associated criteria established by the CEF, and local initiatives, priorities and planning.

As the Unteres Traisental region begins to confront climate disruptions through strategic adaptation, the KLAR! program constitutes the central mechanism for coordinating and advancing local initiatives. Thus, the NAS/NAP adaptation frameworks play a crucial role in how adaptations are stabilized locally. The KLAR! manager is engaged in ensuring that adaptation planning in the region complies with policy objectives and guidelines in a vital way by shaping deliberative processes and the consideration of key criteria of adaptation evaluation — particularly regarding principles of "good adaptation" and maladaptation. Accordingly, the KLAR! manager plays a crucial role in localizing adaptation in the Unteres Traisental region.

Due to the emphasis on participatory processes and with the managers as the driving force and central local coordinator, the sites for decision-making and localizing adaptation fall immediately outside established organizational structures of the polity[99] (such as municipal/regional governments, as it is the

[99] This has important effects for governing accountability. As has been argued, the management of epistemologies functions as the governance of possible outcomes of these deliberative processes, however decisions become presented as a "collective choice" informed by public participatory processes and hence limit political accountability of individual institutions and decision-makers (Linke & Jentoft, 2016). Ribot (1999) discusses the colonial politics of

case for the CSC program in New York). Instead, program-related adaptation activities unfold in relation to local communities, with sites of decision-making being multi-sided and reliant on — at least in limited degrees of[100] — deliberative and participatory methods.

Moses* is the local manager in the region, and my first contact as I entered the field. Moses* invites me on a tour to meet local farmers. Here, in the "Unteres Traisental" region, state-driven adaptation doesn't manifest exclusively in government office spaces, as it is the case in New York. Rather, it manifests in meetings with and between the various local stakeholders, in public engagement events and co-creation workshops, and a wide range of multi-sited activities by the KLAR! manager.

In company of the manager, I observe key elements of their daily work at community meeting rooms during participatory planning workshops, or by visiting farms, where we talk about experiences and needs. We meet with mayors — the occasion of my visit itself constituting an exchange of experiences about approaches and strategies — arranged by the manager. Moses* hosts and organizes[101] public events "to really build awareness and an understanding: what is adaptation, why is important, how to go about it."

During our conversations, Moses* repeatedly emphasizes that a major part of his work involves building public understandings of adaptation:

> When I first arrived here, that was a hard time, but now it changed a lot. Just the way the mayors speak about the issues, it really is with them now: that climate change is a problem, how it impacts them and how to understand many of the challenges. That took a lot of work, informal discussions

participation processes carried out by local institutions that remain accountable "upwardly" and their involvement in the maintenance of colonial power relationships.

[100] As Chapters 5 and 6 of this dissertation will problematize further: The assembling of concrete publics is revealed as highly political processes to lend credibility and legitimacy to adaptation decisions and to distribute accountability in ways that ultimately avoid accountability by reference of "the process." These processes turn out to be only to a limited extent about strengthening deliberative-democratic processes, and more about the maintenance of authority and control while managing accountability and critique of processes (Felt & Fochler, 2010; Young, 2001).

[101] This relates to the role of the knowledge broker in managing participatory processes and underscores their power in shaping processes. This is highly problematic when considering where the KLAR! managers are recruited from: A vast majority of managers are private professionals running consulting businesses, hired by the municipalities. This points to an on-going privatization of democratic processes and their transformation into a business. Coupling the responsibility of initiating, managing and conducting participatory processes with the overall role of managing individual regions by the transferred authority of the state creates a significant shift of how democratic processes and democracy itself are carried out. It remains unclear — and unaddressed in the literature — in how far the rise of engagement processes as key element of democratic processes in the EU converges with their corporatization.

> and all the events that we do through the KLAR! and the KEM program. That is the first and important step for anything.

This also maps onto how federal policy makers, planners at the CEF, and the authors of the NAS/NAP articulate the need to disseminate epistemological frameworks of adaptation — or as an administrator at the Federal Ministry for Sustainability and Tourism puts it, to create a:

> […] good understanding about the problem and its justifications and needs, and why this is an important and necessary topic, and how to think about it.

While the work of the KLAR! manager involves reporting functions towards the CEF, Moses*'s work is defined by high mobility across the region, moving between different political places of decision-making: They meet with mayors and other local elected officials, coordinate with administrative bodies, and meet with state and federal political decision-makers at different levels. This effort is strongly focused on coordinating work between key stakeholders involved in realizing individual or overall goals of the regional strategy. At the same time, the KLAR! managers are heavily invested in generating local stakeholder input beyond locations of political power, drawing in specific stakeholders from different social segments of the regions. The development of the regional drought plan serves as a good example of how the KLAR! manager brokers different adaptation and risk epistemologies in order to stabilize adaptations to this hazard in the region.

4.5.3. Workshopping Drought and Heat Adaptation with the Manager-Broker

As one of the major activities through the KLAR! program, the region was committed to developing a drought emergency plan as a strategic document to coordinate the region's response and increase its resiliency. A cornerstone in the development of the plan was the participatory process, and centrally, a co-creation design workshop over two days with a variety of stakeholders participating. Walter* talks me through the concept, explaining that the idea behind the workshop is to bring together the multiple perspectives and interests of local stakeholders and develop a coordinated approach that allows to incorporate different — and at times competing — interests. At the same time, it would be a crucial vehicle to help shape local understandings of challenges, their cross-sectoral interactions and the ways in which adaptation can re-shape the region.

It is during this workshop where competing adaptation epistemologies (what is being adapted to, how, and to what ends) become explicit in their negotiation — and the important role of the KLAR! manager as knowledge broker becomes tangible.

The workshop, which I am invited to as an observer, brings together a wide range of local stakeholders of the regions waters: There are those who depend on the extraction of water as resource: local hydroelectric power plant operators, farmers, foresters, representatives of the public water utility and waste water plant operators. There are those who extract from the water, but are also involved in the conservation of waters' ecosystems: The local fisheries in particular come to mind. Finally, there are the public officials — the regions mayors. They all are distributed over four groups that discuss drought in the specific context of individual problem domains: agriculture, forestry, public infrastructure and water use … The different stakeholders come together in these groups over two days to discuss the different impacts and potential adaptation pathways. On the first day, participants are urged to exclusively discuss impacts and challenges: "Whenever you begin to discuss solutions, the group moderators note them down and park them to return to tomorrow. Today we exclusively talk about the problems."

After brief input by the moderators — presenting them with scientific background information about statistical impacts and future climate projections — the individual groups begin to develop three future scenarios for the regions, focusing on their individual group topic. They use LEGO® bricks to "build" these scenarios with invited "experts" providing feedback in-between "building rounds":

> These experts will challenge your understandings and ideas and provide you with a new perspective.

These "experts", Moses* explains, were chosen to incorporate a plethora of different viewpoints and experiences. They would not be scientific experts, instead coming from the region: Local farmers, political officials, emergence response managers from the provincial government, water rights experts, and emergency responders. Over the course of these explorations, the entangled impacts across sectors and lived experiences become explicit, as the stakeholders build their three scenarios of the future — best case, moderate, and worst case. I participated in the group focused on agriculture and drought. Initially, conversations focus on the impacts of drought on local farmers:

> A: We won't have the varieties we grow now anymore.

C: Everything is concentrated into extremes, first it was dry and then everything comes down at once.

R: The additional vegetation days, I don't think that we will produce any wine if that comes true, because we still have that frost, and that will kill just about everything.

A: And that will change the whole region. There won't be farmers, if they can't survive. Except for the field farmers, but that will be one or two that own and grow everything.

Yet, the problematization of impacts quickly moves beyond the immediate impacts of drought on agricultural systems, and the discussion focuses on the implications for the region, and the impacts of adaptations that aim at maintaining the status quo, particularly irrigation technologies. Karl*, the organic farmer I met previously for an individual interview, explains:

If you begin to irrigate in a way that keeps everything running, then it will explode society. I cannot imagine that the industrialized production will have a chance in a future of climate change. […] In the worst case, we will have a parallel society: The big ones will have direct access to the water, where it is possible to irrigate, and the small ones will sit at the periphery, where they can.

Another participant, a water manager, asks:

B: The large ones are independent from the drought [because they have the resources to secure water and irrigation] right?

Karl*: Absolutely! But if the water runs low, as it did this year, and even worse in 2014, and that more regularly, then we will have to face that question: do you irrigate, or provide that water to the public, and who has priority and rights? And who has the power to exert themselves to secure the water? This will really, irrigation will cause a clash.

In the end, they construct three visions of drought and climate change that the participants begin to describe as increasingly more dystopian than the other, clearly identifying an unwanted future, progressing from the "promised land", to "disruption" and "[societal] split":

- **Promised Land —** The present or near future in the region: small-structured and diversified agriculture with some larger farms; Major challenges are individualized water uses and existing water usage rights; At the same time there would be room for creative experimentation in adaptation.
- **Disruption —** Structural changes in agriculture lead to less and larger-in-size agricultural operations, water is drawn from the river Traisen for irrigation, on-set of agricultural industrialization; first retention basins are established; crop varieties and cultural identity of the region begin to change. Challenges are strategic water management, uncertainties, water access, increased water consumption pressures, how will contaminated ground and surface water become usable for drinking water and irrigation
- **Split —** No field agriculture possible anymore, full consolidation of agriculture and associated technologization of large-scale farming; irrigation from Traisen and other

> sources (including newly created artificial water bodies); full transition into mechanization and automation; plains increasingly transition into an extended steppe. Differentiation of agriculture and societal structures along access to water and water security Challenges: Who gets water when, how much?

It is notable how discussions quickly move to problematize the interactions of industrialization and technologization as key drivers of what participants describe as dystopian futures that would centrally undermine an equitable life for farmers and a wider society. This is embedded in the strong regional identity of small-scale agriculture and agricultural lands as cultural landscapes. Accordingly, as the conversations progress towards different potential solutions, the participants — guided through the workshop design, the KLAR! manager and via the input of strategically selected experts — begin to problematize central questions of equity, maladaptation and the structural changes that drought *as well as* adaptation will bring to the region. Note these representative excerpts of statements during the workshop:

> V: Generally, livestock gets water first. What comes first? Livestock? Wine? Fields? Topographically, the livestock farmers sit above, take away the water for the fields below, and when it comes to us [the municipalities] then there is nothing left?
>
> C (about irrigation and water as commons or resource): In that we already have a redistribution of water.
>
> Karl*: Wherever irrigation is possible, it will establish itself along industrializing operations [that buy up small-scale farmers] and where it's not possible, the small structures will scrape by. Ultimately it is a competition for the access to resource, and that will lastly become a clash about water.
>
> R: But if we adapt intelligently, then we can resolve that societally. That is also a problem, because corporations are narrow-minded until it is too late. Often we are economically efficient, but not with the [natural] resources.
>
> A: Here in this ‚promised land', the stakeholders don't talk with each other, and that where it causes catastrophe, because we maneuver ourselves into drought. Despite us being dependent on the same lifeline.
>
> A: We have to give up our existing rights for the commons.

During the course of the workshop — as indicated in these excerpts — a curious transition occurs: The conversation turns from immediate problems impacting agriculture as an isolated economic sector to the impacts of the regions ecosystem and natural resource base as commons is exemplary and the problematization of the agricultural system as risk producing. “We maneuver ourselves into drought”, as

A. explains. It is a peculiar transition in the conversations that increasingly turns away from a natural hazard focused problematization of climate change to the structural conditions of human systems and practice that (co-)produce drought.

The future visions of the region in a changing climate manifest this shift — and the solutions that participants develop over the second day of the workshop change from initially maintaining existing systems (through irrigation) to building towards “a just climate future for the region”, as the participants describe it in their final share-out of the future they literally built with LEGO bricks (Fig. 2).

In the image, on the right: a vision of adaptation futures where material water management structures such as retention basins preserve the local wine economy through irrigation. These material infrastructures however would require maintenance and upkeep, and would potentially become obsolete as climate change progresses, as the participants articulate. This is represented by the maintenance workers in the scene. On the right, three scenarios of adaptation futures are represented, described as dystopian, mitigated dystopia and ideal by the participants (from left to right). On the left, water is managed entirely through technological intervention, with what is described as a complete loss of nature; the middle shows a future where heat and drought make technological interventions necessary, but key aspects of the cultivated landscape can be preserved. On the right, natural processes are supported to maintain ecological processes as a means of adaptation.

The group — encouraged to settle on one or two potential solutions that then were further developed over the course of the day — settled for two potential adaptations to drought: the creation of water storage (surface water retention basins) in different variations or the focus on ecosystem and soil health. As one of the participants explains: “Hummus or Retention”:

> We created something, with the first solution, that at the end during drought there ain’t gonna be any water again. And it only maintains the status quo and will become counterproductive in the long term.

Another participant adds:

> The humus buildup, that has effect multipliers, it also changes agricultural practice, it allows to think adaptation more broadly and long term.

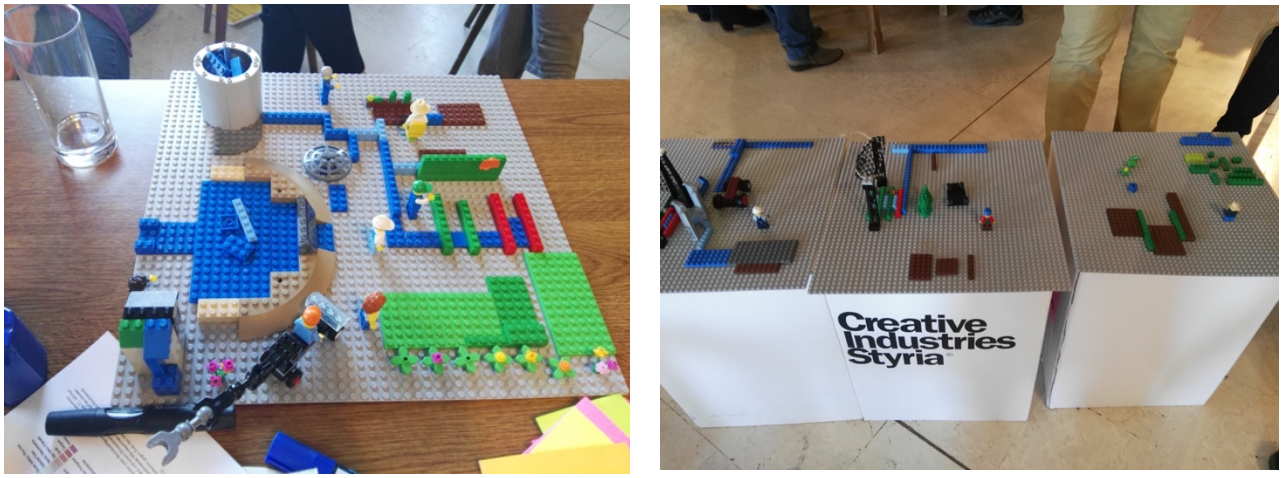

Figure 2. Participants build — quite literally — adaptation futures.

Here, adaptation itself becomes scrutinized by the participants for its material politics and transformative capacities through the differentiated discussion of how adaptation itself can crucially cement-in social and political orders — discussed in the case of irrigation solutions to drought. Participants quickly problematize irrigation as significantly impacting power relationships around water, its use and access to it. As one of the participants puts it, “Who gets it first, who is prioritized?” Ultimately, the envisioning of a future of a societal clash makes explicit how climate change bears the potentials for significantly disrupting societal cohesion, questions of equity, democracy and power. The industrialization and technologization of agriculture converge with technological adaptations that are quickly problematized for cementing in relationships of power. Irrigation, in this perspective, is problematized by the participants as a materialization of (unwanted/undesirable) social orders of a globalized, large-scale and industrialized agricultural system.

4.6. Conclusions: Managing Transformation Epistemologies

This episode is key evidence for a broader effort to manage climate risk and adaptation epistemologies in Austria on a structural level through policy and its localization – and allows to bring forward several critical differences between how adaptation manifests in processes of localizing in Austria and New York. These differences are constituted specific epistemological orders, constituted in the

management of problematizations. Differences emerge in three dimensions of how epistemological orders materialize in adaptation localizing:

1. Depending on context, climate risks are constituted in natural hazards (NY) or co-produced with the structural conditions of agriculture as a social system (AT).
2. Adaptation problematizations constitute epistemological orders about climate risks, adaptation and the socio-political orders of the systems that are being adapted. This establishes distinct adaptation objectives — either as (NY) economic system where adaptation aims at maintaining economic productivity in changing conditions or as (AT) socio-cultural system where adaptation aims at advancing equity, justice and sustainability transitions in agriculture.
3. Constituted in such problematizations, adaptation is stabilized either as (NY) an adjustment of the agricultural system to impacts from climate change as an external force or (AT) the management of reforming risk-producing structures of the agricultural system

In these three dimensions of epistemological difference, adaptation is revealed as socially constructed on the one hand, as political "all the way through" (Eriksen et al., 2015) on the other. The management of epistemological orders through specific problematizations of risks, adaptation options and pathways become important political ordering devices that open-up certain adaptation pathways and societal futures while foreclosing others.

Chapter 3 and 4 made explicit the ways in which state adaptation planning in New York and Austria respectively become localized across scales. I brought to the forefront the central characteristics of state adaptation planning in Austria and New York, as it manifests in epistemological orders of adaptation across scales and sites of decision-making. I argued that key differences in the two adaptation approaches are constituted in important decisions about what needs protecting, maintaining and preserving; what needs to change and to what ends; and what can be let go. The outlines of these become explicit in the distinctions of adaptation, as detailed in the previous two chapters: Austrian reformist aspirations towards sustainability futures stand in juxtaposition to the adjustment of the agricultural economic system in a productionist paradigm.

In New York, state adaptation planning emphasizes explicitly the maintenance of currently existing regimes of agricultural production in economic terms and aims at securing outputs of agriculture as economic sector. This is strongly coupled with a lack of differentiation in how food is being produced and its effects on climate, ecosystems and rural societies and communities. In a technoscientific regime of risk assessment, impact analysis and solution-development, New York's adaptation policy makes implicit value judgements about socio-economic and political orders in an economic-productionist paradigm.

This becomes particularly explicit when placed in context of the adaptation problematizations that constitute Austria's reformist-interventionist adaptation approach. Explicitly, structural conditions of agricultural productions become problematized for their impacts on ecosystems, social and cultural identity, and climate change alike — and become mobilized to justify an interventionist approach to adaptation in the attempt to reform agricultural systems. These themes have been foregrounded in the previous two chapters:

NY: Problematizations	**AT: Problematizations**
- Escalating natural hazards as impacting agricultural productivity - Impacts are assessed in agro-economic metrics of productivity, output and (economic) loss	- Risks are constituted in escalations of natural hazards *and* the impacts of extractive and unsustainable agricultural practice - Adaptations are problematized for its effects on ecosystems, climate systems and social systems

Figure 3. The different problematizations involved in manifesting adaptation governance.

These problematizations are associated with key differences in the governance of adaptation localizing, establishing reformist and adjustment epistemologies that inform specific styles of adaptation planning. I made the case that the two modes of planning in New York and Austria are distinct in the degree of intervention associated with transformative and adjustment adaptation approaches.

NY: Policy Objectives	**AT: Policy Objectives**
Adaptation […] includes those strategies and policies that can make both human and natural systems better able to withstand the detrimental impacts of climatic changes, and also potentially take advantage of opportunities emerging with climate change (NYSERDA, 2011b, p. 51)	What is needed is a 'politics of incremental steps' with continuous incorporation of aspects of climate change in all domains of planning. But it also needs a long-term reconstruction of society and a renewed recognition of sustainability in its fullest meaning (Federal Ministry for Sustainability and Tourism, 2012, p. 5).
While climate change will create unprecedented challenges [for agriculture], there are likely to be new opportunities as well […]. Taking advantage of any opportunities and minimizing the adverse consequences of climate change [is the objective of adaptation (NYSERDA, 2011b, p. 218)	Ensuring sustainable, resource-conserving and climate-friendly (agricultural) production and maintaining and improving the ecological services of agriculture under changing climatic conditions (Federal Ministry for Sustainability and Tourism, 2012, p. 53).

Figure 4. The policy objectives as they map onto the problematizations.

Major differences emerge between Austria and New York: 1) Austria's adaptation approach aims at system transformation while New York focusses on system adjustments; 2) This is constituted in the problematization of climate risks being constituted in the risk-producing structures of agriculture as social systems. As a consequence, 3) Austria plans for adaptation in agriculture not only to maintain economic productivity, but to achieve system transitions that integrate questions of social justice and equity, sustainability and democracy. In this context, it becomes important to 4) govern adaptation practices and outcomes, not only in terms of economic criteria, but in terms of their compliance with societal and social justice objectives established through the state. This means that 5) the federal government assumes a stronger control in governing local adaptations, whereas in New York, the economic paradigm constitutes a stronger role of market actors in governing on-farm adaptation.

4.6.1. Adjustment Adaptation in New York State

As problematizations of natural hazards in an economic-productionist paradigm dominate New York's adaptation policy, adaptation epistemologies support specific social, political and economic orders that are geared towards perpetuating a status-quo of political-economic relationships of power. A focus on resilience, as also Pelling (2011) argues, is prone to concealing socio-political orders that produce risks and vulnerability and their uneven distribution. As a consequence, New York's adaptation policy is ill-equipped to problematize, differentiate and manage politically the uneven distribution of risks and vulnerabilities. This is significantly grounded in a conceptual approaching of agriculture as a relatively monolithic economic production system, where the maintenance of output is the primary objective — and foreclose important questions (and decisions) about how food is produced and to what social, political, cultural and ecological consequences.

The evolving political-institutional structures in which critical adaptation decision are made mobilize ideas of the local to delegate these questions to the economic-agricultural sector, as becomes explicit in the role of industry/economic stakeholders shaping on-farm adaptation decisions. The state-governance of adaptation evolves in parallel structures to the economic sector. The state is primarily concerned with building subsidy structures to support local adaptation planning without making qualitative determinations about adaptation processes in agriculture as economic sector.

At the sites of decision-making, techno-scientific risk assessments play a key role in promoting technological fixes to adverse impacts on the economic productivity of the agricultural system, and these structures are revealed to be inapt to problematize — within the agricultural sector — other critical questions for adaptation politics. Strongly techno-scientific sciences of risk as truth-speaker become itself a device for managing what epistemological orders become established by constituting adaptation problematizations as almost exclusively focused on the metrical assessment of climate impacts. The evolving governance structures reflect such prioritizations, as they are designed to disseminate adaptation planning guidelines that are constituted in “natural hazards school” risk assessment approaches.

4.6.2. Transformation Adaptation in Austria

This stands in stark contrast to the commitments to structural change explicitly inscribed into Austrian adaptation policy. Epistemologies of socially co-produced risks demand a more explicitly interventionist policy approach across scales that seeks to bring about a “re-design of society.” Adaptation problematizations constitute this approach by directly addressing the co-production of risk, social and ecological orders across scales — and adaptation policy is centrally designed to manage epistemological orders in adaptation processes to ensure that social dimensions of risks become integrated into planning.

In many ways, the approach to adaptation governance is similar to New York’s in this context. The state is centrally focused on disseminating adaptation planning processes across scales instead of directly prescribing concrete adaptation solutions — delegating these decisions to the local. Yet, in the commitment to societal transition and reform, the mobilized epistemologies are much more closely managed across scales by the involvement of various actors, the establishment of clearly defined criteria, the mainstreaming of adaptation planning and its principles, and the close management of decision-making processes that extend into the civic sphere and into individual local farms.

The co-creation workshop that centrally informed the creation of the heat and drought plan for the Unteres Traisental becomes an important case in point in this regard, revealing how epistemological orders established in the NAS/NAP become translated, extended and managed into the concretely local. These epistemological orders become concrete political ordering devices, managing the validity of

epistemological claims and problematizations about climate risks, adaptation transitions and their impacts. Mobilizing and integrating local epistemologies, these public exercises of decision-making importantly introduce and exercise concrete, pre-determined epistemological orders of adaptation and manage them through the modalities of exchange and negotiation “on the ground” (see Chapter 5 and 6).

Ultimately, both New York and Austria are heavily engaged in the management of adaptation epistemologies via the control over and extension of concrete problematizations of risk and the socio-politics of adaptation. Differences in adaptation policy are strongly constituted in the differences of the problematizations, where the one focusses on natural hazards, the other on the societal (co-) production of risks. In Austria, the problematizations of risks as constituted also in societal orders is what justified, produces and supports the reformist capacities and commitments of its adaptation policy.

4.6.3. Problematization and Governing Adaptation

As such, socio-political orders of adaptation governance evolve in and through these problematizations. For Foucault, problematization and governance are closely related — with the one establishing and the other governing the “disposition of things.” One of the central problems for Foucault was the relationship between (constructions of) knowledge-claims and power-relations. In his perspective, epistemological and political orders are tightly coupled and allow for an hegemonic exercise of control and governance (cp. Bacchi, 2015). Problematizations are seen as inherently political and “deep-seated conceptual schema that shape lives” (Bacchi, 2015, p. 9).

Adaptation policy manifests in the problematizations of climate risks. They constitute specific pathways to solutions and foreclosing others, order what aspects of society can be opened-up and re-negotiated in the processes of adaptation decision making, manage the relationships between nature and society, determine what kinds of knowledge claims are seen as “productive” and “valid” in governing climate risks, and who gets to participate in these processes — and in turn foreclose anything that does not fit these epistemological orders.

This becomes explicit in the striking differences between New York and Austria and how and what they problematize in advancing and manifesting adaptation policy across scales. Problematizations of climate risks as external natural force on the one hand, as societally produced on the other determine what is managed in adapting and what not. Problematizations of what elements of society become risky

in this context, and what elements need prioritized protection makes explicit how adaptation is a reflection, materialization and cementing in of socio-political orders. The economic paradigm in New York, and the societal reformist in Austria explicitly shape what are the subjects of adaptation governance as policy becomes localized.

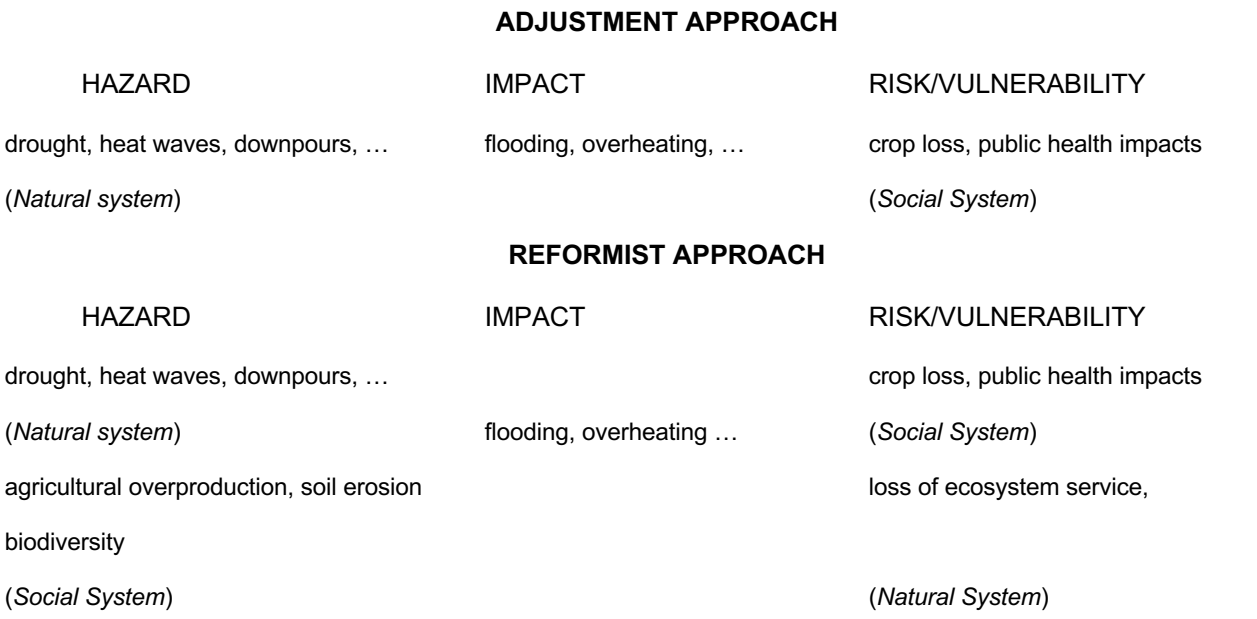

Figure 5. The boundaries between natural and social systems in the production of the risk.

The ways in which the epistemological orders of climate problematizations deeply structures the apparatus of adaptation governance are striking. The externalization of climate risks into the natural sphere constitutes the decision of non-decisions in New York's adaptation governance: As risks come "from the outside", problematizing potentially socially unjust or even oppressive-extractive political structures of agriculture become foreclosed from problematization and through this a non-issue. Diametrically opposite the situation in Austria: these injustices, and the political implications of the structures of agricultural production are center staged in the problematization of climate risks as socially produced. As stakeholders negotiate the parameters of heat and drought plans in the Unteres Traisental, discussion quickly moves from initial problematizations of the hazards themselves, to the political-structural production of risks through agricultural systems and the proposed techno-scientific solutions (irrigation). It is in these different problematizations that the structures of governance become established — where societal orders are explicitly "designed out" of governance problematization, the associated

state apparatus that manages adaptation remains confined to its political boundaries and does find means to justify intervention into the socio-political order of the agricultural economic system. In Austria, on the other hand, the problematization of societal risk production constitutes a governance apparatus with wide interventionist reach and involves a wide range of actors in the local that transcend the institutional confines of the polity.

4.6.4. Adaptation Localizing

The previous chapters examined how adaptation is stabilized in processes of localizing across scales through two processes: 1) the management of organizational structures of political institutions involved in the planning and implementation of adaptation across scales, and 2) the management of epistemological orders of adaptation, including the problematization of risks, vulnerability and social organization. These two-fold processes of adaptation localizing materialized specific adaptation governance apparatus in Austria and New York respectively. The adjustment approach of New York's adaptation policy was discussed for its involvement in the maintenance of existing regimes of food production, by prioritizing the economic output of agriculture. On the other hand, Austrian adaptation policy problematizes the ways in which food is produced and prioritizes their reform towards sustainability, including claims for strengthening equity, social justice and democracy.

Importantly, the governance of localizing processes and the situating of democratic processes within established political institutions on the one hand, or outside of them on the other, reveals important tensions between 1) bottom-up processes and top-down governance; 2) the maintenance and distribution of accountability; and 3) a tendency of corporatizing the management of deliberative processes as key part of democracy become increasingly privatized, as exemplified by the KLAR! manager in Austria.

5. ADAPTING FAMILY FARMS IN NEW YORK

*This chapter and the next discuss the governance **through** adaptation. Chapter five provides a discussion of how adaptation governance interacts with local orders. I argue that adjustment adaptation reflects a larger sociotechnical imaginary of productionist U.S. agriculture and is deployed in ways that reassert the embedded political, social, moral and cultural orders associated with that imaginary.*

5.1. Introduction

The main argument of this dissertation is that adaptation itself is inherently political, deployed as a means for governing societal orders in the face of environmental change on a climatological scale. Determinations about adaptation are made in processes of **adaptation localizing** across scales involving a wide range of actors, while excluding others.

Chapters 3 and 4 focused on the governance **of** adaptation. I discussed how adaptation is established through specific modes of problematization that constitute distinct apparatus (cp. Foucault & Rabinow, 1997) of adaptation governance in New York and Austria, respectively. I explained how specific adaptation epistemologies — concrete blueprints for what is being adapted to, how and to what ends — become stabilized across scales. I explained how this justifies specific scopes of intervention associated with the respective governance apparatus that evolve in these processes.

For New York, I described how an adjustment governance apparatus emerges that is primarily passive-responsive to external hazards, focusing on increasing resilience — and thereby is able to avoid making determinations about how food may be produced in order to perpetuate the status quo. For Austria, I detailed how food production regimes are themselves problematized for their implication in driving climate change, causing environmental pollution and impacting rural and agricultural communities. This constitutes a more interventionist-reformist adaptation apparatus, actively engaging with and seeking to govern the socio-political and material organization of agricultural regimes.

In this and the following chapter I more carefully attend to the interactions between state adaptation governance and the socio-political orders of food production regimes: by turning my attention to the ways

in which governing adaptation also involves governing socio-political and material orders of social systems — a means of governing **through** adaptation.

I argue that both governance approaches are not "neutral", but that reformist and adjustment adaptation are explicitly engaged in the ordering and control of food production regimes, however with different outcomes in mind. Particularly, both unfold in the backdrop of sociotechnical imaginaries about "good" agriculture — and adaptation is involved in reinstating, maintaining, and attaining these imaginaries.

New York's adjustment adaptation is (despite, or rather, because of claims of "neutrality") engaged in the maintenance of the existing orders of modern agricultural production and attached imaginaries of innovation driven agricultural production that "feeds the world." While Austrian adaptation governance claims to have reformist intentions of system re-design, it does so in pursuit of a historically grown imaginary of agriculture as custodian of "pristine" (although cultivated) landscapes and rural culture. In that, both are engaged in ordering food production — and primarily in reinstating existing political orders of agricultural regimes. Also in Austria, despite claims to reform; Small in scale, current orders of Austrian food production are threatened by "outside" industrial agricultural regimes — and claims of sustainability reforms only serve to reinforce existing orders and protecting them from "outside" transformational forces.

In this chapter I focus on the New York case, before discussing the Austrian case in the following chapter.

I first explore how climate escalations bring to light central contradictions inherent to persistent agricultural regimes of production. Competing claims about agriculture and adaptation challenge the dominating visions, making explicit the inherent politics of societal ordering involved in processes of localizing. I describe how conventional farmers are confronted with contradictions of an agricultural system that contributes to the escalation of climate risks and simultaneously strongly limits the capacities of adaptation.

I then situate these experiences in the context of a specific sociotechnical imaginary about adaptation and agriculture that persists in the U.S., and that also adaptation policies are situated towards. I show that these imaginaries imply specific societal-political and ecological-material ordering of agricultural regimes in their ecological and human environments and that these also shape adaptation

practice and governance. I describe how New York's adjustment adaptation policy connects to an imaginary of productionist agriculture driven by technological innovation — and how in its reflection adaptation itself is focused on maintaining productivity through technological innovation. I explore the ways in which local stakeholders participate in shaping adaptation practices against this imaginary.

I conclude this discussion with an emergent alternative vision for agricultural futures. A small but growing agricultural movement contests the dominating imaginary of U.S. agriculture and formulates its own alternatives — built on collaborative food production and production in an ecosystems perspective.

5.2. Conventional Farmers & Adaptation: Family Farm or Industry?

In this section I explore the experiences of conventional farmers as they adapt. In doing so, critical contradictions emerge between the desire to maintain the "status quo" of agricultural production systems and their implication in the (co-)production and exacerbation of climate risks. Farmers' experiences with risks and their adaptation needs make these contradictions explicit, as they speak to how industrial production regimes cause for the farmers and their workers conditions of producing food that are unsustainable — and increasingly are described as making it difficult to impossible to adequately adapt to and counteract escalating climate risks. I then go on to explain how the invocation of an imaginary of U.S. agriculture, localization processes and local adaptation staff are involved in resolving these contradictions.

5.2.1. Conventional Farmers Adapt in a System in Crisis

In many ways, the escalations of weather and climate make explicit the structural contradictions that farmers face in extractive modern agricultural systems: These contradictions emerge, as farmers have to contend with specific expectations of economic productivity while facing escalating climate disruptions and simultaneously complying with an imaginary of the family farmer that are at odds with the workings of a globalized and industrialized agricultural system. As farmers adapt, weather escalations pose a myriad of challenges and adaptation needs — yet, the conditions of modern agricultural systems themselves importantly limit their ability to attend to these needs.

As I meet with conventional farmers in Madison County, discussions focus first on the experiences with a destabilizing climate, with disruptive weather events, and with increasingly unpredictable seasonal

patterns. The farmers I meet — specialized dairy farmers with several hundred cows, farmers who grow vegetables on fields and increasingly in green houses, and family farmers beginning to specialize on hemp as cash crop — generally describe a wide range of impacts associated with climate change. Recounting their experiences, problematizations range from impacts on their own physical and mental health, to work conditions for their laborers, the health of their livestock and crop as well as the larger farm ecosystems, and the impacts of on the economic and practical viability of their farming operations.

A half-an-hour-drive south of Canastota in Madison County, I meet with a dairy farmer who recounts his experiences with increasingly unpredictable weather patterns. His account reflects how other interviewees describe their experiences with floods, droughts and heat waves. A mixture of increasingly severe rainfall events leading to flooding, followed by periods of drought and heat, would make farming increasingly unpredictable and unstable.

He explains how this, for example, jeopardizes “our ability to grow adequate amounts of feed for our cattle. More and more often we run out of it so early that we just can’t maintain our herd size.” Persistent rainfall in the spring would make it increasingly difficult to get into fields in time to perform crucial tasks at the start of the season. During the interview he worries about the health of his cattle; being forced on a diet of hay instead of grazing on pastures that are more quickly depleted in the combination of wet weather and prolonged drought and heat. He worries about “downsizing” his herd because of that.

> In many ways it is really this tension of how do your cattle live; can they be in the open and outdoors or are they forced inside all year so you can keep their milk production stable?

He speaks to the emotional and physical stress of navigating unpredictable weather that causes longer workdays, challenges long-established and traditionalized workflows over the course of the season — and often forces a scramble when the weather allows to get out on the fields “after weeks of rain prevented us from getting into our fields.” He worries about his health, being forced to work long hours, and getting little sleep for long periods of time.

> With everything becoming more difficult, it is really this worry of how do you keep up with that while keeping everyone healthy? It’s a constant scramble and at the same time I often feel I can’t provide my animals with what they really would need — to be outside grazing instead of locked in… all the stress that they have. And, of course, that also impacts how and what we produce …

Others speak similarly about worries for their health — and the health of their workers, as they are exposed to toxic labor conditions in stables that are tightly packed with livestock. One interviewed farmer recounts how her husband fell sick working a large dairy farm in the region:

> He helped out on one of those massive dairy farms for a while. So, you get shit on your hands. It is usually something your body can handle. Apparently, their workers get a certain level of immunity to their types. And he came home and complained that his arm hurt. And it gradually worsens. He had a bacterial skin infection that he caught on the farm. There is E.coli and everything. We had to change antibiotics several times to treat this. He almost lost his arms because of the conditions in dairy farms of that magnitude.

While most large-scale dairy farms keep their livestock entirely indoors to maximize production efficiency in controlled climates, the interviewee expects this threat to the health of farmers and farmworkers to become a more wide-spread problem, as adverse climate conditions additionally force more farmers to move their livestock indoors earlier and increasingly also permanently:

> As farmers of all sizes are forced to just move indoors with their livestock, also because of climate change, this becomes more and more common as a problem.

It is in this context that conventional farmers articulate a tension between adaptation needs to protect, for example, their health and wellbeing as well as that of their animals, crops and the larger farm ecosystem — and the need to maintain their economic viability on an increasingly competitive conventional agricultural market. For interviewees, adaptations to maintain economic viability run up against and are contradictory to other adaptation needs. This would force farmers to make uncomfortable decisions,[102] as one explains:

> All the time, we all the time have to make compromises. In what we feed them, how we can keep them, the ways we grow their food, the conditions in which we produce it. It is, it's really a constant battle, and it is more likely that you won't win and give into what is economically viable.

The paradigm of productivity, farmers explain, at times overwrites other needs and forces adaptations that they at times link to otherwise problematic aspects of industrial agriculture. One farmer explains how extractive practices become intensified in order to maintain production quotas to stay competitive on the market:

[102] Pointing to the violence in which the extension of agricultural systems unfolds, and the limits to act against this in obscuring and contradicting interests of those oppressed, ad Lukes (1974) points out.

> In a way, it is, it becomes harder to grow, and so what we do is, we do things to our lands that I am not always happy about. Like with all those rains and the erosion, I mean, I just have to re-apply. And in the rain, I have to reapply also the pesticides more, and it's just, you have to invest more of those things to make your crop grow. And, I mean I personally don't want to use more pesticide, more fertilizer, than I need to, and that is definitely more.

Conventional farmers explain in interviews how their adaptation strategies are deeply shaped by, and reflective of, the economic and socio-political orders of conventional agricultural production regimes. The restructuring of rural agriculture, industrialization trends and associated cost, and a long-term depressed market lead to a situation where the "margins are increasingly too thin" for local conventional farmers "to cope with any losses at all", as one farmer puts it. I meet with Michaela*, a local agricultural extension expert in the region. She explains how farmers face growing economic pressures to matinain their productive output:

> Yeah, economic right now, the financial situation of farms is driving just about everything. We are in the third year, well now into year four of depressed prices and just everybody's hurting, you know.

Facing the burdens of this economic crisis, many farmers make fundamental decisions on a daily basis in order to keep their farms going, as one interviewee explains:

> Right now, the dairy industry is … we aren't looking much past the end of the week you know. If we just can make it there and get the bills paid, and then we think about what are we growing this season. But the industry here really is in a crisis like we haven't seen in my lifetime right now.

This would constitute key concerns for farms over how to manage their farms during these financially stressful times and fundamentally impacts the capacities for adaptation amongst farmers in the region, their prioritizations and the objectives of climate responses, as well as the ways in which climate escalations are problematized. As farmers confront current economic pressures, climate disruptions are problematized by them primarily as exacerbating threats to their economic viability on often existential levels while other initially articulated concerns are pushed into the background.

Where farmers already "cannot afford to lose another harvest", as Michaela* puts it, adaptations focus on responses to climate escalations that impede their economic survival; climate change becomes the "straw that breaks the camel's neck" amid a deepening structural-economic crisis of modern agriculture in the region, as Michaela* explains:

> My sense is that a fair number are especially with how compress the dairy industry but really all agriculture has been, there isn't wiggle room right now for people to have the catastrophic crop failure.

This importantly shapes how farmers adapt to climate change, seeking to find ways to mitigate the effects of climate change on their ability to survive in stressed U.S. agricultural markets; In a situation where there is no room to cope with additional losses:

> So a lot of farmers, vegetable farmers who are looking to be more, looking to sort of hedge their bets to make sure that they're able to grow the tonnage of seed or whatever that they need to and so I think that they're looking more critically that adaptations that they can make so that they're less vulnerable to an extreme weather events. I think it's been driven a lot less by the actual weather or climate change in a lot more by the finances and profitability.

This means that globalization and industrialization pressures form an important backdrop in an already depressed market and further extend pressures to maintain production quotas. Conventional farmers see themselves unmitigatedly exposed to these pressures. Adaptation and climate problematizations dominate in the context of their effects on meeting the necessary quotas to minimalize economic losses and survive on in a depressed market. Adaptation becomes a response that is primarily focused on maintaining productive output.

Accordingly, most conventional farmers adapt through adjustments of their production processes with the goal of increasing efficiency and productive output. The adaptation solutions that dominate on conventional farms I visited as part of this research reflect this priority. Adaptation unfolds on farms as an extension of existing practices[103] — thus creating a feedback loop with industrialization tendencies and the market pressures, which additionally exacerbate the climate crisis and its impacts as well as consolidation tendencies, as farms fail.

Farmers begin to confront the impacts of escalating weather, as seasonal disruptions and climate change in daily decisions, straining themselves, their workers, and their farm. Thereby, farmers describe how they gradually begin to change their farming practices in weighing different priorities; By keeping livestock indoors; changing planting practices to better compensate for or mitigate losses; Intensifying conventional agricultural practices; Or by introducing "new" practices such as no-tillage and crop rotations

[103] A reminder of the power of "technological lock-in" (Berkhout, 2002; Vanloqueren & Baret, 2009) that underscores the how adaptation policy that follows a neutral approach to production regime perpetuates dominating ones.

to improve soil to better absorb and retain water. Most interviewees agree that especially within conventional agriculture the intensification of established techniques is a central way for how farmers respond.

Farmers rely on increased use of fertilizers and pesticides to maintain the productive competitiveness of their operations on depleted and eroded soils. Technical interventions seek to cope with the effects on productivity associated with downpour events, overheating livestock, new pests and weed pressures, and years of extractive farming practices. The goal is to make up for climate related losses.

This is the case more generally for “iron and gasoline” driven conventional agriculture, responding to pressures by intensifying their use: more iron (in fertilizer, pesticides and heavy machinery, and more fuel running the machinery that applies them on the fields or runs the climate control units in barns) — the use of technological interventions (fertilizer, pesticides, heavy machinery) into natural systems to maximize efficiency and output of extraction of natural resources to make up for losses inflicted by natural hazards.

In a similar vein, farmers discuss the intensification of shelter and climate control techniques and technologies.[104] Row covers, tunnels and in general the movement towards indoors agriculture. These practices are reaffirmed as they produce the wished effect: buffering the impacts of natural hazards.[105] As adaptations, these instruments seek to counteract the adverse impacts that heat, drought and precipitation have on livestock and plants by allowing the control of and/or sheltering against climate and weather. These sheltered forms of farming are increasingly established, facilitated through funding programs especially via the USDA. A direct response to increasingly instable weather conditions, farmers

[104] This is embedded in a larger discourse on the Anthropocene, human control imaginaries and their politics (Chakrabarty, 2012; Masco, 2010; Nigel, 2014).

[105] This also makes explicit how specific solutions and problematizations are related and establish a technocratic-scientific regime. Embedded is an idea of human control over nature (Nash, 1989). Producing the wanted outcomes and “making things work” are not only determined by mitigating climate risks, but in how far the ways that outcomes are achieved are compliant with the organization of agriculture as a socio-political system. This means that adaptation solutions emerge that not only maintain productivity, but regimes of productivity. Ultimately, this extends to an hegemony of techno-scientism (Rice et al., 2018) that eradicates competing knowledge claims and ways of knowing that would undermine these regimes and extends the violence of modern cultivated agricultural landscapes, structures of ownership and control — in an explicitly colonialist settler regime in the U.S..

adapt either through covering soils with plastic tarps, putting up tunnels or even by establish larger-scale, fully climate controlled indoor operations. One farmer in Madison County explains:

> There are more and more folks moving just entirely indoors, which is a whole other level of investment. And I don't know, yeah, maybe it's the future. But we … I mean, yeah, we are putting up more and more of those plastic tunnels, so we are kind of moving indoors too, but it is not an actual factory that is completely enclosed and climate controlled.

Particularly in conventional livestock agriculture this is already well-underway. In general, it allows better standardized conventional production processes as a form of industrialization. This means, that these practices are often not introduced driven by climate change, as most farmers explain: "it is about increasing output, increase productivity, increase profits while saving on costs in labor, fertilizer…"

"And if it helps with climate change", according to one farmer, "the better." Climate change would exacerbate the need for extractive farming practices, and in consequence only extend and affirm already unfolding globalization and industrialization of conventional agricultural. Ultimately, in such adjustment approaches many farming practices on farms are not newly introduced as adaptations. Instead, already routinely present practices and technologies become either intensified to cope with pressures (such is the case for pesticides and fertilizers) or reinforced as climate change affirms their validity (e.g. indoor farming or stable-raised livestock and their ability for climate control).[106]

Adaptation emerges in and is shaped by the limited financial resources for adaptation, the advantages of large-scale farming in market competition as well as adaptation, and the increased reliance of existing agricultural industry structures in weathering the convergent crises of market and climate.

5.2.2. Emergent Contradictions

In the escalation of the climate crisis, major contradictions become explicit. Farmers problematize climate risks that emerge in an already strained and stressed modern agricultural system. Farmers have to contend with a production system that produces structural risks and leaves them in a double bind: In a paradigm of productivity, economic output determines the viability of a farm. However, the available

[106] As an continuation of control, it is not only climate that is being controlled, but also the boundaries of agriculture (Agrawala, Broad, & Guston, 2001; Guthman & Brown, 2015). The toxic nature of modern agriculture contaminates earths and communities, and the introduction of climate control extends the associated necessity of boundaries to the walls of farming-factories that literally cement-in the divisions between cultivated land and rural culture and society.

adaptation responses — an intensification of extractive production practices to maintain output in adverse conditions — themselves ultimately only exacerbate the pressures through the depletion of farm ecologies and by only further driving climate change. In the interviews, farmers articulate these tensions in experiences of highly individualized pressures that are associated with increasing difficulties to achieve the necessary output and profits that allow their farms to be viable: Strained soils, stretched thin margins of profit and loss, and the pressures of an industrialized and globalized agricultural market, driven by U.S. agricultural policy.

Conventional farmers problematize the interdependencies and effects of extractive agricultural regimes in many ways similar to sustainable farmers: This set of interviewees speak similarly about the harms inflicted by extractive agriculture, as sustainable farmers do — and articulate tensions between these experiences of harm and the necessity to participate in the systems of production typical for modern conventional agriculture. One interviewee, a regenerative farmer and advocate in the agricultural community, puts it this way:

> You know, it is not as if they don't care. It is just, how much are they afforded to care about the environment, about their livestock. I mean, of course you want your animals not to suffer, of course you don't want to, you know, make that kind of impact. It's just, more often than not you have to operate in a system that just doesn't allow for that kind of concern.

He explains that, while many conventional farmers would have "real problems with the system they just realistically cannot afford to escape it." Farming as a generational legacy would not afford failure of businesses for many generational conventional farmers:

> It is devastating our communities. You don't fail as a business, you just fail. You fail the generations before you that build this farm. You fail your family. You can't just shake it off and move on. If it is over, for many it is really, really over.

This would be coupled with economic and political interdependencies, as many interviewees reaffirm in their descriptions. One conventional farmer, for example, explains how conventional agricultural production systems would be self-reinforcing:

> You get those contracts, and then you get in debt to get access for, let's say, the seed, and then you have to fulfill the contracts and meet the quotas not only to make your money back, but also to keep your contracts. And at the same time, often that is tied to them telling you how to grow

> your plants or livestock, and so often you don't even have a real say over what you can do in many ways.

And where farmers would have a say, often the pressures of productivity again force farmers to make choices that undercut adaptation considerations that are non-output focused and are pushed to the sidelines:

> It is the change of our community, as we see these consolidations, as we see globalization pressures and industrialization. There is no room for failure, when the system fails us.

This is where adaptation policy converges with local practices in which both are focused on adjustment to existing farm processes in a productionist paradigm,[107] fostered through the structural and economic conditions in which is food produced on the local level. As one interviewed farmer makes explicit in an interview:

> It [Climate Change] is a challenge for our agricultural systems, because our optimized processes become disrupted. So, we really have to minimize labor, maximize efficiency, optimize our processes to maximize what we can get out of the system. For example, precision farming. That is of course on the one hand a reaction to climate change, but it is just as much an instrument to maximize profits.

Farmer therefore describe how they feel that they cannot afford other adaptation concerns — from mitigation to equity to sustainability transitions: Local farmers describe how they would not have the capacities to appropriately figure those concerns in adapting, as they are fighting for their economic survival. Rohan* explains how adaptive adjustments become the overwhelming priority for farmers:

> Because of all of this, I definitely feel like farmers are much more interested in adapting; they are less interested in mitigating the effects because I think there's a feeling of powerlessness.

And another Madison County farmer explains that "the bottom line" determines adaptation in this context:

[107] This interpretation becomes here coupled with the already persisted imaginary of the economic crisis that rural communities and agriculture find themselves in. Alternative interpretations — such as a crisis of capitalist agricultural production or the effects of extractive land use on communities — become foreclosed. Roitman discusses how a crisis becomes a diagnostic tool that has strong ordering effects with material consequences. She writes that "[...] the term 'crisis' signifies a diagnostic of the present; it implies a certain telos because it is inevitably, though most often implicitly, directed toward a norm. Evoking crisis entails reference to a norm because it requires a comparative state for judgment: crisis compared to what? That question evokes the significance of crisis as an axiological problem, or the questioning of the epistemological or ethical grounds of certain domains of life and thought" (Roitman, 2014, p. 4)

> Look, nobody will adapt simply to climate change pressures, if they don't provide economic advantages. […] And if something doesn't help us in our profit margin, then there is a good chance that many farmers won't do that.

Specific cultural, shared understandings, and imaginaries about agriculture play a major role in reconciling emergent contradictions while shaping the adaptive responses on the ground, supported through regional adaptation professionals, industrial associations and industry advocacy groups in particular. Three key aspects of culturally shared understandings of agriculture play a particularly critical role: The idealization of productivity ("We feed America"), a highly individualized-industrialized idea of food production (Family Farming), and the importance of technological innovations in U.S. agriculture.

5.3. Productionist Imaginaries of Agricultural Futures

In Chapter 3 I discussed how adaptation policy in New York aims at maintaining the productive output of agricultural systems in anticipated or already occurring shifts in climactic conditions. This adaptation approach is formulated particularly in the problematization of escalating natural hazards: immediate threats such as droughts, heat waves, flooding and heavy downpour events as well as more slowly and gradually unfolding threats, such as changes in seasonal patterns, sea-level rise and shifts in overall climactic conditions.

Adaptation policy response focuses on system-adjustments, while refraining from making specific determinations 1) about what these adjustments may look like and 2) about the underlying modes of food production. Instead, in claims about positional "neutrality" and its general non-interventionist approach, it defers such determinations to local actors making context-specific decisions about adaptation.

However, although New York's adaptation planning does not make explicit decisions about what agricultural production in a changing climate may look like, it nonetheless operates on a concrete imaginary of "good" and "American" agriculture that informs and shapes adaptation policy, localization and local practice as a powerful undercurrent. Specifically, it's combined prioritization of maintaining and supporting current food-production regimes and economic output constitute a commitment to the "status quo" of agricultural production, while committing adaptation policy to a non-interventionist governance approach in regard to how these systems produce their goods.

These non-interventionist commitments connect to an imaginary about how agriculture operates, and the ways in which adaptation decisions are made in concretely local settings. **First**, it implies that local farmers and farming communities can best determine proper ways to adapt to a changing climate — and in ways that meet their best interests and needs in specific local conditions of food production.

This becomes particularly explicit in the emphasis on local adaptation. New York State's adaptation policy emphasizes local decision making by local municipalities, but also emphasizes a highly individualized local adapting by farmers themselves. While the CSC program supports local municipalities and counties in their adaptation planning efforts, it does not directly address farmers in their adaptation practices. Instead, adaptation support to farmers is less coordinated, and an idea of farmers adapting individually corresponds with a larger individualist imaginary of farmers (which stands in stark contrast to the more community-oriented and -driven local decision-making emphasized in Austrian adaptation policy and localizing). It also supports a minimal-interventionist approach to adaptation governance that precludes regulatory intervention and focuses on providing incentives and resources where adaptation needs cannot be met with available local resources.

Second, sociotechnical imaginaries about farming in the U.S., and in New York in particular, invoke the imaginary of the ingenious family farmer, an archetype of labor ethics, vocation and dedication that feeds the nation and the world by engaging in strenuous labor, exposed to all kinds of weather and extracting the resources of the soil to feed the nation and the word. Built on narratives of labor, land, family and national security, long-running imaginaries of U.S. agriculture celebrate farming as importantly and inherently "American" — connecting these ideas with settler-colonial forms of landownership, cultivation of nature for the purpose of resource and capital value extraction, and the protection of national interests on a global stage (cp. Ayazi, 2019; Mcdonagh, 2014; Wilson, 2001).

The invocation of the family farmer has been deployed strategically and routinely in debates about U.S. agricultural policy and reliably surface at each debate of the next farm bill — invoked to justify a policy that disproportionately supports industrial agricultural policy, while undercutting small farmers and community farming projects alike. Sarah Taber explains how the invoked ideal of family farming is problematic as it shifts the burden of failing businesses on the individual farmer, while undermining the historical reality of successful sustainable farming as a collaborative community practice:

> Idealizing family farms burdens real farmers with overwhelming guilt and blame when farms go under. It's crushing. […] If we're serious about building food systems that are sustainable and robust in the long term, we need to learn from how farming's been done for most of human history: collaboratively (Taber, 2019)

And Ayazi (2019) and McMichael (2007)both explain the connection of the idea of "feeding the world" as supporting an imperial project that is based in the settler-colonial notions of property-ownership and land-claims invoked by the idea(l) of the family farmer.

Third, it emphasizes the economic productivity of agriculture and primarily conceptualizes agriculture as an economic (and not a social or ecological) system. This corresponds with a larger imaginary of U.S. agriculture that is predicated on economic productivity. Particularly the idea of "feeding the world" is invoked as central imaginary of U.S. agriculture, embedded in larger discourses around food security and national interests (Mcdonagh, 2014). This is situated in a primarily export-oriented production regime in the U.S.. While major large-scale production centers for agricultural exports are located in the plains of the Mid-West, New York also has a significant agricultural production economy. It particularly plays a major role in emergent markets (such as industrial hemp), it is the 4th-largest dairy producer of the nation and a major producer of apple varieties (NYCCA, n.d.; NYSERDA, 2011b).

Fourth, it invokes technological innovation and intervention as a central vehicle for adaptation in the agricultural sector. This in general corresponds with an overarching imaginary of agriculture in the U.S. that emphasizes innovation as a central driver of the American success story of agriculture. Generally speaking, American agriculture is imagined as predicated on economic productivity enabled in particular through technological innovation supporting large scale farming operations. The imaginary of U.S. conventional agriculture is one that, according to Dentzman,

> revolves around increasing productivity by continuously improving technological innovation. The envisioned 'good' society of this imaginary is one in which agriculture produces large quantities of crops for food, fuel, etc. on limited and/or degraded land through the application of technologies. It is fundamentally a commercial enterprise, focused on intensification, specialization, mechanization, and technological innovation with the goal of securing national self-sufficiency for agricultural commodities (Dentzman, 2017, p. 30)

This means that the U.S. imaginary of agriculture revolves around reaffirming and asserting land claims and a "national mission" of food production — explicitly connected to ideological claims of American sovereignty and imperialism, as also Ayazi (2019) and Wilson (2014) explain. Ideas of family

farming and landownership are connected with “working the land” and “resisting the elements” to “extract value from land” by “taming of the frontier. These ideas derive from a period of colonialization of indigenous lands and are continued in modern U.S. land claims for the purpose of resource extraction.

While New York’s adaptation policy does not make explicit its commitments to specific regimes of food production, it’s prioritizations of preserving agricultural output in a productionist paradigm is directly connected to this larger sociotechnical imaginary of U.S. agriculture.

This becomes explicit in a range of instances of how New York policy formulates what adaptation is in terms of what it is adapting to, how, and to what ends on the one hand, and how it is localized on the other. The emphasis of productive capacity combined with a strong belief in technological intervention and innovation to enable adaptation figure particularly important, together with an approach to localization that emphasizes local, autonomous decision making through the farmers and farming communities themselves.

5.3.1. A Politics of Industrial Agriculture

This productionist-individualized and technology-driven imaginary of U.S. agriculture appears as a major undercurrent for New York’s adaptation governance in the U.S. agricultural sector as well as for U.S. and New York agricultural policy grosso modo.

U.S. agricultural policy similarly prioritizes the productive output of the sector and figures US food production as an export-focused market and national asset. Jolly (N.D.), an extension economist at the University of California, explains in a statement the connects of productivity, efficiency and societal benefit that are subsumed in the imaginary of U.S. agriculture:

> Agricultural policy has leaned in the direction of supporting large farms over smaller farms because larger farms tend to have lower per-unit costs. Typically, the cost of production of a standard commodity by this measure declines as the volume of production within a production unit increases. Thus, society is assumed to be better off if larger farms displace smaller, less efficient ones (Jolly, n.d.).

And continues to explain how this is importantly driven by the imaginary of “feeding the world” — yet, that this imaginary does not necessarily correspond with the realities of agricultural demand — with significant impacts on the (re-)structuring of U.S. agriculture (Jolly, n.d.):

> The 1996 Freedom to Farm Act was predicated on the idea that the world's population is expanding rapidly and that this expanding population would increase demand for agricultural products steadily and significantly. But reality doesn't always conform to theory. […] The result? Increased supplies, decreased demand, lower prices, and declining farm incomes. Freedom to farm is also a freedom to fail […] [Congress'] focus is on commodities, not farmers, and perhaps they think corporate farms can produce commodities as well as family farmers, if not better. So the ultimate beneficiaries of the new farm policy are not family scale farmers.

Jolly articulates also a major contradiction between the routine-invocation of family farming "feeding the world", and the growth- and scale-based U.S. agricultural policy. While emphasizing an imaginary of family farming, this obscures a reality of industrialization supported through policy, as Graddy-Lovelace argues: U.S. agricultural policy had to be characterized as supporting extractive industrial-scale agricultural systems at the expense of small and medium size (family) farms:

> US agricultural policies have long had deleterious effects on small-scale farmers, ranchers and fishers around the world, but surely they benefit US growers themselves? Rather, since 1900, the number of family farms fell by 63 percent, while the average farm size rose 67 percent (Dimitri, Effland, and Conklin 2005). Under liberalization's upward swing – but continuing a longer trend, small commercial farms (from $10,000–$24,999 in gross cash farm income sales) dropped from 51.2% of US farms in 1991 to 36.5% in 2007 (Hoppe 2010). Farm size increased during this time; acreage in production remained the same. One of the most dramatic US transformations in the twentieth century was the 'national abandonment of farming as a livelihood strategy' (Graddy-Lovelace, 2016, p. 7).

While invoking routinely the imaginary of family farming and the purpose of "feeding the world", US policy structurally[108] supports primarily the expansion of industrial scale agriculture, whereas programs to support small scale, sustainable and community agriculture remain only marginal.

This creates and promotes an imaginary of U.S. agriculture that is predicated on maximizing the extraction of resources from cultivated lands, primarily relying on technical innovation. The result are large-scale agricultural production systems that utilize automation technology, monocultures and technological interventions into the productivity of the land — such as technologies (fertilizers and pesticides) that interfere in the chemical make-up of land and plants.

[108] Adaptation measures are to be understood as governance interventions seeking to exercise power and establish/maintain power-orders in society. As such they seek to (re-)design socio-material orders as political means for which the definition, understanding and delineating of risks and vulnerabilities becomes a key shaping power. This unfolds within as much as it shapes the larger political-material structures of governance (Jasanoff, 2005a).

5.3.2. Climate Smart Farming and Technological Innovation

The undercurrents of technological innovation to support agricultural productivity are informing how adaptation of the agricultural sector in New York is pursued as well. This becomes explicit in the goal to maintain the productive output in adverse climate conditions, and in the promotion of adaptation solutions directly through state policy localizing programs, subsidy programs as well as in intermediary programs, such as the Cornell Cooperative Extension's Climate Smart Farming program.

These share an invocation of the imaginary of the family farmer producing goods by weathering adverse conditions through their *individual* ingenuity and assisted by progress in agricultural production technologies. The states adaptation clearing house summarizes agricultural adaptation strategies in the following way:

> On-farm adaptation strategies include livestock diet and feeding management, use of fans, sprinklers and other cooling systems for dairy barns, shifting planting dates, diversification of crop varieties and crops, and freeze and frost protection for perennial fruit crops. Adaptation strategies beyond the farm include locally available design and planning assistance, disaster-risk management and insurance, financial assistance, and policy and regulatory decisions (NYCCA, n.d.).

The majority of these adaptation proposals are technology-driven, combined with beyond-farm adaptations that include planning assistance, disaster-risk management, insurance and incentives — where the New York Climate Smart Communities program plays a major role. The ClimAID report's articulated adaptation strategy for the agricultural sector specifically mobilizes the same adaptation categories (NYSERDA, 2011b, p. 227ff) — underscoring an imaginary of innovation-driven production security and intensification.

While NYS policy does not explicitly determine how food may be produced, this imaginary is the central undercurrent constituting an innovation driven adaptation approach to maintain productivity. This informs also the NYS CRF (Climate Resilient Farming) and Cornell Cooperative Extensions' Climate Smart Farming programs. Both programs are consultancy and incentive-based programs that strongly support technology-driven adaptations on farms and in farming communities.

Farmers are caught-up in a double bind of climate escalation and agricultural production regimes that drive these risks and exacerbate them. Pressured to maintain productive capacities, adaptation

options diverge from adaptation needs and lead to an intensification of agricultural practices that bring those contradictions and binds only in further sharp relief. It is in this context that a non-interventionist adaptation policy and its commitment to the productionist paradigm become complicit.

Without a commitment of adaptation policy to support transformations of agricultural production regimes, local resources become increasingly important in helping farmers cope with and reconcile these contradictory pressures. Chapter 3 already examined some general aspects of how Extension Services, industry associations (New York Farm Bureau) and industry consultants centrally inform farmers in their adaptation practices. In this context it becomes possible to revisit how these resources play a major role in reconciling these binds and re-asserting the productionist-innovation-driven paradigm of adaptation in modern agriculture.

Thereby, I would argue that each of these actors seeks to address the needs of local farmers and work their hardest to mitigate an increasingly volatile situation for local farms in Madison County. However, in the lack of a structural commitment to systematic change, they are relegated to addressing symptomatic issues and mitigating the worst impacts on farmers while pursuing attempts for incremental change, where possible.

5.3.2.1. Mid-Level Administrators at New York State:

As described in Chapter 3, mid-level administrators play an important role in creating support for local adaptation practices; in particular through built-in measures in specific programs such as the CSC program. Discussed earlier, mid-level administrators make larger efforts in integrating measures that can provide relief for local stakeholders as needs arise and come to their attention (one administrator described in an interview the expansion of cooling centers as a new action in the CSC program in response to emergent local needs). Administrators play a critical role in supporting local stakeholders within and confined by the political and organizational structures that they operate in. However, with an adjustment adaptation policy, these opportunities are limited due to a lack in a larger structural-strategic and coordinated effort to direct address the structural conditions that create the binds in the first place.

5.3.2.2. Cornell Cooperative Extension:

Limited authority in direct interventions (cp. Chapter 3) associated with the confines of established political-institutional boundaries of the polity further increase the importance of locally operating actors.

The Cornell Cooperative Extension plays a particularly important role, acting as a boundary organization. It directly contributed to major parts of the ClimAID report and remains a key consultant shaping adaptation policy and it plays a major role in interfacing with local farmers; also in the context of climate mitigation and adaptation.

The Extension provides several key services to local farmers ranging from consultancy and training regarding farming practices, to climate-specific trainings, providing climate risk related tools (specifically the Climate Smart Farming tools, such as drought monitors and planning tools), and promoting of adaptation techniques (e.g. via the CSF program).

The Cornell Cooperative Extension plays an important role in this regard. It supports farmers through their everyday operations and local extension managers such as Michaela*, who explains what her work with farmers involves:

> So within Cooperative Extension a lot of what I do every day is I pick up the phone calls or I, you know, go out to the farm and I help farmers with issues. What I do on a daily basis changes of the time of year, right now farmers are looking to start getting into their fields in the next three weeks to start planting seed and then once they get everything planted, they are going to, you know, start looking at harvesting and climate has a significant impact. […] So I'm working with farmers right now to sort of figure out what and how they can plan to sort of adapt to the fact that our springs are cool and wet and they used to not be that way — how do we work with that? Towards the end of the summer there's also been a shift in the timing of rainfall, and drought is becoming more of an issue up here […] So I am working with farmers as they stick through till the end of next season, you know, how do they either stockpile or whatever, enough water so that they're able to water their animals or their crops and do what they need to do that way. So, working on sort of building resilience to drought is another thing that I do: working with farmers to really implement these tools so they can make more informed decisions.

Thereby, the extension offers a series of means for farmers to better anticipate climate hazards such as drought or spring precipitation and provide them with possible tools — from crop rotation to no-till, to pointing them towards funding sources for new irrigation systems or optimized pest control tools.

The extension team — particularly through the Climate Smart Farming program as part of their efforts to increase resilience — draws on a range of tools that aim at increasing farm resilience on the one hand, while better incorporating practices that reduce the climate footprint of agriculture through incremental changes on the other:

> I think that's really what we're seeing with farms is, you know, they're making small changes, but over the course of decades, those small changes turn into big changes. I guess the biggest change I've seen has been by increased awareness of soil health and the importance of organic matter in soil.

The extension program particularly through the CSF initiative facilitates the incorporation of planning tools and saw an incremental incorporation of more sustainable practices such as no-till and crop rotation or rotational grazing.

In this way, the work of the extension services simultaneously reintegrates innovation-driven adaptations to maintain farm competitiveness, while also promoting incremental change in farming practices towards more sustainable production. This becomes apparent in the promotion of technological innovations — from precision farming to irrigation practices and building adjustments, to the promotion of new, “climate resilient” crop varieties, while at the same time promoting a limited set of sustainable practices (crop rotation, no till) that are meant to better conserve the resource base of a farm.

However, the sociotechnical imaginary of U.S. agriculture importantly reshapes how even sustainable practices can be deployed meaningfully within current production regimes. “Climate friendly” practices are explicitly deployed in the context of adaptation to enhance production-resilience and not to structurally transition agricultural systems towards sustainability. As Wang explains: “U.S. agriculture continues to experience structural and organizational changes. Over time, farmers have relied more heavily on contracting to manage their risk and agricultural production has shifted to larger and more specialized farm operations” (Wang, 2014, p. 8).

This particularly relates to the imaginary of the “family farmer” undercutting more collectivized and community-driven visions of farming and food distribution, as also Taber explains (Taber, 2019). And Ayazi (2019) explains how the imaginary of the family farmer constitutes claims of land ownership that perpetuates an individualistic carrying of “the burden” of farming success: Undercutting collective farming and land-ownership, the (economic, ecological, social, physical and psychological) cost burdens are put on the shoulders of the individual farmers while foreclosing interventions into the ways food is produced that could distribute benefits and burdens more evenly while providing more sustainable production regimes, as Taber (2019) shows:

> If we truly understood how rare it is for family farms to happen at all, never mind last multiple generations, I hope we could be less hard on ourselves. Deep down we all know that the razor-thin margins put families in impossible positions all the time, but we still treat it like it's the ideal. […|
>
> If we're serious about building food systems that are sustainable and robust in the long term, we need to learn from how farming's been done for most of human history: collaboratively.

5.3.2.3. Industry Consultants

Instead, the idealization of family farms feeding America through personal ingenuity, resistance to weather, and technological innovation undercuts structural changes and further deepens the dependence to industrial stakeholders that provide what is seen as the most effective adaptation solutions within such an imaginary. Providing the most recent developments in seeds, fertilizers and pesticides, farmers explicitly depend on industrial stakeholders — simultaneously buying their products and marketing them and providing the supplies for their production. Most of the interviewees state that such industry actors play an outsize and critical role as resource informing them in their choices on how to best cope with climate pressures, as an interviewee explains:

> And it's also really, you have certain tools on your farm that you know, and how they work, and you have your suppliers that you worked with for often decades that know you and the farm, and so they really help you in fine-tuning the resources that you have to better deal with all that, and bring also new tools.

She explains that these tools are often new crop types, pest management tools and instruments to work on soils in order to better compensate for losses due to adverse climate/weather conditions. The outsize role that industry actors — particularly suppliers — play in informing adaptation transitions on farms has also been observed in the literature (Gray & Gibson, 2013). Consistently, farmers explain how suppliers provide key services for their decision-making via consulting on pesticide and fertilizer use, farming techniques, and providing instructions on the best growing conditions for specific seeds they provide, to mention but some examples.

5.3.3. Industrial Agriculture, Adaptation Futures and a Democracy Dilemma

Finally, connected to this imaginary is a larger premise of “self-regulating” agricultural markets that mirrors the larger economic market policy in the US — and has important consequences for the deliberative capacities embedded in a non-interventionist adaptation policy.

This non-interventionist approach to adaptation governance in regard to the regimes of agricultural production imply that adaptation policy defers decisions about this issue to market/industry actors. However, Lukes (1974) discusses one aspect of power as the ways in which nondecisions themselves are explicitly to be understood as exercises of power, where “such unawareness ‘does not mean, however, that the dominant group will refrain from making nondecisions that protect or promote their dominance. Simply supporting the established political process tends to have this effect’” (Lukes, 1974, p. 22). He describes nondecisions as political acts of keeping specific issues “of the agenda” through deference, non-problematization and what McGoey (2012) terms strategic ignorance.

By making agricultural production regimes a non-issue for adaptation governance, important data on its effects is not produced or incorporated in planning and debates on the issues are importantly foreclosed.

The effect of nondecisions, for Lukes, would be the “suppression or thwarting of” challenges to power and existing power regimes. This means that the ways in which New York State adaptation policy refuses to incorporate decisions about food production regimes themselves become a means to maintain them. This is consequentially linked to the distribution of authority, especially in the ways that contesting claims can make, and here the reliance on science and agricultural industry actors. Ultimately, it excludes potential challenges to the ways in which agricultural regimes are entrenched in a history of extraction of natural and cultural “resources” (and the conceptualization as “resource” in that).

As discussed in Chapter 3, the boundaries of New York’s CSC-Program are tightly monitored, and activities are primarily confined to established political-organizational boundaries. Whereas as of recently citizen task forces were introduced to partially open-up the processes of decision making (reflecting existing methods of participation, cp. Chapter 6), overall decision-making is tightly monitored and

controlled and maintains strong interdependencies with established governance hierarchies.[109] This implies that participatory decision-making processes are scarce even within the structures of state adaptation programs and localizing efforts.

However, a plethora of literatures in STS more explicitly discusses the limitations to deliberative democracy imposed by a deference of governance decisions to what is coined a "free market." On the one hand, these ideas preclude more interventionist governance through the state by limiting regulatory capacities, on the other hand, deliberative decisions about adaptation decisions and the structures of agriculture are strongly limited in this context as well. For example, Minati (2004) unpacks the false equivalency of voting decisions and buying a product. STS in particular has paid close attention to social movements that challenge regulation and the lack thereof, particularly in the context of public health, environmental contamination and toxicity (Brown, 1992; Brown et al., 2011; K. Fortun, 1998; Hess, Breyman, Campbell, & Martiny, 2014; Irwin, 2008; Jalbert et al., 2014; Shapiro, 2015). These literatures only make explicit the extent to which the impacted publics have to actively work towards raising issues onto political agendas to bring about regulatory action and intervention.

Participation of farmers in decision making about adaptation governance and practice is highly limited and rarely occurs in New York — particularly considering the comparison to Austria, as discussed in the following chapter. Instead, decision-making power for farmers is strictly confined to their own farms, and is also limited by the structural conditions and political interdependencies associated with the specific agricultural production regimes they are part of. The local extension expert points in an interview to a "sense of powerlessness" when it comes to larger scale changes in how food is produced and how impacts of climate change may be governed. Instead, farmers would revert to what is feasible and attainable as concrete actions on their farms.

This constitutes a major crisis of democracy that needs more detailed examination in future work on this matter. At this point, this crisis can only be characterized in its general contours — and raises important questions about how decisions about futures and presents of climate change may be made. As

[109] At the same time, as a top administrator explains, the state has limited oversight powers to mandate processes and put in guidelines, particularly due to principles of home rule where the state is relegated to incentive driven policy. This means that incentive-based programs such as the CSC program become an important substitute for more overarching prescriptive policy.

Alan Irwin writes: “In the end, scientific governance is about making choices with regard to the kind of societies we wish to create – and to live in” (Irwin, 2015, p. 30). However, these questions are excluded from deliberation in policy and public, and instead are left to be determined on a “free” (for whom?) market. It remains unclear how farmers, farm laborers and larger society could effectively engage in formulating the answers there.

5.4. An Alternative Vision for Agriculture

The result is an adaptation policy that emphasizes technologically driven production security and intensification, meant to help farmers weather the adverse impacts of climate change, cope with emergent and future risks, and take advantage of emergent opportunities associated with climate change. At the same time, there is little capacity left for conventional farmers to shape adaptation and agricultural production regimes. Key decisions about production and adaptation derive from and unfold within agri-industrial structures of power, where farmers retain only strictly limited decision-making power. Instead, a network of support focuses on mitigating the most significant and severe impacts of industrial food production systems (state programs, insurance programs, new technologies, consulting businesses, etc.). An adaptation economy emerges.

Interventions through adaptation policy and practice, in combination with locally operating “resources”, are designed to help farmers weather a convergent economic, climate and ecological crisis, instead of facilitating structural changes that would create more sustainable agricultural regimes that would also be viable for farmers themselves. As Taber puts it poignantly:

> Family farming isn’t just difficult. It’s so brittle that it only makes a viable livelihood for farmers when land is nearly valueless for sheer lack of people. In areas where family farming has persisted for more than a couple generations it’s largely thanks to extensive, modern technocratic government interventions like grants, guaranteed loans, subsidized crop insurance, free training, tax breaks, suppression of farmworker wages, and more. Family farms’ dependence on the state is well understood within the industry, but it’s heresy to talk about it openly lest taxpayers catch on. I think it’s time to open up, because I don’t think a practice that needs that much life support can truly be considered “sustainable.” After seeing what I’ve seen from 20 years in the industry, continuing to present it as such feels to me like a type of con game — because there is a better way (Taber, 2019).

Taber articulates an explicit critique of the persistent imaginary of U.S. agriculture that informs policy and local adaptation practice. Confronted with the needs that arise from market pressures and the structures of industrial farming systems, adaptation becomes primarily about adjusting farm systems to increase production efficiency in escalating adverse climate conditions.

For Taber, an alternative is possible, and it is rooted in collective agriculture:

> America's history is filled with examples of collaborative farming. It's just less publicized than single-family homesteading. African-American farmers have a long and determined history of collaborative farming, a brace against the viciousness of slavery and Jim Crow. Native peoples that farmed usually did so as a whole community rather than on a single-family basis. In the early days of the reservation system, some reservations grew their food on one large farm run by the entire nation or tribe. These were so successful that colonial governments panicked, broke them up, and forced indigenous farmers to farm as individual single-family homesteads. This was done with the express goal of impoverishing them — which says a lot about the realities of family farming, security, and financial independence. It also says a lot about how long those grim realities have been understood. Indigenous groups today run modern, innovative, community-level land operations, including over half the farms in Arizona; or Tanka's work restoring prairies, bison, and traditional foodways in the Dakotas as the settler-built wheat economy dries up (Taber, 2019).

These are but some of the examples, where communities do and have envisioned and practiced competing imaginaries of how farming looks like, and how it relates to and is situated within larger socio-ecological communities. Drawing on knowledges that have been practices for millennia by the indigenous peoples of what is today the U.S., including Madison County, a small but growing movement of farmers seeks to rethink how food is produced. An alternative, competing vision of agriculture resurfaces that has dominated human cultivation of land for the largest parts of its evolutionary history (Brookfield & Padoch, 1994; Hopcroft, 1999; Kimmerer, 2013; McCloskey, 1991; Nabhan, 2016; Taber, 2019).

One that emphasizes communitarian agriculture that places agricultural practice and the farmers themselves within and as part of larger ecosystems, instead of extracting and depleting ecologies as bearers of resources.

One example is sustainable and regenerative farmers in Madison County, who begin to challenge dominating regimes of agricultural production for their extractive and destructive effects on ecosystems, climate systems, rural communities and the farmers themselves. Embedded in these farming approaches that are explicitly challenging established structures of power in modern conventional agriculture,

adaptation on sustainable farms becomes also a transformative means to rethink the ways in which food is produced.

Farmers rely primarily on already existing and established practices in adapting. This is also the case in sustainable agriculture. Similar to conventional agriculture, adaptation amongst sustainable farmers also unfolds primarily as an extension of existing practices and in reflection of current economic and socio-cultural orders. Yet, whereas conventional farmers adapt embedded in economic orders of an industrialized and globalized agricultural system, sustainable farmers adapt in structures that emphasize an ecosystems perspective. While in both systems adaptation constitutes an extension of existing practices, these distinct socio-epistemological orders produce distinct outcomes.[110]

This small but growing number of producers in New York seek to draw on regenerative farming approaches (such as permaculture, holistic management, regenerative agriculture) and community based distribution and ownership models (from CSAs to shareholder farming and beyond) to build up ecological and society-based adaptation resources and emphasize the intersecting benefits of sustainable and regenerative practices in building up "natural resilience." Oake* is one of them. She sees practices that aim at soil restoration as helpful in increasing their farm resiliency as well:

> As we begin to manage for risks, we really try to take into account people, land the community, profit, ecosystem. So it builds off your values but in the ecosystem perspective and with focus on extremes.

These strategies are primarily grounded in traditional, sustainable and regenerative agricultural practices and focus on soil health, and ecosystem health in general, and in adapting seek to adjust primarily agricultural practices for their impact on these systems. For example, Oake* seeks to limit their herd sizes to allow for regenerative grazing:

> The key is to manage how many cattle we have, we always need to have too much grass. So we have really always a ton of grass. If we go into a drought after next week, we are absolutely fine.

[110] Extending what has been said before on the co-production of knowledge, social order and technology. The politics of extension — that at this point should be revealed as inherent to adaptation — make the underlying regimes in which adaptation unfolds the more important, as long as adaptation does not explicitly become a means for system change instead of preservation (Bassett & Fogelman, 2013; Pelling, 2011). Alternative forms of agriculture are often formulated in the contesting of established political agricultural regimes (Henderson & Van En, n.d.; Kimmerer, 2013; Lindenmayer, Cunningham, & Young, 2012; Wells et al., 1999). In turn this holds an important promise for adaptation thought differently: as it perhaps holds the potentials for facilitating structural change and has revolutionary capacities (Young, 2001). However, for this to become possible, relating to Young's activist challenges, a different kind of adaptation that is inherently political becomes necessary (Eriksen et al., 2015).

> […] We set up our farm in consequence in a way that it strongly limits the number of cattle in order to be self-sufficient and regenerate it. It keeps the money we can make down, but we keep the cost way more down too, so it balances it out substantially.

Further by incorporating practices that support soil health, build up hummus and enable the land to better absorb water in case of extreme precipitation, store it times of drought and maintain cover to prevent erosion. Farmers point to key advantages in terms of mitigating climate pressures and built-into-systems resiliency in such approaches that are standard-practice amongst sustainable farmers, as one organic farmer explains:

> We have a whole raised bed system and that has been really helpful. A lot of people couldn't get in because it was too wet, but we could dry out in a day, and we still compacted the paths, but we could get in.

Moreover, Oake* describes the advantages in dealing with extreme precipitation and drought:

> So that is where the mob grazing comes from, and resting the land, and there is a lot more into it, but I brought that home: we are overgrazing the land and that is causing all our problems. If we change the ways we graze the land will be better handle all those extremes, it will absorb the water, it can handle drought, it builds up all the organic matter in the soil, the microbes, and we are like okay. […] We now, if we put a plow in the land, we know it is doing a good thing to the land.

The main method for organic farmers to adapt to climate change is also found in the extension of practices already established on farms, and their reinforcement for their benefits. Yet, sustainable practices fundamentally differ from those in conventional agriculture in that they situate and constitute risks in an ecosystem perspective.

This is a fundamental difference in how sustainable farmers adapt to climate change, what they are adapting to in doing so, and to what ends. Regenerative farmers describe risks constituted in agricultural practices in a two-fold manner: by depleting ecosystem services that mitigate risks and by driving climate change as a main CO2 emitter and polluter. "And in general, it is just depleting and destroying the very foundations of what you rely on as a farmer", one of the interviewees explains. Consequentially the aim of adaptation — and of sustainable forms of agriculture in general — is to "maintain the environment" or even to rebuild lost ecosystem services through regeneration, "really the attempt to build things up, to build soil up, to restore the ecosystems that we depend on."

Incorporated is a critical reflection of “system-effects” of industrial agriculture and the attempt to resist market interdependencies and pressures. Many of the farmers I interviewed thereby centrally problematize existing market interdependencies as root cause for the current crisis, especially critically examining extractive practices in industrial agriculture as “devastating to ecology, communities and farms”, as Oake* puts it. It would be in this context that “regenerative farming, and sustainable farming in general really is this idea of doing things differently.” As another farmer in the region puts it:

> I can see how a farmer says, I cannot afford that, because I have to sell my product to the big retailers […] and I only get so much for it, and that is a double bind. And, I mean, it cannot be that those retailers control everything and underneath that all that is possible are exploitive conditions.

It is in this context, and the lack of larger policy support, that sustainability transitions largely unfold *against* existing political regimes and are engaged in the explicit resistance of existing political-economic power structures.

Organic agriculture in Madison County faces similar tendencies of erosion through economic coupling and increased pressures. At the same time, interviewees point to additional structural undermining of the central advantages associated with organic agriculture: the leveraging of ecological interdependencies to limit climate impacts and other ecological degradations. Particularly, interviewees make explicit the stronger exposure to market interdependencies in an eroding local economy and ecology as well as vastly different consumer valuing and behavior. Organic production in the US, while growing (USDA, 2019) is still far from the Austrian market share: In 2014 only about 14 thousand farms were in organic production (Office of the NYS Comptroller, 2016) with a modest decline from 2008 numbers. According to the 2016 organic survey of the USDA about 1.000 farms (out of 35.000 in total) were certified organic in 2016 (USDA, 2017). That is 3% compared to the 23.9% of all agricultural area in Austria and 20.4% of all farms (BioAustria, n.d.; BMNT, 2019).

This means that many farmers that push for sustainability transitions also explicitly seek to decouple food production from dominating market structures and try to establish alternative systems of food distribution along with their production. Recognizing the structural limits of market-organized organic agriculture — a small but growing number of producers in New York seek to explore new production avenues to decouple agricultural production more explicitly from globalized market interdependencies in order to enable a center-staging and prioritizing of ecological care — particularly in the context of the

climate crisis. A set of new farming approaches (such as permaculture, holistic management, regenerative agriculture) and alternative market approaches (CSA, shareholder farming, cooperatives) experiment with alternative models that allow for a more explicit prioritizing of ecological care principles in rejection of increasingly high economic pressures:

> A lot of, you know young folks come in and start new and really try to do things differently, try to do these models where you build up the ecosystem through agriculture instead of the other way around. And it is really young folk that don't have that burden of the past and can risk it that are able to do that, because they can afford to fail and can give priorities to the environment instead of the market.[111]

Farmers explore new models that develop bottom-up to rethink farm economies and food distribution in a focus on sustainability and regeneration, social justice and equity — and theregby challenge dominating imaginaries of agriculture.

Regenerative and ecosystem-focused approaches seek to limit economic pressures not only on farmers themselves, but in a holistic and ecological rethinking of the food system. What these approaches share is the attempt to limit economic pressures in prioritizing ecological interdependencies and environmental restoration and regeneration. These dynamics of resistance are wide spread, particularly in unleashed large-scale agricultural production systems, and have been recently well-explored in the literature (Barker, 2007; Henderson & Van En, n.d.; Penniman, 2018).

And this in consequence would have important effects on how communities adapt, their resiliency and the ways they do so in the larger context of industrialization and globalization:

> We really are trying to explore different systems. We primarily are a CSA … Market, retail is much less dependable, CSA is much more secure and more rewarding because you are building relationships.

The farmer explains that CSA models allow to integrate agriculture in the local communities and create larger interdependencies that allow to bypass market interdependencies and insecurities while building a re-valuing of food products. Thereby, interviewees make explicit an opposition to large scale/globalized market systems in opposition to dominating power structures in the U.S.:

[111] Paraphrased from interview notes

> Wholesale is different. We would need to specialize in a couple of crops, buy additional machines to make it more economical. We would have to make it efficient enough to make it economical to sale wholesale, you need to figure out how to make it more efficient, so you have certain machines to make the harvesting and the storage an really develop markets for that thing, which is hard and then you are dependent on them and exposed: They can change their mind, it is risky, you put all your eggs in one basket. I have always been in CSA otherwise you'd have to be more efficient and have fewer crops and make all those concessions we are not prepared to make.

Interviewed farmers describe experiments with distribution approaches to enhance ecologies and communities of agriculture as an fundamental, self-reflexive rethinking of agriculture:

> It is to really rethink about how we grow things, and how we are in the environment.

5.5. Conclusions

The imaginary of U.S. agriculture perpetuates a bind for farmers that holds in place an extractive production regime — extractive to ecologies, rural communities as well as the individual family farmers that inhabit it. At the same time, the complacency of New York's adaptation policy to explicitly consider and systematically rethink an (also economically) unsustainable agricultural production system only perpetuates the persistence of the system as "status quo." By implication, it continues a precarious and often irreconcilable situation. Farmers explain how also adaptation facilitates in this way the continued erosion and depletion of ecological systems and only further drives the climate crisis.

Claims of "Neutrality" towards how food is produced are deliberate political acts of non-decisions (Lukes, 1974) while farmers are ultimately put into a bind that makes them act against their own long-term interest — acting in specific production regimes coupled and reinforced by an imaginary of agriculture that corresponds with a) how food is produced locally and contradictions are resolved in individualized ways; b) how ag policy is organized, c) how adaptation policy is organized.

In many ways, distinct differences in adaptation emerge between conventional and sustainable and regenerative farmers in Madison County. An intensification of extractive food production practices to cope with worsening growth conditions due to climate change is juxtaposed with an adaptation approach that emphasizes an "agriculture as partnership with nature" that couples farming viabilities with the health and flourishing of ecosystems and surrounding rural communities.

However, strong similarities emerge in the undercurrents that shape adaptation for both conventional and sustainable farming. Adaptation manifests within the socio-cultural, political and material orders of the agricultural production regimes in which it unfolds. The organization of agricultural systems, including the distribution of power across different actors, directly shape adaptation in its ends, means and in what it is responding to. As such, adaptations become a materialization of the order of agricultural production regimes and their larger societal, cultural, political and national contexts. This means that also New York's adjustment adaptation policy is deeply implicated in decisions about agricultural production regimes, their embedded structures of power, and the injustices they produce. It does so not despite, but because it defers decisions about food production regimes in a claim of "neutrality".

As extensions of existing farming practices and philosophies, adaptation emerges from and reflective of larger orders of agricultural production as socio-ecological systems, and the distribution of power within them. New York's adjustment adaptation policy unfolds in a politics of large scale agriculture and a consequence of its "neutrality" and indifference regarding how food is being produced.

Adaptation policy in New York State is localized as non-decisions about how food is produced and to what consequence. Problematizing the impacts of natural hazards converge with the prioritizing of economic output of the food system. This converges with a larger imaginary of agriculture that emphasizes large scale production systems. It is in this context that non-decisions emerge as highly political decisions themselves. The historically idealized imaginary of the family farmer as the backbone and epitome of Americana, while routinely invoked, is increasingly disappearing in the globalization and industrialization of agriculture.

The consequences are significant, extending extractive practices through adaptation that are poised to only exacerbate climate risks through the loss of biodiversity, natural resources for adaptation and resilience, and impacts on larger rural communities that are continuously described as devastating by interviewees for this research and in the scientific literature alike. Sustainability transitions in agriculture therefore emerge primarily from the bottom up. U.S. policy support is strongly limited, and adaptation policy does not incorporate any decisions that would support on-the ground transitions.

It is in this context that adaptation localizing is explicitly engaged in the governance of local orders and power structures of food producing systems — as non-decisions about modes of food production and

the simultaneous emphasis on maintaining economic productivity in a changing climate lead to the extension of multi-dimensionally extractive agricultural system. Ultimately, adjustment adaptation and its localizing in the current orders of food production bear significant potential to exacerbate climate risks by extending industrial agricultural systems. The current crisis and adaptation itself become mutually reinforcing in this context — increasing pressures to automate and industrialize farms to survive in escalating, globalizing markets.

What is more — it has highly problematic democratic implications. All but neutral, the deference of decisions to within the modern agricultural industry is a political act, committing to preserve the status quo. But it precludes a democratic-deliberative decision making, and more explicitly: forecloses it. As adaptation decisions are deliberated, decisions about the orders of agriculture and their potential change are explicitly foreclosed and kept off the agenda as non-issues.

However, hope persists as alternatives become tangible. A growing agricultural movement recovers farming practices that rethink food production, placing it into communal ownership and decision making, and situating it within larger ecologies that it not only depends on, but is part of, and only can thrive together with, not off of.

6. ADAPTING PRISTINE LANDSCAPES IN AUSTRIA

Chapter six provides a discussion of how reformist governance interacts with local orders. I argue that reformist adaptation reflects a larger sociotechnical imaginary of small-scale, pristine Austrian agriculture and is deployed in ways that reassert the embedded political, social, moral and cultural orders associated with that imaginary. This relativizes the reformist claims of Austrian adaptation policy, showing how, in the light of an imaginary of the "pristine", adaptation is deployed to reassert dominating political orders of Austrian agriculture.

6.1. Introduction

In Chapter 5 I discussed how adjustment adaptation interacts with local orders. I examined major contradictions that emerge from agricultural production regimes and their implication in the production of climate risks. I discussed how a sociotechnical imaginary of U.S. agriculture and adaptation work towards resolving these contradictions, while simultaneously them holding in place. Particularly, the imaginary of "family farming feeding America and the world" would simultaneously drive innovation-centered adaptation approaches and individualize experiences of climate risks.

In this chapter, I argue that a more community- and culture-centric imaginary of agriculture problematizes (rather than supports) industrial production regimes in agriculture as "external" threats that "pollute" Austrian national agriculture, landscapes and cultural identities of the rural. A valuing of agricultural landscapes as "pristine", and in situating farmers as custodians of these landscapes, allows to stabilize a historically small-scale agricultural sector that is tightly coupled with its surrounding social communities. However, this romanization of the agricultural landscape as "pristine" also forecloses the problematization of aspects of Austrian agriculture that do not "fit" this imaginary.

This makes explicit how adaptation in the Unteres Traisental, although focused on sustainability transitions, is deployed similar to the New York case as a means to maintain the existing structures of power in Austrian agriculture. Situating adaptation localizing in larger national agriculture policy commitments and the local orders of food production, I then argue that adaptation localizing draws on a

specific technoscientific imaginary that reinstates existing political power structures in agriculture, and to what consequence.

I make this argument by following the structure of Chapter 5: I first (**section 2**) discuss the experiences of local farmers in the Unteres Traisental with escalating climate conditions, and show how in the case of the Unteres Traisental farmers make direct and explicit connections between industrial modes of production and the (co-)production of climate risks. I then discuss (**section 3**) how a specific sociotechnical imaginary of the pristine shapes these problematizations and the corresponding adaptations by positioning farmers as "custodians" of "pristine" landscapes. This allows farmers to reconcile contradictions between agriculture, its impacts on ecosystems and climate change, and the need to adapt to escalating climate disruptions. **Section 4** begins by explaining how this corresponds with larger agricultural policy and how adaptation policy itself is connected to and reinforces this overarching imaginary. It then discusses how policy and imaginary produce an externalization of industrial agriculture as "polluter" of "Austrian" agriculture, while rendering invisible the extractive patters of Austrian agriculture as "internal pollutions", and how this is reconciled in local practice.

6.2. Problematizing Climate Risks on Austrian Farms

This section details the experiences of local farmers, as they adapt to climate escalations, and how this manifests contradictions with the agricultural production regimes they are part of.

There are substantive parallels between how conventional farmers in the Unteres Traisental region and in Madison County problematize climate change. During interviews, farmers routinely downplay the impacts of climate change on e.g. their personal health, on their farm's ecologies and on their relationships to land, plants and animals. Instead, climate impacts figure for the Austrian farmers primarily for how they affect their ability to produce. Impacts thereby concern the timing of growth, seasonal patterns and yield alike and reflect associated growing uncertainties that destabilize the farming system:

> It all is happening so much earlier, the start of the season. You have to be at it in the beginning, you have to make use of the winter moisture, until April, May, June. The fruit has to grow enough until then, so it can cope with the summer drought that we get now. The whole seasonal timing — it all changed.

The problematizations during interviews with conventional farmers mostly reflect what has been described for Madison County: increased weather uncertainties, and the escalation of extremes in particular as external hazards constitute risks to the economic viability of farming operations due to quality and quantity losses — to the extent of entire yield losses. As one conventional farmer in Austria explains:

> I don't know about prolonged growth seasons. It maybe gets warmer in average, but what you don't know is the timing of the extremes. I mean, yes you plant earlier, but you still have that late frost, and that gets really problematic when we have the plants out so much earlier.[112]

The occurrence of extremes and unpredictability of seasonal patterns become a central concern for farmers, for example the timing of rainfalls and the associated availability of water, as one farmer explains:

> The rain periods that we had, it wasn't that extreme in a long, long time. And now the droughts, they are becoming now normal, where we always had to worry about excess water.

(Importantly, the farmers I spoke to all articulate the abrupt shift and emergence of drought as a new problem in a region that was primarily impacted by excess water).

And similar to Madison County, interviewed farmers associate the climate impacts with the structural conditions of food production, problematizing a discrepancy and disconnect between climate conditions and highly standardized production regimes. The farmers in the Unteres Traisental region thereby also explain how climate disruptions and seasonal instabilities make it "harder to grow", as habitualized and traditionalized farming practices become invalidated in new weather, seasonal and climate patterns. However, despite these similarities, interviewed farmers in the Unteres Traisental region routinely connect these climate escalations and their impacts more explicitly with the organization and structure of agricultural production, increasingly problematizing these production regimes themselves for the unsustainability in a changing climate. Importantly, conventional farmers note that highly standardized work processes as a precondition for modern, conventional farms becomes increasingly challenged and called into question. As one conventional farmer in Austria explains:

[112] Paraphrased from notes

> Climate change that is something that changes and that is a challenge for large scale agricultural systems, because the optimized processes don't work out the way you'd want them to and then you get a cascade of problems.

6.2.1. First Contradictions Emerge: Problematizing Agricultural Production Regimes

It is in this context that conventional as well as organic farmers in Austria articulate similar tensions that emerge from climate change, describing climate disruptions as direct challenges to modern agricultural systems that demand adaptations of these systems. Farmers explicitly problematize climate change and agriculture in terms of growing discrepancies — on the plant system level, the level of the individual farm, as well as on the level of larger agricultural system:

One farmer explains how modern farming relies on stable system on the plant level where:

> When everything is normal, you have enough water in the plant and it transports the chemicals around … but then you have ten weeks no rain and everything collapses and you want the plant to grow, or produce fruit and transport your chemicals, but the plant is in extreme survival mode not in normal growth mode, so it stops growing, and tries to survive.

Which would lead to discrepancies between what the farmer wants and what the plant wants and therefore impact the larger farm system of which both, farmer and plant are a part of:

> That's completely against what the farmer wants and so you try [to normalize/stabilize] it, by irrigating, putting more resources in, just to keep the same outcome.

And another farmer explains in strikingly similar words during an interview how this constitutes a major challenge for the validity of the conventional agricultural production model:

> That's climate change now. That what the plants want and what the farmers want drifts more and more apart. And in that moment, conventional farming does not work anymore, not in quantity and not in quality.

A challenge that extends also to the larger system level of modern agricultural food production and distribution systems. The interviewee discusses interdependencies between retailers, providers and suppliers and the producers. These would create a system that revolves around highly standardized and timed processes that in disrupted climate conditions would not work in the smooth ways required to operate on a globalized industrial market scale.

One of the interviewees, a conventional farmer that begins transitioning into sustainable practices, explains his motivation for this shift in his operation as climate disruptions began to significantly impact his farm:

> I was in a state of static comfort. If it runs in stable ways, there are not really any problems. But now, as everything gets instable you get a headache, that's a huge challenge because you just can't do what it needs you to do, and all the risk is on us farmers. And so, I see — and many others see that too now — see that doesn't work the way it used to, and we all always could rely on it, we all made a lot of profit with it, but now it doesn't anymore. And so, we try to minimize the costs and the labor, try to optimize, minimize the expenses, especially with labor, to maximize what we can get out from the land and soil. And that's good, you need to optimize, but the whole system can't cope, because it only can optimize when everything runs in these standard-ways that we don't have anymore.

6.2.2. Limits of Techno-Scientific Adaptions in the Unteres Traisental Region

It is in this context that many conventional farmers (different to the Madison County case) see explicit limits in techno-scientific adaptations to their farming practices. Certainly, these solutions play a major role also on Austrian farms. In Chapter 4 I discussed how a group of farmers in the Unteres Traisental region pushes for the creation of irrigation infrastructure to cope with increasingly problematic drought conditions, and to maintain their farms productivity. Such technological solutions play an important role in climate adaptation also in Austria. Increasing needs for irrigation, pesticide and fertilizer use, as well as some limited forms of sheltered farming practices (such as tunnels) can also be observed across Austria and on the various farms I visited during this research.

However, all farmers that I have interviewed over the course of the two years I spent in the region also explicitly articulate strict limits to these solutions that require more structural shifts in how food is produced. Interviewed conventional farmers increasingly begin to problematize the limitations of such solutions to maintaining the stability of industrial modes of production. One interviewee explains how these solutions presuppose a certain size of farming operation, and therefore would not make sense on the average-sized farm in the region:

> The calculations of the companies, the retailers or the seed providers, with their experiments. That you can't do as a normal consumer [meaning, as a small to mid-size farming operation,

> rather than a large industrial scale agricultural producer]: You would need such large amounts of chemicals, of fertilizer in order to maintain quotas. Of course, there are areas where there is so much rain that it kinda works out also for the smaller ones, but not for us.

Austrian agriculture is small in scale and highly diversified, which means that many of the agricultural practices that are tied to scale in industrial agriculture — and with that the tendencies towards large-scale agriculture, as described previously — are not as readily available here. This is due to the structural and topographical conditions converging with an explicit policy approach to limitation. Another farmer calculates the cost of industrial adaptations:

> What changed is the automatization, and then you get the market price collapse, that goes hand in hand and feeds into another. With all that machinery all of that is no problem anymore — in theory [as long as one has the resources to acquire them, as the interviewee explains later, reiterating the inherent dynamics of consolidation]. You can do hundreds of hectares with those, and at the same time you break the neck of the small ones that cannot keep pace. And then you get the drought, and all that. The experts do all those calculations, tell you 'eight or ten tons times €180 per ton'. But you only get 4 tons and you get €150, how would you survive if you are not a giant producer [where you can compensate it with scale]? You pay social insurance and then you are done, and you are not left with anything to invest, [and you loose even more ground to the large producers]. That all does not work out anymore.

Industrialization and consolidation are certainly well-underway also in Austria. However, due to these limitations, conventional farmers begin to increasingly incorporate non-conventional approaches into their overall conventional farming operation.

6.3. Imaginaries of Landscapes of (Agri-)Culture

This section details a specific sociotechnical imaginary of "Austrian" agriculture and how it is mobilized to address and situate emergent contradictions between agriculture, adaptation and climate change.

The problematization of industrialized agriculture as well as the limits that farmers identify in this context for techno-scientific adaptation solutions are connected to the specific cultural and structural orders of small-scale Austrian agriculture. Agriculture in the Unteres Traisental, as for most parts of Austria, is traditionally small in scale and highly diversified. Vintners are playing a particularly important role in the region, and importantly shape the regional identity, but the agricultural sector in the region remains diverse. This is embedded in a larger sociotechnical imaginary of agriculture as the cultivator and

custodian of pristine agricultural landscapes that are directly connected to the cultural identities of rural communities.

6.3.1. Imaginaries of Cultural Identity and Agriculture

The small-scale character of agricultural production in the region — and in Austria in general — is associated with close ties to the surrounding communities.[113] Cultural life and regional identities are closely tied to farming and farming histories. Local life unfolds in regional festivals that are tied to agricultural farmers, and the vintage is a fixture in the yearly cultural calendar. Close bonds between farms and surrounding communities are reflected in cultural traditions, seasonal and traditionalized practices and the organization of local social life. The "Heuriger" remains a central cultural and culinary institution and central element of cultural life: more than "just" an eatery, it is a cornerstone of cultural life, meeting spot, and a place where cultural traditions are celebrated. This constitutes close ties between agriculture and cultural identity in a region that is centrally shaped by growing food and wine that are not found to this extent in Madison County.

The importance of these ties is deeply embedded in the cultural understanding of the region. Karl*, a local farmer, explains the ties, as mutual support:

> Everybody knows each other and so it really becomes something where we support the communities and the communities support us — and at the same time we really can grow a local identity.

What Karl* speaks to is a culturally embedded understanding of Austrian agriculture that is constituted in the tight coupling of social life, cultural identity and agriculture. A specific sociotechnical

[113] Different constructions of relating to nature become explicit as informing adaptation and its localizing. Throughout this chapter I will argue that Austria relates to agricultural landscapes as constitutive to their culture, fostering a conservational stance towards these landscapes. However, these relationships are still embedded in an idea bout nature as resource, although one that transcends economic terms. This shapes importantly how society is placed within and towards nature. This relates to key literatures in STS discussing how imaginaries of nature and society in nature are coupled with specific ethical commitments and shape social orders (Adger, Quinn, Lorenzoni, Murphy, & Sweeney, 2013; Blaike, 1994; de la Bellacasa, 2010; Jasanoff, 2011a; Nash, 1989; Stehr, 2001). A whole additional body of literature further problematizes the extractive relationships to nature and its relationships to colonialism, the colonialist extraction of indigenous knowledges about relating to nature and earth, and the ways in which valuing and devaluing of nature in conservational agriculture reproduced colonial-capitalist extractive cultures — literatures that are highly relevant in this context and especially in the context of land use land ownership, property and agriculture in the U.S. context (Dei, Hall, & Rosenberg, 2000; Glasson, 2010).

imaginary emerges, that situates small-scale and diversified Austria, as a critical aspect of rural and larger Austrian identity.

Agriculture is seen in this coupling as constitutive to the viability of the rural: farming and social life are not, as in the US, decoupled — also materially: Many farms are located directly in the villages, with fields surrounding them. Local institutions and agriculture are seen as flourishing together, with local grocery stores selling local products and farms being important social gathering places and hosting cultural events around their products.

The agricultural landscape itself is valued for its importance to community and identity, attracting tourists and serving as important recreational spaces.[114]

> While agriculture in North America is considered an industry, and nobody would normally think of leisurely strolling through wheat fields, the Austrian relation to the countryside, for example, is more 'romantic'. Considerable parts of the Austrian landscape do not render themselves to large-scale industrial farming, and there are still many family farms. Austrian and foreign tourists spend their holidays in rural areas and consider them to be "natural" even if cultivated and to be kept in the interest of country life and an intact landscape. Applying only commercial considerations to agriculture is a mistake to many, although some may also think of revenues from tourism. Consequently, there was always support both from national governments and the European Commission, despite high costs, for agricultural areas that would not match sheer productivity goals but were considered societal and environmental assets (Torgersen, 2002, p. 179).

Indeed, 92% of farms in Lower Austria are family owned and run. About half of them are the main income source (BMNT, 2019). Whereas agricultural production itself is still an important income source, farming is increasingly becoming an important driver of regional tourism economies and therefore an important aspect in the prosperity of rural communities in the region, and in Austria as a whole. This is also the case for the Unteres Traisental region, where regional agriculture — and especially vintner — are a constitutional element of a growing regional tourism sector that importantly strengthens regional rural structures and infrastructures (Handlechner, 2010; Pevetz, 1991; Schneidhofer, 2008).

[114] This underscores how agriculture and its effects on ecology and ecosystems is dependent on how it is done, not how much it needs to produce. An agriculture that can become an important enrichment for ecologies and biodiversity has been practiced for centuries by indigenous peoples across the world. These knowledges are being increasingly "recovered" in colonial appropriations of these knowledges that simultaneously discount indigenous expertise and knowledge in an emphasis of western knowledge-structures of science (Kimmerer, 2013)

These connections become incorporated into the prioritizing of rural space as cultural landscapes.[115] The association of landscape and culture becomes explicit in the Unteres Traisental region. Historically embedded in the region's identity, the landscape of wine growing in particular — with its terraces and the famed "Weingassen" — becomes constitutive to local cultural identity. The allies of wine cellars are a center of cultural life in the region. A local vintner explains:

> We have this cultural identity around our specialized agricultural products, especially with the vintners. The whole region identifies around that and it really became also a motor for the communities, tourism, with events, with just what it means to live here and people come here because they are looking for that.

It is in this context that an imaginary of agriculture couples food producers, rural communities, landscapes and ecologies — and re-figures globalization and industrialization as "polluting" Austrian (rural-agricultural) identity and a threat to Austrian nature as cultural territory.

6.3.2. Contradictions Between Industrialization and Cultural Identity

During interviews, farmers problematize agricultural globalization and industrialization as threats to not only the viability of agriculture in Austria, but also for its impacts on the surrounding rural communities and regional cultural identities, as Karl* explains:

> What maintains us [and the entire region] is the individual character of our diversified agriculture. And now everything is geared towards eliminating this individuality: Everything is becoming bigger, bigger, bigger, automated. Many quit, it's sold. Consolidation. In the long run, you see this creeping structural change that eradicates this individuality.

Karl* describes this character as the lifeblood of the region, constituting its original culture and the cultural landscapes that maintain regional life. Without it, Karl* explains, ripple effects fundamentally change local society: The elimination of local markets, cultural institutions, and regional shops. The consequences would be a 'death spiral', where supermarkets sell agricultural products at "dumping prices."[116]

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[115] Some of these cultural landscapes (for example the Wachau, which neighbors the Traisental region) were declared UNESCO world cultural heritage sites, underscoring the importance of the close connections of agriculture, landscape and rural live.

[116] The politics of extractive, colonialist agriculture become revealed in their mitigated iterations in Austria. The emphasis of cultural lands is connected to the importance of rural institutions, cultural practices, and rural society and its prosperity on the one hand, agricultural practice on the other, as well as the topographical, cultural and ecological

This marks a significant difference to the imaginaries of highly individualized family farming in the U.S. context: Communitarian farming practices — agriculture is seen as embedded in and an integral part of rural community, instead of existing besides it — are deeply valued and understood as foundational aspect of Austrian agriculture. This directly relates to why, and how, farmers problematize industrial agricultural practices in regard to and beyond climate change.

In this vein, many interviewees describe the threats posed to grown traditions surrounding agriculture and rural life. Historically, cultural traditions revolved around the farm calendar, especially the harvest. However, changing demands of labor and the erosion of ties to local communities — described as "sleeping communities", where people commute to work and only return to their homes to sleep — would undermine the resilience of local farming. The eroding participation of wider local publics in farm harvest in particular is seen as a major loss for farmers and a reflection of larger-scale transformation of rural life.

> I mean, we don't have that as much anymore, but we still have the neighbors that come and help out. And we have those close connections. I mean everybody lives in the same town and we all know each other. And back in the day the whole town came together. When we need a new wine press, everyone came and build that together, it was a big deal, we have that less so today, but we try to revive it with new initiatives and it really helps.[117]

Still, these cultural traditions extend into the present. Today they increasingly also attract visitors from beyond the region. This makes them worth preserving and protecting for local farmers as well as according to policy commitments. While local communities participate less and less in on-farm tasks, close relationships with farms still exist, and volunteers continue to help out in harvesting tasks, especially in the vintage, which is still a major cultural event in the region. Similarly, many interviewees describe a loss of the social institutions that would be formative to the close-knit agricultural structures. Karl* warns of the emergence of sleeping ghost towns:

> You lose the local infrastructure. The local culinary scene suffers as well, the local shops suffer. Everything begins to close down. And people start to shop once a week instead of buying regionally and organically. And everything has to become cheap and convenient. That escalates

landscapes that emerge out of it (Barker, 2007; Cone & Myhre, 2000; Gowda et al., 2018; Jackson, Pascual, & Hodgkin, 2007; Schermer, 2015).

[117] Paraphrased from interview notes

> it further. People start to commute, and they only come here to sleep but the life center is the workplace and the supermarket. That's the fear.

It is in this context that interviewees criticize industrialization and globalization for its effects, not only directly on agriculture, but on rural life in general. This underscores the deep-running imaginary of agriculture as culturally foundational.

The close ties of farming and rural life expose tightly coupled threats, undermining the socio-cultural fabrics of farming and rural life together. Accordingly, many interviewees (farmers as well as public officials) express concerns over a devaluing of the interdependencies between social life in the rural and food production — and stress the threats of commodification. One farmer explains:

> [In a globalized agricultural economy] our products are not valued adequately. It doesn't incorporate that we create regional jobs, that we create value for the land and people, that we create supply security, or that we work in a way that maintains a landscape that is livable and not monocultural wastelands.

These problematizations make explicit a closely coupled relationship between farming and the fabrics of social life, where the impacts on the one radiate into the other. Farmers describe transitions across rural communities as significantly impacting farms, particularly in terms of labor or fair pricing of products — accelerating price and market pressures. On the other hand, farming has significant importance to local cultural life and the organization of rural communities: local farming is a significant engine for local tourism economies, seen as cultivating local landscapes, and supplying critical local institutions that can counteract the "desertion" of rural town centers, maintain regional grocery stores and fuel cultural life, as a local mayor explains:

> I cannot overstate the importance of these connections between landscape, farmers and our communities.

It is in these tendencies that a broad resistance to agricultural consolidations, globalization and industrialization emerges from a specific imaginary of Austria agriculture as connected to land, people and cultural identities: An explicit rejection of certain forms of agriculture emerge, as they are considered a threat to local cultural identity, rural fabric of life, and the viability of a "specifically Austrian" structure of agriculture.

6.3.3. How the Imaginary Shapes Adaptation

At play is an imaginary that ontologically links ecosystems, landscapes, cultural identity and agriculture. In this context, climate change is also problematized for its impacts on ontologically coupled land, people and agriculture. Thereby farmers discuss transformational tendencies associated with globalization and structural change in the rural. They particularly problematize their impact on the resilience of local rural communities overall, and agriculture as an elementary part of rural society and farming landscapes.

Increasingly, globalization and industrialization become a major object of concern and subject that importantly shapes the problematization of climate change and adaptation as well.

Local farmers adapt in the context of making connections between agriculture, rural life and cultural landscape as tightly coupled relationships.[118] The specific "Austrian character" of small-scale diversified agriculture and its close ties to local communities and regional identity are valued for their importance for farming resilience, while structural transitions — particularly industrialization and globalization — are problematized as negatively impacting the cohesion of rural life and the cultural landscapes as its ecological-social base.

Farmers explicitly emphasize the importance of diversified agriculture for adaptation successes. The same characteristics of Austrian agriculture that are valued for their crucial role in rural life in general (and in distinction to globalizing dynamics of industrial agriculture) are consistently described in interviews as critical assets in adapting. Karl* explains how diversified, small scale agriculture would be more resilient to climate pressures:

> It is really the diversity that helps us. I have it relatively easy when hail shoots out some of my salad. Because I have planted three before and three after, and in the middle, I lose one patch. But I can bridge that because of the local structures, and because I don't have a massive monoculture where I lose everything at once. Just last year, I lost my entire salad because of the heat, that was tragic, but it did not break my neck because I have a broad setup.

[118] See discussions about the Anthropocene and its cascading effects, the coupling of disasters and crisis and their governance (Chakrabarty, 2012; Crutzen, 2002; Haraway, 2016; Nigel, 2014).

Hubert*, in a similar emphasis of diversity and resilience through connections with land and people, emphasizes how the small structures of agriculture allow for a strong coupling with surrounding communities, which in turn helps them weather key stresses:

> It offers us this local resilience, where we have the community support. And it creates flexibility, when I directly sell locally, I have more freedoms, can make more choices and have less pressures from the retailers and the market. And there is a certain holding-together [or solidarity]. We bring our customers as much on our farm as possible, and they learn and understand, and then it's okay if there is a pest, or if they cannot get a certain product [because we lost it to hail or drought] and they understand better to buy what is available.

This makes explicit multiple dimensions in which localized, highly diversified and regional food-production is valued for its increased benefits in resilience, providing a range of flexibilities (from labor to consumer behavior to elevated market pressures) to cope with climate impacts and increase resilience.

In turn, globalization and industrialization dynamics are problematized for their negative impacts on farming resilience, adaptation and community cohesion in the region overall. Hubert*, a conventional farmer, concurs during an interview:

> That's that mistake that many make, that they think the big ones that have all the resources to extract everything by increasing technology and standardize everything have an advantage. When climate change escalates, when it becomes the way it is now, then they just hit their limit. There are things, you can't bend. You can't bend nature. And there I have less problems if I am diversified, and if I pay close attention to my lend and work with it [instead of putting everything into one pot].

And continues:

> For the big ones that is fatal. This is our big asset, that we are smaller, that we have those different structures that give us the flexibility.

In this context, conventional farmers do not only problematize external climate risks as escalating market interdependencies and complicating production, but increasingly see them as co-produced with systematic conditions of industrial agricultural production and its impacts on local farming and community ecosystems. Schauppenlehner et al (2010, p. 663) come to a similar conclusion, explaining:

> The interactions of natural and anthropocene processes created over the course of the last centuries cultural landscapes of high ecological, cultural and aesthetic value. Current developments, such as industrialization of agriculture, climate change and changes in demands

> for agricultural products, shape these landscapes within part negative consequences for landscapes and biodiversity.

"Cultural landscapes" thereby express the connections between cultivation, ecology and biodiversity and social life in the rural. This idea of the cultural landscape has important consequences for how adaptation and climate change are governed in the context of larger processes of the Anthropocene, as Schauppenlehner et al. argue. The governance of agriculture through adaptation is understood as directly coupled to local cultural identities, which in turn are constituted in identity-forming cultural landscapes and ecosystems. Torgesen (2002, p. 179) explains that this is constituted in that "[c]onsiderable parts of the Austrian landscape do not render themselves to large-scale industrial farming." Farmland as cultural landscapes would considered "to be "natural" even if cultivated and to be kept in the interest of country life and an intact landscape" (Torgesen, 2002, p. 179) This constitutes an undercurrent that values land and agriculture beyond "commercial considerations to agriculture" as "a mistake to many":

> Consequently, there was always support both from national governments and the European Commission, despite high costs, for agricultural areas that would not match sheer productivity goals but were considered societal and environmental assets (Torgersen, 2002, p. 179).

6.4. The Politics of the Pristine

This section discusses how sociotechnical imaginary and adaptation policy correspond, how this works to render invisible "polluting" aspects of Austrian agriculture, and how contradictions become reconciled in collaborative-participatory policy processes that invoke that imaginary.

Adaptation policy emerges in the context of this imaginary as the governance of local order in a mode of "keeping out" external-polluting forces (of globalization, extractive industrial practice, and climate change, alike). The prioritization of sustainability transitions converges with an externalization of unwanted, polluting and extractive patterns of agricultural production and rural structures.

It becomes explicit how adaptation does not only engage with climate disruption, but as a reflection of value judgements and prioritizations about the fabrics and constitutions of local rural life. Adaptation policy objectives in the NAS become explicit as prioritizations of agricultural and social orders

as embedded in the ideas of cultural landscapes and consistent with the sociotechnical imaginary of the pristine. As is stated in the NAS:

> **Agriculture —** Ensuring sustainable, resource-conserving and climate-friendly (agricultural) production and maintaining and improving the ecological services of agriculture under changing climatic conditions.

Most notably, its adaptation goals extend to facilitate structural change towards sustainability and ecosystem preservation. The Austrian approach integrates risk management with a projectification[119] of adaptation that works towards a re-design of socio-economic structures. These transitions seek to better the ability of farmers to prioritize ecological concerns while preserving their economic livelihood. As one top-level policy maker explains:

> We don't only prioritize economic interests of the large scale. For us, for example, it is important to enable farmers to attend to the welfare of animals, how to design pastures, to give the space, that would be really important that we are successful with that. Especially the small structure of agriculture, to maintain that, with its diversity instead of large scales and landscapes of monoculture and monotony. There is a different kind of valuing at play, because there is the understanding that the small-structured community provides a different form of resilience, and that is my hope, that we even better support that, that we don't go along with the structural change. Because there is that huge advantage — more flexibility, more diversity, less monetary dependencies, especially on the global market, alternative incomes — tourism, live quality, identification with the ecosystems you inhabit …

The commitment to the Agricultural landscapes as explicit cultural landscapes runs through all scales of governance and is embedded in the social identity of agriculture and a fundamental public identity of the rural landscapes. This is reflected in policy across scales, as for example, in the Lower Austrian rural development policy's principal objectives.[120]

1. Maintenance, restoration and improvement of the functioning of the cultural landscape and the lands' topography, especially incorporating ecological requirements and necessities.

[119] Projectification means the restructuring of activities into projects and associated organizational formats. Mats Fred (2017) details the "projectification" of public administration and policy across Europe. The ways in which the KLAR! program is designed, and adaptation policy becomes localized resembles such project structures. In this context, I use the term to point towards how the re-design of society itself becomes a project and embedded in project-like structures.

[120] Translated from (Landesregierung NÖ, n.d.).

2. The sustaining of crucial preventive and protective responsibilities against natural disaster and erosion of the natural land and living space.
3. Avoidance of an intensification of land use and the associated negative environmental impact; the avoidance of bringing entire landscapes and regions into production, in protection of cultural landscapes against their opening-up and erosion.

Austrian rural agricultural landscapes are considered a commons integrated into a public consciousness as well as policy. Austrian agri-**cultural**-landscapes are considered recreational spaces (Sinabell, 2002) and at the same time — in convergence with agriculture that is grown around rural town centers — is considered constitutive to intact rural social fabric. This is reflected in a commitment in policy, public and civic movements and consciousness that explicitly rejects large scale industrial agriculture as destructive of and disruptive to these essential goods that maintain rural life (cp. Sinabell, 2002), while also characterizing them as "polluting forces" imposed onto Austria from the outside.

This constitutes a different social, geographical, topographical and ecological landscape in Austria that is actively valued in non-economic terms (cp. Sinabell, 2002) and sought to be preserved by minimizing economic pressures that would erode the viability of rural communities, as one farmer explains:

> Here in Austria the subsidy system, we invest relatively high amounts of money to compensate for those pressures.

Austrian agricultural policy is explicitly designed to support small and diversified production and is increasingly expanding the subsidy of ecological and sustainable agriculture in this context. A long history of sustainable agriculture policy paved the way for important transformations, and the mitigating of industrializing tendencies, beginning in the 1970s. Some key aspects of Austrian agriculture regulations do not exist in the NY/US context in a similar scale. An expansive regulatory and self-regulating landscape (grounded in an EU coherence regulation) laid early groundwork for the expansion of ecological agriculture. Austria was one of the first countries globally to regulate biological and sustainable farming on a national scale. European agricultural policy is heavily engaged in the industrialization and global colonialization of markets (cp. Graddy-Lovelace, 2016), and Austrian agricultural policy in many aspects is still favoring acreage and scale, as Greifen et al. (cp. 2003) explain. Yet, as one farmer

articulates in in an interview, things have been changing in support of mitigating industrialization tendencies:

> A lot has changed, but we really have to start fully funding quality and how we produce food, fund sustainable practices, instead of acreage. We do that, but we don't do it enough.

The resistance narrative made Austrian policy importantly emphasize the cultural character of agricultural rural landscapes that constitute measures of protectionism, prioritizing other-than industrial valuing systems. As one top-level adaptation planner in the federal Austrian government explains:

> We have the ELER and ÖPUL — very important elements where we not only… of course there is investment funding and funding purely on acreage, but we really emphasize and center-stage the kind of cultivation, for example sustainable and organic, in our funding decisions, really pay attention to how things are grown and to reward that. The ÖPUL in particular is a success story there. That we there also focus on maintaining cultural landscapes, biodiversity, and that we take that into account in adaptation also in agricultural policy in general, and that would get lost otherwise, if we would not integrate that in larger policy, and the ÖPUL is in particular important, that is a very important pillar in our adaptation strategy, to maintain and support that.[121]

This difference is crucial. It enables to bypass purely economic concerns in support of ecological care not only in adapting, but in agricultural policy in general. This is evidenced in key Austrian policies that seek to support and maintain the agri*cultural* landscape and its ecosystem services, as well as in the Austrian NAS priority objectives for maintaining these agri*cultural* landscapes.

This means that while globalizing tendencies persist in Austria and constitute significant transformation of rural life, these tendencies are mitigated by a political and cultural commitment that promotes sustainability transitions and seeks to preserve small-scale agriculture. The effects become explicit in statistical data: Organic practices are far more widespread in Austria than in most countries globally, and the organic sector is one of the proportionally largest in the

[121] Torgersen (2002) makes explicit how the seemingly "scientifically unsound" lock-out of biotechnologies in agriculture (especially GMO) becomes better understood in these alternative valuing systems: "While agriculture in North America is considered an industry, and nobody would normally think of leisurely strolling through wheat fields, the Austrian relation to the countryside, for example, is more "romantic." Considerable parts of the Austrian landscape do not render themselves to large-scale industrial farming, and there are still many family farms. Austrian and foreign tourists spend their holidays in rural areas and consider them to be "natural" even if cultivated and to be kept in the interest of country life and an intact landscape. Applying only commercial considerations to agriculture is a mistake to many, although some may also think of revenues from tourism. Consequently, there was always support both from national governments and the European Commission, despite high costs, for agricultural areas that would not match sheer productivity goals but were considered societal and environmental assets" (Torgersen, 2002, p. 179).

EU (European Commission, 2016). In %-Share of the fully converted organic area in the UAA in EU Member States, Austria is approximating 20% in 2015, leading amongst EU member-states (European Commission, 2016).

At the same time, Austrian agriculture remains small scale and relatively diversified (cp. BMNT, 2019; Sinabell, Schönhart, & Schmid, 2018).

What emerges is a conventional agricultural sector that is confronted with similar problems to other parts of the world, including Madison County: extractive practices that only escalate and exacerbate climate risks persist also in Austria, and the agricultural sector continues to erode natural resources, adversely impact ecosystems and remains a major emitter of GHG. Yet, the structural conditions in Austria are uniquely different to Madison County and other industrial agricultural systems. This indicates some basic starting points for a more substantive re-structuring of food production that could yield important lessons for a more transformative adaption approach — laying groundwork for a better balancing of ecological care and economic concerns.

6.4.1. External Pollution

Austrian adaptation is shaped by a specific imaginary of small-scale, diversified agriculture and its tight coupling with larger rural society. Explicitly, the valuing of farmland as cultural landscapes implies important prioritizations that establish a rejection of certain elements of globalized-industrial modes of food-production. Adaptation emerges in this context as prioritizing social cohesion, rural development and the preservation of small-scale agriculture by rejecting exclusively commercial considerations. However, it does so only for specific — romanticized — aspects of agriculture and rural identity, while rendering invisible elements of food-production that do not match this “romantic ideal” of agriculture.

The valuing of cultural land imports cultural commitments to small-scale agriculture and its connections to ecology and community. In Austria, ecosystems, landscapes, cultural identity and agriculture are epistemologically inseparably linked. This shapes how risks in the agricultural sector are problematized, extending beyond purely economic considerations and deeply embedded in and mobilizing a larger national-cultural identity of ecological pristineness associated with ideas of resistance to what is constructed as outside, polluting forces. A participant in the workshop developing the regional drought emergency plan (cp. Chapter 4) allures to this as “the promised land” — or literally: land of the blessed.

This is a common way of referring to Austria as integral part of cultural identity. Commonly, Austria is seen as less affected by natural disasters, economic pressures and the forces of globalization (which are seen as generally unwanted) and social, political or environmental instability in the face of globalized power relationships. Felt (2013) discussed how specific identities of "Austria is Free" are ingrained in, reinforced by, and shaping techno-political choices:

> The imaginary of "Austria being free", as I will argue, could thus also be successfully deployed as part of a resistance narrative – in this case against specific technologies – depicting the country as being different and, importantly, as making a difference in Europe despite its small size (Felt, 2013, p. 9).

This resistance narrative of Austria being free extends to adaptation and its localization as involved in the governance of cultural landscapes and its implied socio-ecological connections. Adaptation becomes not only a matter of maintaining agricultural economic productivity, but one of preserving what is considered "pristine", and "uncontaminated." Despite apparent self-reflexive tendencies of Austrian adaptation, this makes explicit a different view: One that sees adaptation as a matter of fending off external-polluting forces impacting the "pristinely" Austrian. Both, climate change and polluting-extractive agricultural practices become something that intrudes Austrian agriculture "from the outside." An alien pollutant to what is seen otherwise pristine.

As Felt (2013) explains, these same ideas played an important role in the governance of GMOs and other technologies and are routinely framed in terms of a resistance narrative to trends of globalization and transformation of locally grown structures and cultures. In their consequence, this re-frames adaptation as the governance of keeping *polluting* and *deteriorating* tendencies out that are explicitly associated with agricultural globalization and industrialization; and their impacts on the *serenity* of (cultivated) ecologies and communities.

It is in this context that the epistemologies of moderated sustainability transitions become re-framed and mobilize a resistance narrative in particular against globalization pressures. This imaginary is commonly mobilized by interviewed farmers, particularly in the context of industrializing and globalizing agricultural structures, which are perceived routinely as threat from the outside — even when these practices are found on an Austrian farm.

This tendency to externalize anything that does not fit the romanticized ideal of Austrian agriculture can be of advantage for facilitating sustainability-transitions. Framing e.g. extractive farming practices as something that "pollutes" the Austrian-ness of "pristine" agriculture, allows unsustainable practices to be problematized as explicitly "un-Austrian" . The imaginary of the "pristine" cultural landscapes fosters sustainability transitions and seeks to strengthen critical social structures of local communities — in response to the effects of climate disruptions and their association with extractive agricultural practices.

However, it also minimizes wide-spread unsustainable and extractive agricultural production regimes in Austria and has the tendency to render invisible anything that does not fit the romanticized ideal of the Austrian farmer-custodian.

6.4.1.1. Sustainability Transitions Through Adaptation

It is in this context that interviewees explain how Austrian conventional farmers begin to re-think on a more substantive scale these negative effects of industrial agriculture, as what Schauppenlehner et al (2010, p. 663) as their involvement in interactions of natural and Anthropocene processes:

> Current developments, such as industrialization of agriculture, climate change and changes in demands for agricultural products, shape these landscapes with in part negative consequences for landscapes and biodiversity.

However, these tendencies are externalized as globalizing- and industrializing-pressures that act upon farmers "from the outside", and similarly externalize the ways in which agricultural production also in Austria is implicated in driving climate change and exacerbating climate risks.

This framing facilitates significant shifts in the ways in which food is produced, as they emerge explicitly through adaptation — not only adaptations to climate change, but adaptation to a global food system that increasingly "pollutes" the imaginary of the pristine Austrian farmer.

Increasingly, conventional farmers begin to speak to what they describe as "substantial advantages" in resilience against these external forces. Sustainable agricultural practices, also promoted through adaptation policy, would allow farmers to sustain the idealized imaginary of farming in Austria by better weathering climate change and the external pressures of globalized agriculture.

Farmers point to a convergence of policy commitments, the (partial/limited) rejection of scale in an attempt to slow (still unfolding) consolidation and larger scale production), the costs burdens of industrial scale methods and technology as adaptation strategies:

> There is a rethinking underway, we re-figure our processes [as the climate crisis escalates]. And all the tillers that we bought; they are just standing around. Nobody needs those anymore. They were used to rip open the ground and that is obsolete now. Because one, it is too wet in the spring anyways and then you have another round of snow in March to May, and then everything tries up and nothing goes. But if you don't till, and you support your soil — then you see really the soil supports you. And we were the idiots in the Lagerhaus (industrial production) system of fuels and iron, had all those heavy machinery…

In this convergence, the visible successes of sustainable farming additionally opens-up new and alternative adaptation processes, as the farmer continues to explain:

> We really see it now with the organic farmers, they know that. They know to conserve the soils and how to work it, how to deal with all the water and all the drought and that becomes really important for us now. And our machinery stands around unused because you don't have the time to use them anyways when everything is so instable and uncertain and constantly in flux. I mean, where we get to be faster and more efficient it helps, but only as far as it helps to react to extremes and doesn't make them worse. And so we learn from the organics to deal with our soils to keep them in a way that we then can go in and use the windows and at the same time don't need to worry so much about how to retain water, irrigate or get it out, because the soils are just there.

Conventional farmers confirm the expansion of agricultural practices explicitly in relationship to the visible successes of organic farmers, especially when they are their neighbors:

> I mean, of course you look over there and you see they have no problems and you begin to think about why that is.

A sustainable farmer explains:

> In general, I would say, climate change is boosting sustainable agriculture, because the pressures increase, and we all have to rethink this system and need innovative methods. That would have not been thinkable 30 years ago, because there was still that iron and fuel thinking. That is now high tech, but also a lot that we forgot and now re-learn. No till — we lost a lot that we recover now and the whole way that industrial systems work, where they constantly sell you things you can do for free with old techniques is at fault there.

This leads to a partial re-thinking of industrial agricultural practices as an alternative pathway for conventional farmers — and the convergence of structural conditions with problematizations of industrial

practice in the context of climate change (also due to public pressures) ultimately allow to better (although still only partially) integrate ecological care into economic concerns.

Many explicitly state that they adapt in the recognition of devastating effects of (conventional-industrial) agriculture on ecosystems on the one hand, its adverse impacts on their livelihood on the other. One farmer explains this as a paradigm shift:

> And now you see, this is […] a paradigm shift, it all begins to change, and they recover old knowledge, and that was not knowledge — that was sensible and sensing and gut feeling, and they relearn that, and folks start to support that also from the state.

Local farmers adapt in the context of these connections between agriculture, rural life and cultural landscape. Adaptation emerges in the partial rejection of globalization trends and instead emphasizes small-scale agriculture and diversified agricultural production practices as an asset to adaptation, consistent with the imaginary of "pristine" farmland cultures. Austrian cultural landscapes in their ecological importance are increasingly problematized as threatened in this context. The same characteristics of Austrian agriculture that are valued for their crucial role in rural life in general (and in distinction to globalizing dynamics of industrial agriculture) are consistently described in interviews as critical assets in adapting. In this context, conventional farmers do not only problematize external climate risks as escalating market interdependencies and complicating production, but increasingly see them as co-produced with systematic conditions of industrial agricultural production.

6.4.1.2. Governing Technological Choices Through Adaptation

Adaptation emerges in this context explicitly as a means to govern socio-technological adaptation decisions, for example, by managing and limiting industrialization tendencies commonly associated with adaptation in a productionist paradigm. Adaptation emerges as the governance as socio-technical choices, and explicitly as the balancing of technological innovations while mitigating its unwanted effects associated with industrialization.

Technological modernization of agriculture is not rejected grosso modo. Mechanization and automatization are key element of adaptation in Austria as well, as one conventional farmer explains:

> The new harvesting machines are extremely important and that showed in 2018. We had that early harvest and it was still hot so you needed to work earlier because you couldn't get out with the labor and volunteers in that heat. And so with the machine and the lights, you can go out all

> night instead of being able to start at 5 or at 6 with your volunteers and labor. And you can do it on your own, mostly.

However, the recognition of anthropogenic climate change, and the problematization of agricultural practices as key drivers of the crisis, appear to facilitate a re-consideration of agricultural responsibilities and a more careful examination of the relationships between modes of production, ecosystem stability and effects on larger rural communities.

All conventional farmers interviewed for this research centrally address not only the escalating resource demands necessary to stabilize an otherwise increasingly disrupted agricultural industrial production system that relies on standardized processes and monocultures. They also problematize the structural demands of technology in this context, explicitly negotiating the politics of adaptation and its effects on their own cultural and social prioritizations in adaptation. Farmers involved in the local push for irrigation repeatedly caution against the potential system-structural and cultural conditions these solutions may reinforce infrastructurally. Karl* is a strong advocate for introducing an irrigation system to the region, yet he also emphasizes that irrigation has a specific use that would need to be built into its design and organization:

> To increase quality, to weather drought, but irrigation to increase quantities — we don't want that, that's counter-productive to what we are.

Karl* thereby cautions that access to irrigation must reflect resource inequalities and urges that considerations on larger social impacts must guide the planning. A recognition becomes explicit that large scale farming exhibits destabilizing tendencies particularly in context of climate change.

These problematizations become associated with a well-established commitment to limited scale explicitly tied to this identity of Austrian agriculture. Adaptation decisions often incorporate such reflections. Many interviewed farmers explicitly problematize the relationships between scale of agricultural production that certain adaptation technologies demand, and its conflicting effects on the local agricultural identities, albeit to varying degrees.

However, Karl* also explicitly articulates that incorporating such considerations is an uphill battle, noting that regional competition could manifest the worst consequences of irrigation. Short-term market advantages would make "many blind", tempting many farmers to advocate for implementation of irrigation

(and other technological) systems that aim at securing and extending agricultural productivity through extractive and unsustainable means.

The cultural prioritization of local small-scale agricultural structures constitutes important structural limitation to such technological interventions and encourage alternative approaches. One farmer explains that the small structures are valued by many higher than the changes that would be necessary to successfully introduce large industrial production techniques:

> Sure, irrigation helps a lot, if you have it. We don't have that for field crop, because that just doesn't make sense on this scale. I mean really, sit down and calculate the costs, and the replacement and all that. It's insane. And those who can irrigate, but for us, what do you want to do? And it gets hot, so it's not only drought and so you just can't do it that way anyways.

Industrial-scale adaptations just "don't make sense" in the context of the dominant imaginary of Austrian agriculture, given the size and organization of individual farms (and the economic value of agri-tourism for the region). The cost of industrial adaptation strategies exceeds the capacities of small scale Austrian agricultural systems, not only economically but also culturally. Hubert* explains:

> The costs are really the problem. A GPS automated system? Or large-scale irrigation? Or those big tractors — that does not make sense for us at all.

Karl* points out that many industrial farming adaptations require monocultural production practices that are explicitly or implicitly rejected by farmers. This would "cost us our culture" and destroy landscapes; costs that many farmers explain they are not willing to bear. Continuous rejections, different valuing of agriculture, its structures and landscapes, and the limits imposed by the organization and structural conditions of food production in Austria therefore shift adaptation choices in a prioritization of cultural landscapes. This would make it easier to resist economic advantages of adaptations that support industrial-scale farming, as Karl* explains that the climate crisis only reinforces these choices.

> For all of this to make sense you need exactly what you don't want: The big monocultures and everything standardized and as big as possible to minimize cost and expand your input. But as you see, in climate change that calculation doesn't work. Instead you get pest, you lose an entire harvest and you make no money on the market.

Instead, while conventional agriculture also relies on the intensification of conventional practices to compensate loss — many of the interviewed conventional farmers in Austria explain that they adapt increasingly by incorporating practices that have been well established in organic agriculture for a long

time, and hence well tested in practical application. Farmers are increasingly problematizing industrial practices in adapting and problematizing climate change and incorporate the effects of adaptations in their thinking. This means that conventional farmers increasingly incorporate agricultural principles focused on ecosystem preservation and the leveraging of natural resource-based adaptations that are understood as better supporting local cultures of agriculture.

6.4.2. Internal Pollution

However, these prioritizations also render invisible those aspects of Austrian food production that do not fit the romanticized ideals of agriculture, and as a consequence render invisible, for example, the conditions of migrant farm labor on farms or the still highly polluting and extractive realities of present-day Austrian agriculture.

The imaginary of the pristine is routinely invoked to position farmers as custodians of what is seen as unpolluted and unchanged nature. However, Austrian agriculture itself is not free of pollution by any measure. Existing agricultural practices in Austria need to be examined for their own polluting effects on social and ecological communities.

For example, Eurostat released in 2020 a new report (European Commission, 2020) that found a significant increase in pesticide application in Austrian agriculture and warned of significant ecological impacts. It states that:

> the highest increase in pesticide sales was recorded in Cyprus (+94%), followed by Austria (+53%), France (+39%) and Slovakia (+38%) (European Commission, 2020).

This lead to a major complication of the narrative of sustainability transitions in Austrian agriculture and the overall “success story” of a “clean” and sustainable Austrian agriculture — and prompted the industry chamber (“Landwirtschaftskammer”) to immediately seek to reconcile the contradiction in a press release, calling for a “responsible interpretation” of the statistic that “takes into consideration all factors.” So would the use of CO2 as well as copper and sulfate — primarily attributed to biological (organic) agriculture — account for a majority of these increases (Siffert, 2020). Without addressing the potential environmental and public health impacts of these substances, the invocation of the “biological” (i.e. organic) agriculture serves as reconciliation of an emergent contradiction and again renders invisible what is otherwise to be considered a pollution of the pristine.

Instead, it is taken as indicative of the success in Austrian sustainability transitions. The Austrian Public Broadcaster ORF covered this story, and quoted Jürgen Friedel, a University professor and agricultural expert:

> In contrast to chemical-synthetic pesticides, sulfur would be more environmentally friendly. The former would — depending on type — have harmful effects on the level of DNA, hormones and cause cancer, according to Friedel. A part of these artificial pesticides would additionally be connected to the rapid losses in bee populations. 'This means, even as the use of sulfur increase in organic agriculture, this goes hand in hand with a decreased use of synthetic pesticides, which would be good for environment and us'.[122]

However, this narrative glosses over growing scientific evidence (in an understudied area) of harmful effects of these "organic" pesticides and does also not address the increased production of CO2 emissions in this context and instead reinstates a "success story." That organic practices are by far preferable to industrial-extractive agricultural practices is the case — however this framing forecloses a more critical examination of what is often framed as "sacred" organic agriculture in Austria. This instance is an example for a more broadly absent conversation about the environmental impacts of (both, conventional and organic) Austrian agriculture (Erlemann, 2012) — and makes explicit how important internal contradictions are generally rendered invisible and require immediate active reconciliation when they break open.

Another, even more striking, example regards the conditions in which food is produced

The imaginary of the pristine is connected to an idyllic idea of the (male) farmer working his herd and land — an archetype of proximity and being "in tune" with nature. However, this is complicated by a reality of food production that centrally relies on low-wage migrant labor in highly exploitive and precarious conditions.

[122] German original: Im Gegensatz zu chemisch-synthetischen Pflanzenschutzmitteln sei Schwefel deutlich umweltfreundlicher, da erstere je nach Gruppe eine erbgutschädigende, hormonelle oder krebserzeugende Wirkung hätten, so Friedel. Ein Teil jener künstlichen Pestizide könne zudem auch mit dem Bienensterben in Verbindung gebracht werden. „Das heißt, selbst wenn die Wirkstoffmengen bei Schwefel durch mehr Biolandbau zunehmen, aber bei den chemisch-synthetischen Pflanzenschutzmitteln dadurch abnehmen, dann wäre das gut für die Umwelt und auch für uns", so Friedel.

This reality was for many in Austria a surprise, although an ill-disguised one. One interviewee for this research, a leading expert on the labor conditions of migrant farmers in Austria, offers this description:

> "Well know and yet not talked about. We just pretend it's not there and act surprised when we learn about — that is are reminded of — it."

The conditions of migrant labor came into sharp relief in the spring of 2020, as the pandemic cut off farmers from their migrant labor — and lead to a broad public discourse about the need for farm labor, and the price our society is willing to pay for it. Ultimately, the Austrian government ended up — with much public attention — to charter flights to bring "system critical" migrant workers into the country during a nation-wide lockdown and in the mid of a pandemic. Cordula Fötsch and Elisa Kahlhammer of Sezonieri discuss how the pandemic brought the exploitive labor conditions on Austrian farms to the attention of the public, writing on April 10:

> The Cornoa-Cirisis and the closed borders make suddenly explicit the importance of farm labor for food security is. For weeks, the media reports about a shortage of at least 5.000 agricultural workers. Farmers complain about losses in yield and risks to food security (Fötsch & Kahlhammer, 2020).[123]

The conditions of agricultural labor in Austria remained invisible previous to the pandemic, despite the efforts of experts and activists to raise awareness on that matter. Incompatible with an imaginary of the pristine, the issue remained absent from public discourse.

This is problematic, however, as climate change intensifies already harsh labor conditions on Austrian farms: Weather extremes force farmers to accomplish more farm tasks in shorter time periods, as one farmer explains:

> There is this tension. Our nerves were eroded to put it mildly, during harvest, everything had to go so fast, reading, preparing the machine-based harvest, coordinate people, it all has to happen fast and on short-notice, so much so that we had almost no time for the harvest itself, and that really brought one's nerves to the limits.

And similar testimony underscore this:

[123] German original: Durch die Corona-Krise und die Grenzschließungen von Nachbarstaaten wird nun plötzlich besonders deutlich, wie notwendig die Arbeit auf den Feldern für die Lebensmittelversorgung ist. Seit Wochen berichten Medien über das Fehlen von mindestens 5.000 Arbeitskräften in der Landwirtschaft. Bäuer*innen klagen, dass die Erträge ausfallen und die Versorgung bald gefährdet sein könnte.

> And I mean, we have those focused windows where we can get in and, and then you need the labor, but you don't have it. And it becomes more difficult to get that labor in the first place, so we, you know, machines help a lot here, and then just, you need to get it done.

Thereby, farm labor is generally problematized amongst farmers as a concern of scarce resources that are in higher demand due to climate change — which in-turn also exacerbates labor conditions within the pressures of economic concerns:

> What also becomes more and more a problem — to find people, workers, that you find fitting people that are willing to work. That also is in the education, in the school, the liberal … they don't listen anymore, talk back, no want, only excess. And we would desperately need that labor, in the spring and in fall.

Here the farmer, in not so subtle terms, describes the strong demand for labor, and explicitly for a specific kind of labor: namely compliant labor that endures the harsh conditions that often dominate on farms. And labor conditions were already bad for migrant farm workers — the major labor force also in Austrian agriculture, before climate change increased the health risks for farm workers severely.

In Austria I meet with a legal expert and farm rights advocate. During our interview they describe the conditions of farm laborers, especially of undocumented, migrant and seasonal laborers:

> I mean, it is this interdependency that enables all these horrific conditions. Because, our labor is essentially 100% migrant workers, most of them from the EU. They know they get exploited, but they need that income at home, and so the necessity to make as much as possible, work as many hours as possible, that also then enables the employers to exploit that.

And these conditions are explicitly exploitive, as the Austrian expert continues:

> In terms of health, it is a catastrophe, especially the horrific way that work accidents are dealt with at times. We know about many cases where the injured worker has been put into the car and they drove him across the border and dropped him off there. And, I mean, all the workers have in principle the right for health care, are insured by the state, but the insurance card is sent to the farmer, because the workers live there. So what happens is the farmers keep the insurance card to exercise control over the workers. And on top of that, they are completely dislocated, they live — by necessity — on the countryside, and they don't know where the next hospital is, and at the same time, as they live on the farm usually, they are isolated, they have no social support structures. And then, what happens with pregnancies, all that. It is bad.

Climate change, the expert explains, makes things worse. The conditions during the harvest are often unsustainable. Although legally required, farmers often do not provide adequate opportunities for

hydration, do not provide protective gear and restrooms are often unavoidable: leading to exacerbated risks for heat strokes especially for female workers who have more difficulties to relief themselves.

> "That really matters, as they then do not drink enough, even if water is available. We see that this is really problematic now that we have all those heat waves, and now that the harvest has to happen earlier in the summer when there is a drought."

Some factors that strongly contribute to this situation are increased social isolation on the farm, the shifting labor structures, and economic tensions, especially when it comes to pay and forced long work hours:

> I can see how a farmer says, I cannot afford that, because I have to sell my product to the big retailers REWE, Spar, Hofer, and I only get so much for it, and that is a double-bind. And, I mean, it cannot be that those retailers control everything and underneath that all that is possible are exploitive conditions.

The discourse of the "pristine" thereby pushes the considerations of migrant labor conditions to the margins.[124] Adaptation policy does not address it and, as the expert explains, there is no political interest in producing even any data on this, we don't have research on this, we just don't know the full extent of this situation, because this is just not something that you can talk about. "It just doesn't fit that romantic image of the 'farmer in nature'."

6.5. Alignment and Deliberation

These contradictions extend into how adaptation is governed. I discussed in Chapter 4 how Austrian adaptation governance relies on a combination of bottom-up decision making and top-down dissemination of specific ideas about adaptation. I detailed how in the combination of these two processes, adaptation is stabilized by prescribing what adaptation is (in terms of what is adapted to and to what ends) while allowing local, autonomous decision-making about the means with which specific adaptation objectives can be achieved.

[124] Guthman (2015) on pesticide regulation articulates how the ways in which risks are constructed and governed in a regulatory apparatus are entrenched in the biopolitics of valuing and *de-valuing* of "populations" (as to-be-governed") vs. "people" (as ignored by the regulatory apparatus). Spivak (1988) extends this perspective (criticizing it for its general restriction to marginalization in a colonial perspective) onto the subaltern – the voice and speechless and problematizes how these voice can be made vocal without "speaking on their behalf."

Specific guidelines and criteria play an important role in maintaining “compliance” with state imagined adaptation as communities engage in local, collaborative adaptation decision-making. For agricultural adaptation, these objectives importantly center-stage sustainability transitions, and this chapter has examined how an imaginary of “the pristine” supports these transitions by externalizing likewise climate as well as globalization and industrialization threats. What this concretely means, however, becomes more explicit in the local, and participatory processes play a major role in making these determinations.

Chapter 4 illustrated on the example of heat and drought emergency planning how participatory planning processes in the KLAR! region Unteres Traisental create alignment with policy objectives. I this section I will briefly re-examine how participatory processes are governed to maintain an imaginary of pristine agriculture, and how this serves to re-instate existing political orders of Austrian agriculture instead of changing them, running against the transformative claims of Austrian adaptation policies.

Thereby specific determinations about the configuration of participatory decision-making play a major role to restrict community-collaborative planning in their place, extent of deliberation, varying participatory opportunities for different stakeholders, and agenda setting capacities. This is situated in the context of Alan Irwin’s questions about the role and capacity of public participation in the governance of major, global-scale questions about climate change and food security (cp. Irwin, 2015).

6.5.1. The Potentials of Deliberative Decision-Making

In many ways, the collaborative opportunities for decision making are a critical part of the KLAR! program’s success story. Uniquely, collaborative decision-making processes remain a critical aspect of adaptation planning in Austria, allowing various regional and trans-regional stakeholders to engage in the negotiation of major conflicts around agricultural futures in a changing climate, particularly in regard to major aspects of resource access and distributive injustices.

These spaces create opportunities for stakeholders to critically examine adaptation options not only for their effectiveness in maintaining agricultural systems in adverse climate conditions, but center-stage the effects of concrete adaptation options on the larger rural community. The discussion of irrigation technology in particular is illustrative, as it becomes problematized for its effects on the overall water

security in the region as well as the inscribed power relationships of these interventions. One participant, a member of the local community, articulates this this way:

> Who makes the decision? Who decides during a drought who gets that water first? And when we go for that irrigation, does that mean that the farmers just get the water while we can't water our gardens?

Outside the collaborative decision-making events, these questions about the inherent politics of certain technological interventions[125] were not explicitly addressed. So were some interviewed farmers involved in the initial planning of a potential irrigation infrastructure for the regions' farmers. During interviews, the farmers speak to the feasibility of the intervention and its effectiveness for solving some major drought issues. Yet, larger societal effects were never addressed during these conversations as much of the planning occurred behind "closed doors" in deliberations between local planners, farmers and water right experts consulting their planning efforts.

It is in this context, where the KLAR! manager plays a significant role in opening-up the deliberations and re-examination of adaptation interventions for their impact on the larger societal fabric of the region. Bringing these solutions into direct deliberation with a wider public in the early stages of planning efforts allows for broadening the considerations in decision-making processes. It provides a more critical re-examination of proposed solution and allows stakeholders to shape adaptations in sectors that they are not part of but affected by, and that they would not have decision-making power otherwise. This stands in critical contrast to how adaptations on Madison County farms are governed and particularly reiterates the limitations for deliberative democracy where major decisions about agricultural futures are made within the closed system of an industrial system.

6.5.2. Restricting Competing Claims and Assembling The Public

However, these participatory capacities are importantly limited — and become often an instance of creating alignment instead. This is because both Austria and New York use their programs to restrict adaptation and decision-making processes to particular places. I will only briefly examine some critical ways in which such restrictions are achieved and thereby critically limit participatory processes.

[125] This relates to the discussion of politics of artifacts, and the inherently political structures that certain technological interventions presuppose (Winner, 1980). The introduction of irrigation technologies entails implicit decisions about the governance of waters and access to them.

The most obvious form of restriction is a **geographical** one, using different political boundaries for delineation. In New York's CSC program, adaptation is restricted geographically to the boundaries of individual local government — either county or municipal borders. In the KLAR! program, a regional approach is chosen, where at least two municipalities must come together to form an adaptation region.

As a consequence, Austria requires an inter-municipal collaborative perspective in its program and emphasizes an approach that takes regional effects of both, climate change as well as adaptation, into account. The consequence is **political restriction** of adaptation next to geographic restrictions. The CSC program emphasizes very concrete local geographical and political boundaries within adaptation planning so as to unfold organizationally (who is making decisions, and how) and materially (what are the areas impacted/affected by adaptation. The repeated emphasis of inter-municipal competition, seeking to trigger a local race of sorts to outdo each other in adapting, is a good case in point for this.

The KLAR! program on the other hand takes a more expansive view that makes, in contrast to competition, negotiation and collaboration processes between municipalities necessary in localizing adaptation. This, in-turn, results in a different organization of the spaces in which decisions and planning unfold. Where competition is the modus operandi, and municipal exchange is not explicitly written into the processes incorporated in the adaptation programs, it is more likely that adaptation planning can unfold behind the closed doors of planning and government offices. The collaborative approach of the KLAR! requires more open spaces of decision-making, at least as it regards inter-municipal collaboration as part of one region.

However, restrictions are made in terms of **social space**, as well. The permeability of boundaries of decision-making spaces already indicates one aspect of restricting adaptation in its social space along political boundaries of decision-making. The second way of social restriction are restrictions to specific stakeholders involved and addressed via concrete adaptations. Both programs show here fundamental tendencies to discounting marginalized population groups. As a consequence, participatory processes in Austria do not include many of the stakeholders that would stand in conflict with the overarching imaginary of Austrian agricultural production. The continued invisibility of (undocumented) migrant farm laborers must be highlighted here. Participatory opportunities are strongly scripted and restricted for their

scope, timing and access. The KLAR! manager plays a significant role here for assembling the public that engages in deliberative decision making.

The imaginary of “good” agriculture plays an important role in shaping local decision making about adaptation and agricultural futures. It provides a framework for what needs preserving, as it becomes particularly explicit in the collaborative engagement opportunities as part of the KLAR! program. Stakeholders develop future imaginaries of agriculture, delineating wanted from unwanted futures. Let me briefly re-state a critical moment of the co-creation workshop described in Chapter 4:

During the workshop, the participants formulated three visions of drought and climate change that they began to describe as increasingly more dystopian than the other, clearly identifying an unwanted future, progressing from the “promised land”, to “disruption” and “[societal] split”:

- **Promised Land —** The present or near future in the region: small-structured and diversified agriculture with some larger farms; Major challenges are individualized water uses and existing water usage rights; At the same time there would be room for creative experimentation in adaptation.
- **Disruption —** Structural changes in agriculture lead to less and larger-in-size agricultural operations, water is drawn from the river Traisen for irrigation, on-set of agricultural industrialization; first retention basins are established; crop varieties and cultural identity of the region begin to change. Challenges are strategic water management, uncertainties, water access, increased water consumption pressures, how will contaminated ground and surface water become usable for drinking water and irrigation
- **Split —** No field agriculture possible anymore, full consolidation of agriculture and associated technologization of large-scale farming; irrigation from Traisen and other sources (including newly created artificial water bodies); full transition into mechanization and automation; plains increasingly transition into an extended steppe. Differentiation of agriculture and societal structures along access to water and water security Challenges: Who gets water when, how much?

These visions are explicitly framed in the backdrop of the sociotechnical imaginary of agriculture, described in this chapter: The “promised land” describes a current status-quo of distinctively “Austrian” agriculture and situates this imaginary in the backdrop of a threat for disruption and societal split — brought about less so by climate change itself than by techno-scientific adaptation interventions that scaffold up industrialization and globalization dynamics. What is at risk is not a mode of agriculture that comes to be understood as the “present state” of food production in Austria.

This form of Austrian agriculture overlooks already persistent food production practices that undermine the very imaginary that participants (not only farmers, but public officials, emergency planners and members of the public) articulate.

Particularly, labor conditions, existing system interdependencies and polluting effects of current forms of Austrian production regimes remain unaddressed and rendered invisible by invoking this imaginary. In fact, these aspects of agricultural production are not addressed once over the course of the two-day workshop — nor are they addressed even once by interviewees and during observations over the two years I spent in the Unteres Traisental region. Instead, participatory processes appear to become an important site to perform, rehears and re-establish cultural commitments about agriculture and its role in larger society.

6.5.3. Writing The Rules of Decision-Making

It is in this context that the KLAR! manager plays a major role not only in "assembling the public", but determining the rules of engagement and brokering underlying claims of knowledge and about adaptation principles between local stakeholders and policy objectives and priorities. Three instances may illustrate the ways in which the KLAR! manager strongly shapes, limits and opens-up participatory processes where competing imaginaries of agriculture, adaptation and climate change can be negotiated.

First, the KLAR! manager plays a critical role in assembling different publics that participate in decision-making, where this decision-making occurs, and — by implication — who can not participate in these processes. This already was argued for co-creation exercises, where specific members of the public are invited to participate, while others are not. This occurs along existing lines of marginalization.[126]

However, important decisions about adaptation are still backstaged (Hilgartner, 2004b): Public participation in decision-making is restricted to specific moments that are tightly controlled for their organization, access and agendas (see discussion of the cocreation workshop) — and participants have little control over the outcomes of these processes. At the same time, a critical role of the manager is to negotiate between different local stakeholders in informal settings. During the research I observe the manager, as he negotiates irrigation adaptations with local farmers, discusses adaptation planning with mayors, and negotiates the legal landscape (of, for example, water rights) that shapes and at times limits adaptation options. In several instance, for example, I observe the manager discussing with farmers and mayors the feasibility and implications of a major irrigation infrastructure project, negotiating different

[126] Compare thereby discussions in STS literature about governing issue-making, agenda setting and participatory processes (Felt & Fochler, 2009, 2010; Hagendijk; Rob & Irwin, 2006; Irwin, 2015; Marres, 2007; Wynne & Irwin, 2003)

priorities and working towards alignments of interests surrounding the project. These negotiations occur on the “backstage” and away from publics — and critical aspects of these discussions are not introduced in the co-creation workshop.

Secondly, the manager explains to me how this work involves creating alignment with adaptation policy objectives, particularly in regard to maladaptation. He discusses major shortfalls of the farmers’ plans for establishing larger scale irrigation infrastructures in regard to water rights, impacts on ecology and its relationship to climate change. This underscores how large parts of the manager’s work revolve around creating alignment between local actors, adaptation solutions, and policy criteria and objectives. It also re-iterates what was I discussed in chapter 4, where administrators and planners in the federal government emphasize how participatory processes are deployed to create alignment with policy priorities by creating consistency between policy imaginaries of adaptation and local interpretations of climate change and adaptation needs.

At the same time it makes explicit how participatory processes and larger planning and decision-making processes revolve around creating alignment — at the cost of allowing for contradiction and competing claims to emerge and become integrated more substantively in decision making processes.

This also points to a third, major aspect — relating to Lukes’ discussion of rule-making for decision-making processes as a major aspect of power (Lukes, 1974). He explains how the design of decision-making sites and processes is an constitutive element of power, as it shapes agenda-setting, the opening-up and closing-down of moments of controversy and contestation, and pre-supposes criteria for potential outcomes of processes. These dynamics are a critical part of what I observed at the diverse sites of decision-making, and I only briefly want to review key dynamics: The emphasis on prescribing and disseminating from the top a specific imaginary of adaptation, constituted in policy objectives, criteria and guidelines, strongly shapes the kinds of decisions about adaptation that are possible in the local. Further reinforced by evaluation critiera associated with the KLAR! program, decisions need to take a specific shape that can be measured and evaluated along the pre-set categories provided in the KLAR! program structures and through the NAS. The cocreation workshop is a good example, where results are reworked to meet the criteria of an outcomes report while resulting actions can be completed within the timeframe of the program. Similarly, the two-day workshop did not allow for participants to define possible

outcomes of the engagement exercise and how this may be achieved. Instead, the designers of the workshop predetermined these outcomes and designed the engagement processes in ways to ensure the production of these outcomes. Finally, the importance of ensuring proper outcomes from decision-making processes becomes also evident in interactions between the manager and local decision makers, particularly the mayors: Here, the KLAR! manager speaks to the efforts necessary to ensure a “proper understanding of the issues” by the mayors, and the important negotiations with them to create alignments and shared objectives for outcomes of the KLAR! program.

6.5.4. Maintaining Structures of Agricultural Production

The consequences are significant. Sustainability transitions translate from policy to local agricultural production regimes. This leads to substantial successes in transforming Austrian agricultural production and allowed Austria to lead the way in extent of organic land use. However, these transformations do not extend into the underlying structures of power involved in these systems.

Decision making processes continue to be primarily accessible by the same stakeholders, while marginalized communities (particularly farm laborers) continue to have no say in decision-making including adaptation. Furthermore, the deconstruction of the sociotechnical imaginary of the pristine makes explicit how adaptations also in this case act to maintain established agricultural production regimes and their associated structures of power. Climate change and industrialization become an external threat from which local farmers need protection. The imaginary of the pristine at the same time prevents a critical examination of the ways in which Austrian agriculture (including sustainable agriculture) itself remains a “polluter.”

2This is useful for strengthening rural communities and their socio-ecological ties, helps mitigate globalization and industrialization practices and allows to reflect on Anthropocene roles of agricultural production. However, without explicit recognition of social inequities and extractive marginalization inherent also to such systems — especially regarding farm labor — it inadvertently perpetuates the rendering invisible and discounting of these lives, extending their vulnerabilities and exposures not only to climate change, but to the paternalistic relationships that constitute them. The notion of the “pristine” and the extension of political power of farmers plays an important role in this dynamic, as the precarious experiences of farm labor “contaminate” the notion of the pristine.

Farmers play an already extraordinary powerful role in local, state and federal politics in Austria. Perhaps, instead of rendering them invisible, a strengthening of farm laborers in their social-cultural positionality and a better cultural and societal integration would further strengthen the resilience of farming communities and rural communities as a whole? Currently however, their marginalized position and extraordinary vulnerability remains unaddressed despite transformational claims and commitments to equity. This conflicts with claims to incorporate — and even center-stage — equity and democracy through adaptation governance.

6.6. Conclusions

Adaptation localizing in this perspective emerges as deeply involved in governing not only how adaptation manifests in the local but governing the power structures of agriculture — and by extension the social structure of rural communities around them. Adaptation localizing in New York emerges very explicitly as committed to industrial scale food production regimes, with significant implications for local framers and laborers alike. Both are increasingly exposed in their vulnerabilities, as economic crises, the effects of globalization and industrialization and the climate disaster converge. A “politics of non-decisions” reveals highly political commitments to maintain a power structure of food production that is exploitive in multiple dimensions — regarding ecologies, climate, land, people and histories.

Austrian adaptation policy manifests transformative capacities also in the local, as it leverages an imaginary of the pristine cultural landscape to advance sustainable modes of food production. The NAS defines as adaption goals the gradual, long-term societal reconstruction. In the case of agriculture, this reconstruction regards a transformation of agricultural production regimes towards sustainable production, the preservation of agricultural ecosystem functions, and the maintenance of what is considered to be a “pristine” agricultural landscape with important cultural and national value.

This unfolds embedded in the structures of a similarly committed agricultural policy as well as in the local cultural conceptions that emphasize the “natural” of the rural and agricultural, even as it regards cultivated land.

Thereby, adaptation localizing in Austria fosters a small-scale agriculture that strengthens rural communities in many ways — and appears capable of extending sustainability transitions in an explicit

resistance to globalization and industrialization as negative “outside forces.” Critically, it effectively strengthens the position of agriculture by limiting the impacts of industrial agriculture on farmers. That provides important room that is necessary for sustainability transitions to occur ((e.g. by providing relative economic security for farmers).

However, by invoking an imaginary of the “pristine”, it limits the extent to which sustainability transitions can truly restructure the power relations of food production, maintaining existing ones. It also renders invisible “internal” exploitive structures where they would enter in conflict with an imaginary that establishes farmers as custodians of a cultural landscape that extends beyond the topographical and deeply into the social and ecological. As such, transformative and reformist claims of Austrian adaptation governance are revealed for their not-so transformative role in maintaining existing structures of power in regimes of food production and larger societal orders in the rural and political.

When one considers the existing structures of food-production in Austria, the capacities and intent of adaptation policy appear less transformational-reformist. Instead, they are revealed for maintaining existing power relationships of food production and rural social structures alike.

This becomes explicit in two ways: First, despite the emphasis on equity and social justice, the lives of migrant farm workers — providing 95% of labor in the Austrian agricultural sector — are entirely discounted: Neither adaptation policy, nor local planning, nor farm workers make mention of this aspect in any substantive manner. Additionally, data on labor conditions, health and impacts of climate change on migrant farm workers do not exist and are not produced. This particularly vulnerable and exposed group has also no access to adaptation decision-making processes, including decisions impacting them directly.

Instead, secondly, the policy relies on the cultural landscape imaginary, and therefore its associated imports on social order and political power in the rural. The cultural landscape imaginary explicitly designates famers as curators and custodians tasked not only with the production of food, but with the cultivation of land of cultural and societal significance. While this powerfully fosters the significance of biodiversity, conservation and sustainability, it also cements-in existing agricultural power-relationships associated with the small-scale diversified production structures characteristically for Austria.

Ultimately, this reveals how adaptation localizing is an instrument of governance, engaged in the ordering of power structures as much as it is shaped by them. Despite varying claims of and commitments to adjustment or transformation in overarching policy objectives — its localizing makes clear that the differences between Austrian and New York's adaptation governance are not as different as they may be made out to be: Embedded in different regimes of food production, they both work to maintain existing relations of power in similar ways, albeit in different material contexts. Lastly, however, the consequences are nonetheless strikingly different, due to the different material and political orders of food production. This might be the biggest promise of the Austrian transformative claim to adaptation: as the small structures of agriculture, and a commitment to preserve them, at least enables to foster sustainability transitions in agricultural production on a sustained and structural level.

6.6.1. The Imaginary at Work in Austria and New York

Distinct imaginaries of adaptation, climate change and agriculture are at play as adaptation policy gets localized in Austria and New York. These distinctions are consequential for, but also reflective of, how food is produced *in* society and *in* ecologies of the present and the future.

6.6.1.1. Individualism and Collaboration

The first major distinction lies in the imaginary of agricultural production as an individual or collaborative endeavor, not only within agricultural production regimes but also in connection to wider society. The imaginary of the family farmer is thereby mobilized in both cases, however in different ways. In the U.S. the family farmer is a monadic entity, reflective of a wider cultural commitment to individualism. This reflects how adaptation draws on — primarily technological — interventions that support the family farmer in "conquering nature", precludes an imagining of agriculture as collaborative practice, and throws extractive conditions back onto the individual farmer. Problematizations of systematic conditions of risk production as well as potential responsibilities of farmers and agriculture for other-than-resource-extractive purposes become rendered invisible in this imaginary. This places U.S. family farmers in a precarious double-bind, where the need to uphold family legacies becomes an individual endeavor of success and failure.

Contrast this with the ways farming is imagined in Austria. The notion of family farming is upheld here, as well. However, this imaginary is a somewhat more collective one, embedded in the ideas of a

social responsibility of farming — particularly in connection to rural culture, identity and the maintenance of constitutive landscapes of the pristine. This extends also in the material, where farms are located within rural settlements and not apart from them. This contrasts with the U.S., where interviewees regularly problematize the material and social disconnect between farms, rural land, and the gated communities of suburban America.

A small but growing movement in the U.S. and globally begins to contest these disconnects and attempts to reimagine agriculture as a collaborative and societal endeavor, as for example Taber (2019) describes in her writings. Regenerative farmers draw thereby on ideas that have been known and practices by the indigenous peoples of the lands they cultivate for thousands of years prior to them. Here, a competing imaginary of agriculture, grounded in the collective and collaborative, becomes tangible. This imaginary fundamentally seeks to reconnect ecologies, communities, and food production in an explicit commitment to ecological and social regeneration.

6.6.1.2. Ideas of Adaptation

These imaginaries fundamentally shape the idea(l)s of adaptation in their ends, means and in who gets to participate in them. The relationships have been extensively discussed throughout this dissertation and only need brief a summary here.

Adjustment, Individualism, Technological Innovation

Connections between individualism and adjustment perpetuate and adjustment approach that heavily relies on technological innovation to maximize extractive practices. Adaptation becomes an individualist endeavor, and places technology developer and industrial agriculture at the places of power. A non-interventionist state apparatus perpetuates existing conditions of food production, and technology becomes the major means for adaptations that are compatible with large scale, industrial production regimes.

Reform, Communitarianism, Sustainability

This is contrasted by ideas of farming as a societal-cultural endeavor. Closer connections between rural landscapes, larger surrounding societies, farmers and adaptation emerge. Agricultural landscapes are seen as constitutive to rural identity, and farmers and farming are valued in other-than-economic terms. The preservation of these landscapes become a priority. However, it still is predicated on

extraction for recreation and cultivation alike. Different to the U.S., this extraction is limited by a necessity to maintain cultivated landscapes in a livable condition. The notion of the “pristine” does not promote practices that are regenerative to ecologies and instead promote an ecology of human recreation and inhabitation. The function of ecologies for humans still is centered.

This forecloses certain extractive adaptation practices, in so far as they stand in conflict with the premise of the livable landscape. Not all technology is rejected, anyhow. Critical adaptation choices become examined, in parts in participatory processes, for their impacts on society. This also includes impacts on ecologies in so far as it impacts their availability for use by a larger society and beyond agricultural production.

Transformation, Ecologies, Regeneration

Ecological imaginaries stand in explicit opposition to both of these relationships between agriculture, society and nature. This includes the regenerative farmers that I interviewed in this research but extends importantly in a wide range of cultural ideas about farming in an ecology perspective. Ideas about regenerativity appear new in modern agriculture. However, they have been known to and practiced by indigenous people for millennia.

In this imaginary, humans are not at the center of practice anymore, and instead the balance and stability of the larger ecosystem becomes the major objective of any human practice, including the production of food. These farming practices aim at “building up” the land and produce food in ways that not only minimize their negative impacts on ecologies, but instead maximize their positive effects. In this perspective, adaptation emerge as collaborations not only between farmers and between farmers and surrounding communities — but as a collaboration with “nature.” Distinctions between nature and society become at least blurred. Adaptations in this context must comply with an ecological imaginary of agriculture.

6.6.2. Adaptation as Intervention in Local Orders of Food Production

These distinctions make explicit how imaginaries, local socio-ecological orders and adaptations are co-produced. Adaptation (in practice and policy) is a direct outcome of these imaginaries. However, as adaptation decisions are cemented-in in their localization, determinations about viable and possible

agricultural and ecological presents and futures are made.[127] As adaptation is localized, critical determinations are made about local orders of food production. As such, adaptation governance — the governance of how we adapt and how these decisions are made — is ultimately a governance of these local orders.

The claims of neutrality in New York's adjustment adaptation and the claims of reform in Austria are both explicitly and unavoidably political decisions of what kinds of futures of agriculture, ecology, climate change and society remain attainable and viable as adaptation manifests "on the ground." Both represent primarily determinations of what kinds of society and future will be preserved and worked towards — and which ones will be abandoned and lost.

[127] Key literatures in STS point to how "technology is society made durable" (Latour, 1991). Akrich, for example, discusses how imaginaries about societal orders become "inscribed" into technologies and therefore "enact" these judgments in their implementation. She also describes how local actors resist and reinterpret these imaginaries as they engage with technology in specific cultural settings (Akrich, 1992). And Langdon Winner shows how technological artifacts are political, not only in their application, but in the socio-political orders they presuppose and themselves produce (Winner, 1980).

7. CONCLUSIONS

In this dissertation, I examined how adaptations of the agricultural sector are governed across scales and to what consequence. I did so on the case of two rural communities — the Unteres Traisental region in Austria and Madison County in New York State — both of which participate in state adaptation policy implementation programs: The Austrian KLAR! Program and New York's Climate Smart Communities program.

I developed the notion of "adaptation localizing" to describe adaptation governance as multi-faceted and multi-sited processes. I analyze adaptation governance as a procedural process that is at the same time involved in the governance ***of*** adaption and the governance ***through*** adaptation. I point to 1) how adaptation is conceptually and materially stabilized across scales and at different sites through processes of localizing; and 2) how social orders involved in and addressed by adaptation themselves become also governed as part of the same processes.

This stands in contrast to established literatures on adaptation policy, evaluating the effectiveness of adaptations and their local implementation. These literatures primarily analyze adaptation policy and its localizing as linear-hierarchical processes unfolding from the top-down and focus on the effectiveness to mitigate the impacts of natural hazards ("natural hazards school"). This has several limitations, two of which I want to foreground: First, an outsize focus in the climate adaptation literature on the management of risk — primarily constituted in an escalation of natural hazards — and on procedural government responses as their management "has meant that the scope of adaption thinking has been confined to very narrow parameters": It limits problematizations on proper government and governance responses to mitigate risk impacts and does not properly incorporate the social production of risk and vulnerability.

The second limitation is in many ways a consequence of the first, as this focus on the management of a specific set of "naturally constituted" climate risks obscures the inherent politics of adaptation in a techno-scientific risk-assessment approach. Eriksen et al (2015) suggest that an analysis of adaptation and its governance need to address its explicitly political character "all the way through":

> Adaptation needs to be reframed as a socio-political process, taking place through struggles over authority, knowledges and subjectivities across scales by multiple actors (Eriksen et al., 2015, p. 351).

They point to the normative processes implicit to adaptation and its governance across scales, arguing that different modes of problematizations designate authority over adaptation decisions. For example, they explain that “adaptation options are typically conceived of as formal public sector interventions or programs addressing specific climate risk. Such adaptations implicitly reinforce the authority of policy-makers and experts, rather than, for example, the full range of actors involved in managing change, including vulnerable populations” (Eriksen et al., 2015, p. 351).

I seek to address these two limitations by introducing the concept of climate localization. However, I also argue that there is a central third limitation that the analysis of adaptation governance as processes of localizing seeks to overcome.

Political economists draw attention to the first two limitations by analyzing adaptation as political “all the way through.” They draw attention to the normative implications of adaptation for the distribution of authority and the shaping of political processes. However, they do not properly address how adaptation has normative implications for socio-political and material orders of the larger social systems that are adapting.

Drawing attention to how adaptation governance unfolds in processes of localizing allows to address these limitations in the following way. First, it argues that processes of localizing are governing adaptation as cross-scale and locally situated processes that stabilize specific adaptation epistemologies (i.e. determining what is being adapted to, how and to what ends). Second, I argue that stabilizing concrete adaptation epistemologies have concrete normative implications for the apparatus that governs adaptation. Localizing processes co-constitute authority and control across scales as well as the social, political and organizational orders of its exercise — what Foucault and Agamben describe as “dispositif” (Agamben, 2009; Michel Foucault & Rabinow, 1997). Third, the confluence of these processes of adaptation localizing are normative for the societal-material orders of adapting systems.

In other words, localization is the sum of processes in which competing adaptation stabilizations (as stabilizations of what adaptation is, as stabilization of the organizational-political orders that govern them, and as stabilizations of social orders that adaptations produce in the adapting social systems) are managed in governance processes.

The main argument of this dissertation is that adaptation itself is inherently political, deployed as a means for governing societal orders in face of environmental change on a climatological scale. Determinations about adaptation are made in processes of **adaptation localizing** across scales, involving a wide range of actors, while excluding others.

These processes of adaptation localizing unfold at carefully managed and safeguarded sites of decision-making across scales, and who is able to participate in making adaptation determinations and on what terms they do so, is carefully governed and organized. Each of the chapters of this dissertation focusses on specific aspects of adaptation localizing processes as modes of governing societal orders and cohesion in the face of change, to develop a better conceptual understanding about how adaptation is a) governed and b) used to govern.

In this conclusion I will revisit key arguments of this dissertation to further clarify each of these three dimensions involved in governance through processes of adaptation localizing.

7.1. Governing Through Localizing in Three Dimensions

7.1.1. Stabilizing Adaptation

Chapters 3 and 4 drew attention to how localizing processes stabilize specific adaptation epistemologies across scales. In doing so, I made two major arguments: That the stabilization and management of specific modes of adaptation is co-constituted with specific problematizations of risks, vulnerabilities and societal orders. While this unfolds across scales, it also does so locally situated in material and social places of decision-making and therefore is also co-produced with their organization.[128]

This revealed distinct differences between adaptation governance in New York State and Austria, as it is co-produced with distinct modes of problematizations. Differences between how adaptation manifests and is stabilized in Austria and New York are constituted in specific epistemological orders and

[128] It is this emphasis on local situatedness that constitutes the use of the term of localizing to describe these processes: On the one hand it points to the processes of localizing adaptation itself — for example of specific solutions in concrete agricultural communities. On the other hand it points to the localizing of the processes themselves, as a push back against the conceptualization of scales as increasingly place-less and non-material as one moves “upwards” on scales. And third, it points to the located-ness of governance itself, as it unfolds across these material places and has itself material and local implications.

in the management of problematizations. Differences emerge in three dimensions of how epistemological orders materialize:

1. Depending on context, climate risks are constituted in natural hazards (NY) or co-produced with the structural conditions of agriculture as a social system (AT).
2. Adaptation problematizations constitute epistemological orders about climate risks, adaptation and the socio-political orders of the systems that are being adapted. This establishes distinct adaptation objectives — either as (NY) economic system where adaptation aims at maintaining economic productivity in changing conditions or as (AT) socio-cultural system where adaptation aims at advancing equity, justice and sustainability transitions in agriculture.
3. Constituted in such problematizations, adaptation is stabilized either as (NY) an adjustment of the agricultural system to impacts from climate change as an external force or (AT) the management of reforming risk-producing structures of the agricultural system

In these three dimensions of epistemological difference, adaptation is revealed as socially constructed on the one hand, as political "all the way through" (Eriksen et al., 2015) on the other. The management of epistemological orders through specific problematizations of risks, adaptation options and pathways become important political ordering devices that open-up certain adaptation pathways and societal futures while foreclosing others.

In New York, sate adaptation planning emphasizes explicitly the maintenance of currently existing regimes of agricultural production in economic terms and aims at securing outputs of agriculture as economic sector. This is strongly coupled with a lack of differentiation in how food is being produced and its effects on climate, ecosystem and rural societies and communities. In a technoscientific regime of risk assessment, impact analysis and solution-development, New York's adaptation policy makes implicit value judgements about socio-economic and political orders in an economic-productionist paradigm.

This becomes particularly explicit when placed in context of Austria's reformist-interventionist adaptation approach. Explicitly, structural conditions of agricultural productions become problematized for their impacts on ecosystems, social and cultural identity, and climate change alike — and become mobilized to justify an interventionist approach to adaptation in the attempt to reform agricultural systems.

These problematizations are associated with key differences in the governance of adaptation localizing, establishing reformist and adjustment epistemologies that inform specific styles of adaptation planning. I made the case that the two modes of planning in New York and Austria are distinct in the degree of intervention associated with transformative and adjustment adaptation approaches.

Major differences emerge between Austria and New York: 1) Austria's adaptation approach aims at system transformation while New York focusses on system adjustments; 2) This is constituted in the

problematization of climate risks being constituted in the risk-producing structures of agriculture as social systems. As a consequence, 3) Austria plans for adaptation in agriculture not only to maintain economic productivity, but to achieve system transitions that integrate questions of social justice and equity, sustainability and democracy. In this context, it becomes important to 4) govern adaptation practices and outcomes not only in terms of economic criteria, but in terms of their compliance with societal and social justice objectives established through the state. This means that 5) the federal government assumes a stronger control in governing local adaptations, whereas in New York the economic paradigm constitutes a stronger role of market actors in governing on-farm adaptation.

These differences play out not only across scales, but within their local-material conditions. In a way, this erodes the hierarchical notion of adaptation that is so prevalent in the established climate adaptation literatures. Chapter 3 and 4 pointed to the ways in which these overall stabilizations co-evolved in specific material and social orders of different places that traditionally would be located on a hierarchical scale of governance (policy – state government – local government – concrete farms, for example). However, such a hierarchical conceptualization obscures power relationships and makes them appear objectively given. This becomes explicit, for example, in the analysis of how mid-level state administrators in New York State stabilize adaptation within specific social and material orders of the places they work at while drawing on, interpreting and reestablishing policy objectives on the one hand, responding to (perceived, communicated or anticipated) needs in local governments and “on the ground.” Similarly, other actors across scales stabilize adaptation in their interactions that are explicitly not one-sided. As such, adaption and specific local orders at different scales are co-produced; not only within the individual sites but in their interactions across scales, geography, time and place.

7.1.2. Stabilizing the Adaptation Governance Apparatus

Eriksen et al. point out how these “socio-political process[es], [are] taking place through struggles over authority, knowledges and subjectivities across scales by multiple actors” (Eriksen et al., 2015, p. 351). I argue that adaptation localizing are the processes of governing these struggles. As adaptation manifests distinctive through locally situated problematizations, the involved processes (of localizing) constitute, justify and maintain distributions of authority over adaptation, designations of the validity of specific knowledge claims, and the subjectivities of adaptation (which also constitute legitimacy to

participate in adaptation processes). Foucault relates problematizations and associated epistemological ordering as processes of disposition and ordering. Agamben describes these co-constitutive relationships as governance apparatus; a formation that "at a given historical moment has as its major function the response to an urgency" (Agamben, 2009, p. 2). The apparatus essentially puts "things" (institutions, nature, knowledge claims, individuals, relationships, etc.) into such a disposition that makes them governable in a specific way, and therefore also reaffirms the constitution of the apparatus itself:

> [T]he nature of the apparatus is essentially strategic, which means that we are speaking about a certain manipulation of relations of forces, of a rational and concrete intervention in the relations of forces, either so as to develop them in a particular direction, or to block them, to stabilize them, and to utilize them. The apparatus is thus always inscribed into a play of power, but it is also always linked to certain limits of knowledge that arise from it and, to an equal degree, condition it. The apparatus is precisely this: a set of strategies of the relations of forces supporting, and supported by, certain types of knowledge (Agamben, 2009, p. 2).

Adaptation localizing relates to, but is not the same as, the apparatus. It is involved in its constitution by managing — for example — epistemologies and their ordering capacity, as was described in Chapter 4 on the case of Austria. There, transformative objectives, political organizational structures that realize them, and the problematization of risk-producing systems are analyzed for how they are co-produced. The management of epistemologies play a major role here: seeking to establish concrete interpretations about what is being adapted to (the problematization of risk-producing (elements of) social systems), the establishment of imaginaries about the relationships between society and nature, related determinations of the ends of adaptation (established as sustainability transformations). The management of such adaptation epistemologies across scales allows for what policy-makers and planners describe as "technology neutral" approach: What kinds of adaptation techniques and technologies are viable — and which ones are not — is constituted in these epistemological orders and therefore indirectly can be controlled through them.

At the same time, these relationships also designate subjectivities of adaptation — who is included in governance considerations, incorporated (also explicitly as biological bodies) into the scope of governance — and which ones are excluded and explicitly rendered invisible. In the case of Austria (Chapters 5 and 6), migrant workers, for example, are explicitly rendered invisible.

This also relates to the governance of how decisions are made, where they are made and on what terms, and who can participate in these processes. These processes are directly related to the organization of the apparatus and the configuration of governance, its objectives (transformation/reformist) and its problematizations (hazard-risk vs. societal-risk). Chapter 6 discussed these configurations and how deliberative processes about the rules of adaptation are organized, how its boundaries are maintained and who has access to them.

7.1.3. Stabilizing Societal Orders

Finally, processes of localizing do not only a) establish the governance of adaptation across scales, and b) establish the apparatus of its governance — it also co-constitutes the governance of local-societal orders in and through adaptation. Adaptation localizing in this perspective emerges as deeply involved in governing not only how adaptation manifests in the local but governing the power structures of agriculture — and by extension the social structure of rural communities around them. Adaptation localizing in New York emerges very explicitly as committed to industrial scale food production regimes, with significant implications for local farmers and laborers alike. Both are increasingly exposed in their vulnerabilities, as economic crises, the effects of globalization and industrialization and the climate disaster converge. A "politics of non-decisions" reveals highly political commitments to maintain a power structure of food production that is exploitive in multiple dimensions — regarding ecologies, climate, land, people and histories.

Adaptation localizing in Austria fosters a small-scale agriculture that strengthens rural communities in many ways and is capable of extending sustainability transitions in an explicit resistance to globalization and industrialization as negative "outside forces." However, by invoking an imaginary of the "pristine", it limits the extent to which sustainability transitions can truly restructure the power relations of food production, maintaining existing ones. It also renders invisible "internal" exploitive structures where they would enter in conflict with an imaginary that establishes farmers as custodians of a cultural landscape that extends beyond the topographical and deeply into the social and ecological. As such, transformative and reformist claims of Austrian adaptation governance are revealed for their not-so transformative role in maintaining existing structures of power in regimes of food production and larger societal orders in the rural and political.

Ultimately, this reveals how adaptation localizing is an instrument of governance, engaged in the ordering of power structures as much as it is shaped by them. Despite varying claims of and commitments to adjustment or transformation in overarching policy objectives — its localizing makes clear that the differences between Austrian and New York's adaptation governance are not as different as they may be made out to be: Embedded in different regimes of food production, they both work to maintain existing relations of power in similar ways, albeit in different material contexts. Lastly, however, the consequences are nonetheless strikingly different, due to the different material and political orders of food production. This might be the biggest promise of the Austrian transformative claim to adaptation: as the small structures of agriculture, and a commitment to preserve them, at least enables to foster sustainability transitions in agricultural production on a sustained and structural level.

7.2. Hope and Transformation Capacities

In the analysis of adaptation localizing, both New York and Austrian adaptation policy is revealed for their maintenance of persistent power-structures in agricultural communities. The implications are deeply consequential, as agricultural regimes of production are deeply involved in the constitution of climate futures.

Modern agricultural production regimes in both Austria and New York are deeply involved in the exploitation of ecosystems and the human-social communities as part of them. The toxicity of modern agricultural production, the overextension and depletion of ecologies, the devastating impacts on biodiversity, and the topographical shaping of land and (human and non-human) life transcend the issue of climate change. Climate adaptation is discussed for its involvement in the maintenance and change of these systems and their disposition, making adaptation itself consequentially far beyond the issue of how social systems weather climate change. This analysis ultimately implicates adaptation in the persistence of modern extractive agricultural systems with potentially catastrophic consequence.

Gowdy foregrounds some key arguments for why climate change will make agricultural production in its modern form impossible, threatening civilization collapse similar to how previous regionally confined changes in climate ultimately lead to the collapse of past civilizations. Although he does not discuss it, it is

also well established how modern agricultural systems itself is perpetuating these dynamics that — in Gowdy's perspective — ultimately will lead to its collapse:

> The ability of agriculture to adapt to climate change will depend on the rapidity of changes as well as their severity. Intensively growing high-tech crops on the massive scale required to support billions more people will be prohibitively expensive just in terms of the energy required. The feasibility of massively moving crops North to avoid warmer temperature is limited because of poor quality soils in places like northern Canada and Russia. Also, temperature fluctuations will be greater toward the poles. Much of the evidence is anecdotal, but there are already indications of climate instability more than offsetting the advantages of longer growing seasons in northern regions (Gowdy, 2020, p. 5).

Many of the observations and experiences made by farmers interviewed for this research and presented in this dissertation add on to this evidence in anecdotal form. At the same time, adaptation in both Austria and New York ultimately maintain food production regimes that are more likely to not facilitate transformations deep enough to prevent such futures. New York explicitly aims at the maintenances of modern, industrial-scale agricultural systems that not only have in parts devastating impacts on rural communities, farmers and ecosystems today — but only accelerate the crisis that adaptation is responding to.

While Austrian adaptation seeks to promote sustainability transitions, it has also been revealed for doing so embedded in an imaginary of the "pristine (national) cultural landscape." This imaginary, I argued in Chapters 5 and 6, perpetuates the vulnerabilities and exploitations of the laborers that produce our foods, most of them migrant workers, while maintaining their invisibility and the discounting of their life. What is more, it is involved in the perpetuation of the dominant power-structures of Austrian small-scale agriculture. All of this deeply limits the scope of sustainability transitions to a very narrow form that ultimately perpetuates agricultural extraction regimes even in organic agriculture in its current embedding in capitalist market regimes (De Wit & Verhoog, 2007; Holt & Reed, 2006; Raynolds, 2004).

But there is hope. New approaches to agriculture attempt to move beyond sustainability and attempt to develop food-production systems that actively seek to regenerate land, ecosystems and social communities. Their efficiency and capacity to "feed the world" seems promising (Francis, Harwood, & Parr, 1986; Rhodes, 2012; Sherwood & Uphoff, 2000), and their impact on the flourishing of ecologies and human communities has been well-established. This research finds farmers in all sorts of places

— conventional, sustainable, organic, regenerative, etc. — working inventively to rethink how food is produced and distributed, often despite and in confrontation with the policies and market actors that are supposed to, intended to, or claim to support them.

Both, Austrian and New York policy find some promising initiatives that attempt to facilitate change also, and as policymakers across scale find inventive methods that attempt to facilitate these changes within persistent material, organizational, political and social constraints and limitation. The CSC program, for example, seeks to utilize the idea of certification to promote changes on a structural level despite the political realities of U.S. environmental and climate governance. The KLAR! program allows communities to promote sustainability transitions in a long-term strategic manner. Their limitations are related to larger structural conditions of power, but both programs facilitate change in at times surprising ways, considering the substantive hurdles they need to overcome and work against facilitating those changes.

However, I fear that this ultimately won't be enough, as long as the larger structures of extractive food production and consumption and their associated power structures persist and remain unchanged, especially they converge with colonial histories of exploitations of land, ecosystems and people — histories that in this dissertation could only allude to in passing.

7.3. The Case for Regenerative Agri-Futures

This dissertation makes an important contribution to the global movement for regenerative agriculture. It details the ways in which adaptation is involved in the governance of agricultural futures in a changing climate. Importantly, it details how reformist as well as adjustment adaptation ultimately are both involved in the continuation of existing regimes of food production — all of which have explicitly extractive characteristics. The consequences are significant for societal, agricultural and ecological futures.

In both cases, agriculture is organized in small and relatively diversified structures. However, this dissertation shows how adaptation policy in New York is implicated in the acceleration and intensification of industrial agricultural practices, whereas Austrian adaptation policy explicitly seeks to mitigate these transformations and instead creates conditions that enable sustainability transitions.

The two adaptation policy approaches interact with the material and political conditions of existing agricultural production regimes as well as with overarching agricultural policies. Adaptation policy, in

these interactions, manifests dramatically different consequences for local farmers in New York and Austria, respectively. Whereas New York's farmers face existential threats in a continued economic and market crisis, consolidation pressures and structural transformations of rural America, Austrian farmers find themselves in a relatively comfortable and protected situation, enabled through explicit political and policy commitments. And within these situations, climate escalations and adaptation unfold dramatically different. Ultimately, Austrian farmers as well as the overall Austrian agricultural system appear much more resilient than it is the case for New York, with the latter in serious trouble and with at times little hope for survival.

This provides the necessary conditions for major sustainability transitions in the Austrian agricultural sector, critically based on efforts to preserve existing structures of small-scale agricultural production and the prioritization of its cultural value. In New York, these same foundations would still exist today. However, major transitions are underway that undermine them — supported by agricultural as well as adaptation policies. This exposes New York's adaptation policy for its part in creating conditions in its agricultural sector that run the risk of exacerbating its structural vulnerabilities in the long term. In the worst case, current adaptation policy in New York itself contributes to the existential threats that New York farmers currently find themselves exposed to.

As a consequence, Austrian adaptation policy supports important sustainability transitions. However, chapter 6 shows how these transitions are enabled by and perpetuate extractive undercurrents of the Austrian agricultural systems. This importantly connects to ideas about sustainability that render invisible major problematic aspects of both conventional and organic Austrian agriculture. This includes amongst others, some unsustainable, extractive and at times polluting and toxic practices that persist in organic agriculture. More critically, it renders invisible the role of migrant labor in Austrian agriculture and the often inhumane and dangerous conditions in which it unfolds. This means that organic practices address only some of the extractive conditions of conventional agriculture that drive climate change, erode ecosystems and negatively impact social and ecological systems, while extending others.

As Austria pursues major transitions in its agricultural production regimes, decisions made around these transitions become increasingly durable and "cemented-in" into the material fabric of adaptation.

Many of these decisions continue extractive patterns and dangerous interdependencies that could ultimately undermine what Austrian adaptation policy seeks to protect and preserve.

Regenerative forms of agriculture bear the capacities to create more substantively the livable worlds that are necessary in response to a changing climate driven by the extractive patterns of modern food production. Three core elements of regenerative forms of food production stand out:

1. Regenerative agriculture is premised on collaboration. It bears the potential to strengthen agriculture, social communities and ecologies by reinstating critical relationships that have been undermined and eroded by modern agriculture. This includes the critical dimension of shared decision-making. In this sense, regenerative agriculture is generative to reciprocal relationships between farmers, communities and ecosystems.
2. Regenerative agriculture has the capacities to enhance social justice. As a collaborative endeavor it, for example, rethinks for example the ownership of land and in its best forms directly counters racial inequalities grounded in settler-colonial agriculture.
3. Regenerative agriculture dramatically improves resilience through an emphasis of "working with nature." Success-stories are manifold and have also been presented in this dissertation.

It is in this context that the critical examination of agricultural adaptation policy and practice in Austria and New York provides key insights to strengthen the position of regenerative agriculture. Its results point to major recommendations for how to reshape and rethink adaptation policy in ways that better support regenerative agriculture.

1. Policy Objectives And Policy Commitments

   A particular strength of Austrian adaptation policy are its explicit commitments to sustainability and its coupling with larger political commitments to equity and social justice. Adaptation policies should explicitly incorporate transitions into regenerative agricultural practices, adopt these objectives as law, and establish concrete mechanisms to realize these objectives (including financial commitments).

2. Agricultural Policy

   Agricultural policy needs to be revised to explicitly support these transitions into regenerative agriculture. Creating legal obligations to mainstream these policy objectives perhaps is the

most effective form to achieve these transitions realistically. This would extend key considerations into processes of permitting, subsidy and incentive programs and regulations.

3. Certification

   New York's strategy to localize adaptation policy appears as an effective mechanism to facilitate transitions within political structures and a political climate that prevents stronger top-down interventions into food production regimes. Effectively designed certification programs can create advantages for regenerative agriculture, and regenerative adaptation planning and practice more generally.

4. Preserving Small-Scale Agriculture And Supporting Community-Driven Agriculture

   Agriculture in New York and Austria is similarly organized in small-scale and relatively diversified farming operations. This dissertation shows the critical importance of such structures in increasing resiliency and counteracting structural vulnerabilities. The Austrian case in particular shows, how these structures — grounded in an emphasis of community-centered agriculture — enable important sustainability transitions in the agricultural sector as a means to address the structural production of climate and other risks. And it additionally indicates the role these structures play in enabling the transitions to occur with direct benefit to the individual farmers as they undergo these transitions.

Additionally, the following three recommendations represent more structural interventions into agricultural systems that could potentially catalyze the transformations recommended above.

5. Re-distributed Ownership Of land, Social Justice And Equity

   Perhaps one of the most effective mechanisms to facilitate necessary changes regard the restructuring of land ownership. The discussion of the imaginary of the family farmer in the U.S. indicates how current structures of landownership feed into the current dynamics of transformation. Research suggests how creating collective land ownership structures can have perhaps most significant effects on how land is treated and maintained. Today, land ownership is structured to perpetuate a settler colonialism (Bhandar, 2018; Wolfe, 2006). Legal frameworks need urgent reform and need to reconcile their histories of disrupting (historically

collective forms of) black farming communities. This includes reparations for people of color as well as the repatriation of lands to Indigenous Peoples in the U.S..

6. Food Distribution

   Reform needs to directly address current regimes of agricultural production regimes. This dissertation makes explicit how persistent interdependencies and exploitive structures of modern agricultural production undercut effective adaptation in Austria as well as New York. Without breaking up critical monopolies in the global agricultural sector, effective adaptation seems impossible. Additionally, this dissertation discussed how the creation of local, community-driven or owned food distribution alternative can help decouple problematic interdependencies. This indicates the need to go hand in hand with creating the necessary conditions for local, generative food production systems. CSA systems in the U.S. chart new ways, as the attempt to de-couple food distribution from global market pressures.

7.4. Outlook

Localization processes emerge from and unfold across sites, scales, place, time and socio-cultural strata. In this dissertation I focus on one specific instance of adaptation localizing — namely the localizing of state adaptation policy; or in other words: how the state governs (with) adaptation across scales: 1) how it manages the processes of stabilization across scales, and 2) manifests them in the concretely, locally situated reality of food-producing communities, and how it 3) manages competing stabilizations of adaptation through different configurations of democratic-deliberative and participatory decision-making processes — the sum of which I call localizing. The stabilization of adaptation is of course not achieved solely in processes of localizing policy, as different stabilizations of adaptation co-exist and compete with each other.

I would argue that adaptation is localized in multiple competing processes that also transcend national boarders, especially as challenges such as climate change become global[129]. Just as policy is

[129] "Or one can go even further by suggesting that the notion of a fixed 'centre' for governance and decision-making breaks down altogether as such processes operate within – and are constructed by - a world of networks, shifting alliances and 'ethno-epistemic assemblages" (Irwin, 2015, p. 26).

localized in an interplay of a diverse set of actors across scales and sites, so do economic stakeholders, activists, individual communities, parties, etc. also push to manifest and stabilize their own idea(l)s of adaptation across scales. This means that how adaptation actually manifests, is the product of multiple, co-existing localizing processes that interact and shape each other, and that can potentially also result in competing, simultaneously existing adaptation realities on the ground and even in the same place. Some traces of this phenomenon became explicit in this dissertation, for example, in the deliberate attempts to de-couple economic adaptation and state adaptation efforts in Madison County and New York State. Others are concealed in the structural conditions and histories of racism and colonialism that obscure, in this dissertation, the realities of colonial occupation of indigenous land and their perpetuation in agriculture, the overwhelming racism in the agricultural system and landownership, or the exploitive conditions of agricultural labor, to mention but three. In the case of this study, I developed the notion of localizing on the case of adaptation policy — the ways in which the state seeks to manifest and stabilize adaptation and govern through it. It is intended as but a first chapter in a larger project that ultimately aims to situate what has been described in this dissertation in a larger anti-racist and de-colonial project.

That agriculture does not necessarily need to be exploitive emerges most explicitly in the deep knowledges of indigenous peoples around the world — knowledges that were actively brought to the brink of eradication in the very same colonial histories that brought about modern agricultural systems. There is a flourishing world out there. It is our responsibility, as we adapt, to transcend romanticisms of this recognition and embed adaptation in an explicitly anticolonial project.

7.5. Conclusion

The futures of agriculture are uniquely at stake, as climate disruptions escalate and, in response, adaptation manifests across scales. Critical decisions need to be made, as we chart unknown territory. This dissertation leverages an analysis informed by the field of Science and Technology Studies (STS) to make these stakes explicit, in the hopes to chart a way forward.

STS scholars shows the material politics of technology (Akrich, 1992; Asdal, Brenna, & Moser, 2007; Silbey, 2009; Winner, 1980). In this context, adaptation is revealed as the material constitution of critical moral, ethical and political judgements involved in its governance. It considers adaptation as

technological (in a broader sense) choices that imply political, social and cultural orders and make them durable in their implementation as “technological lock-in”. For example, Akrich (1992) or Winner (1980) show how these judgments, once inscribed, have significant implications for the material constitution of futures and presents. At times, adaptations may be introduced as quick, ad-hoc technological solutions to bridge the impacts emergent problems until more long-term solutions become available or (technologically, politically, economically) viable. However, these literatures show how such short-term “bridge” solutions become durable by pre-determining future solutions and extending current conditions that perhaps preclude more long-term solutions.

These material implications of adaptation furthermore make explicit, how important collective decisions making about them truly is. The introduction of even minute adaptation solutions become part of larger decisions about what may be considered viable futures and how they might be attained. This dissertation made this point by tracing the co-production of policy and local practice, revealing how they are coupled with larger socio-technical imaginaries (2013) about agriculture, adaptation and climate change.

Alan Irwin (2015) raises this question, and asks what role participatory processes can play when it comes to the governance of global-scale challenges and as decisions are made in distributed and often minute instances. STS offers an unique critical lens through which to analyze governance, systems of power and deliberative democracy — and raises important questions about the capacities of participation and deliberative democracy in techno-political regimes (Felt et al., 2013; Hagendijk; Rob & Irwin, 2006; Stengers, 2010; Winner, 1980; Young, 2001).

Drawing on these analytical lenses, I made the argument that adaptation is involved in the governance of the structural, political, social and economic orders of agriculture. At the same time, I showed how adaptation itself is shaped by, limited and/or enabled by the ways in which agriculture-in-society is organized, structured and relationally embedded. I argued that in both cases, critical decisions are made about futures of agricultural production regimes and of those who are involved in it — at times in explicit ways, but often implicitly, indirectly or by consequence.

These decisions emerge across scales, specific sites of decision-making and minute situations. In drawing on Foucault (1997), I made explicit how intertwined processes of problematization, knowledge-

making and governance unfold in de-central and distributed ways and often in minute actions as part of a larger governance apparatus. It is within the specific dispositions of the individual elements that major adaptation decisions are shaped. Adaptation policy has a major role in these dispositions, and can create the structural frameworks for viable and livable futures in a changing climate.

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