

# **Notions of Drought. Nomadic Economy and Tribal Community in Eastern Morocco**

Von der Fakultät für Geschichte, Kunst- und Orientalwissenschaften  
der Universität Leipzig  
angenommene

DISSERTATION

zur Erlangung des akademischen Grades

DOCTOR PHILOSOPHIAE

(Dr. phil.)

vorgelegt

von David Kreuer

geboren am 20.03.1982 in Köln

Gutachter:

Prof. Dr. Jörg Gertel

Prof. Dr. Sebastian Maisel

Tag der Verteidigung: 25.06.2019



# Table of Contents

List of Tables.....	4
List of Figures.....	5
Abstract.....	6
Acknowledgments.....	6
Transcription and Terminology.....	7
1 Introduction: Exploring Drought.....	9
1.1 The Ubiquity of Drought in Eastern Morocco.....	14
1.2 Theoretical Positions: Actor-Networks in the Middle East and North Africa.....	20
1.3 Conceptual Focus: Drought as a Punctualization and Assemblage.....	30
1.4 A Brief History of Drought Studies.....	38
1.5 My ‘Method Assemblage’.....	45
2 Drought and the Nomadic Economy.....	55
2.1 Being Nomadic: Mobility and Sedentarization.....	58
2.2 Water: Scarcity and Abundance at Once.....	63
2.3 Vegetation: Forage and Food.....	67
2.4 Land Use: Appropriation and Conflicts.....	72
2.5 Sheep and Markets in Eastern Morocco.....	82
2.6 Pastoral Producers and Commercial Strategies.....	89
2.7 Neoliberal Policies: Free Trade and Green Morocco.....	94
2.8 The PDPEO: Case Study of a Development Project.....	98
3 Drought and the Tribal Community.....	106
3.1 What is in a Tribe: Identities, Elites, Gender Issues.....	111
3.2 Indicators of Wealth: The Question of Polarization.....	117
3.3 Sources of Power: The Solar and the Spiritual.....	129
3.4 From Tribes to Professions: Education, Diversification, Migration.....	139
3.5 ‘Ayn Bani Mathar: Urbanization in the Making.....	144
3.6 Social Distinction and Generational Shifts.....	150
4 Interpretation and Reflection: The Meaning of Drought.....	159
4.1 Empirical Insights: Rural Morocco and the State of Nomadism.....	160
4.2 Drought Matters: For an ANTification of Middle East Studies.....	165
4.3 Policy Implications: The End of Drought?.....	169
4.4 Drought Philosophy: A World of Silent Transformations.....	175
5 References.....	180

## List of Tables

Table 1: What drought does.....	11
Table 2: Precipitation and drought years (from my 2009 survey).....	16
Table 3: What drought is.....	30
Table 4: Households interviewed per cooperative.....	47
Table 5: Sheep ownership over the last ten years.....	61
Table 6: Income sources (percent) of nomads, former nomads, and non-nomads.....	62
Table 7: Herd size categories and their characteristics.....	90
Table 8: Average sheep sales price (dh per animal).....	91
Table 9: Tribes and municipalities in the survey.....	107
Table 10: Characteristics of the four municipalities.....	108
Table 11: Tents and houses visible from current home.....	111
Table 12: Evolution of mean herd size by category.....	118
Table 13: Gini index by year.....	119
Table 14: Evolution of mean herd size by municipality.....	120
Table 15: Wealth index calculation.....	123
Table 16: Four wealth groups.....	123
Table 17: Herd size versus wealth index (number of households).....	124
Table 18: Wealth group characteristics.....	125
Table 19: Distance to currently used water source.....	136
Table 20: Water sources by municipality.....	136
Table 21: Most popular names per decade for girls and boys.....	154
Table 22: Generations and their characteristics.....	155
Table 23: Income sources (mean percentage) by age group.....	156
Table 24: Mobility, diversification, and well-being in the four municipalities.....	163
Table 25: Demographic development of the four municipalities.....	163

## List of Figures

Figure 1: Mud cracks in the High Atlas, Morocco, October 2008.....	11
Figure 2: Location of the study area in eastern Morocco.....	12
Figure 3: Precipitation and drought years.....	17
Figure 4: ‘Ayn Bani Mathar flood, 1993 (Bilal’s photo).....	20
Figure 5: Overview of the study area.....	46
Figure 6: Assistants carrying out the survey, October 2009.....	51
Figure 7: Population pyramid of the survey sample.....	52
Figure 8: Tent and sheep, Awlad Sidi ‘Abd al-Hakim, October 2009.....	53
Figure 9: Form of habitat by mobility category.....	59
Figure 10: Precipitation and sedentarization.....	60
Figure 11: Sheep ownership over the last ten years by mobility category.....	61
Figure 12: Private pieces of land by acquisition date.....	75
Figure 13: Perception of conflicts by category.....	81
Figure 14: Market in Tendirara, August 2009.....	88
Figure 15: Evaluation of cooperatives by herd size.....	104
Figure 16: Evaluation of reserves by income group.....	104
Figure 17: Nomads per municipality.....	107
Figure 18: Assessment of economic evolution by municipality.....	109
Figure 19: Type of residence by municipality.....	110
Figure 20: Relatives living in the steppe by municipality.....	111
Figure 21: Sheep numbers and Gini index.....	120
Figure 22: Proportion of livestock-generated income by municipality.....	121
Figure 23: Opinions by wealth group (mean values).....	126
Figure 24: Satisfaction by wealth group.....	127
Figure 25: Assessment of own economic development by wealth group.....	127
Figure 26: Frequency of seeing relatives by wealth group.....	128
Figure 27: Province billboards, ‘Ayn Bani Mathar, June 2010.....	130
Figure 28: Power plant – <i>junun</i> – drought network.....	132
Figure 29: Electricity sources by municipality.....	138
Figure 30: Livestock-generated income by wealth group.....	140
Figure 31: Main occupation per ten-year cohort.....	142
Figure 32: Housing type by livestock-based income category.....	143
Figure 33: Real estate advertisement, ‘Ayn Bani Mathar, October 2011.....	145
Figure 34: Road sign, November 2011.....	148

## Abstract

This study is about drought. At the same time, it is about a community of nomadic livestock producers in the drylands of eastern Morocco. Drought is connected to these Arab pastoralists in numerous ways. In fact, it is impossible to understand the social and economic dynamics currently unfolding in the high plateaus without understanding what drought is and does. Even though defining drought may seem straightforward, it turns out that vastly different notions coexist within the study area, each related to a specific constellation (or assemblage) of actors. In this dissertation, I explore those notions of drought and the assemblages they are entangled with, focusing on key elements of the livestock economy and the tribal community.

I hope this study will contribute to knowledge on three levels. First and foremost, empirically: I collect and connect knowledge on an under-studied and marginalized pastoral community in rural Morocco. My insights stem from qualitative and quantitative fieldwork, including a household survey. The second level is methodological: by deploying actor-network theory and assemblage thinking, I tap into theories that have largely been absent from studies of the Middle East and North Africa. As my assemblage approach to drought in eastern Morocco demonstrates, this can generate innovative insights into processes of socio-economic transformation. And third, on a conceptual level, I propose a new way of thinking about drought – a phenomenon of pressing global concern far beyond the high plateaus of eastern Morocco.

## Acknowledgments

Producing this thesis would not have been possible without a reliable assemblage of human and nonhuman actors. First and foremost, I thank my supervisor, Jörg Gertel, who has been an academic role model and a generous friend throughout the years. My further project directors, Ingo Breuer, Karin Frank, and Birgit Müller, offered me advice and inspiration, but also the freedom to pursue this study at my own pace. Sebastian Maisel took on the responsibility of being my second reviewer on short notice. Sandra Calkins and Janka Linke embarked on the PhD journey with me and we have shared many good moments since. The German Research Foundation (DFG) funded my research through Collaborative Research Center (SFB) 586. I am deeply grateful to them all.

The fieldwork was made possible and carried out by a wonderful team of young Moroccan researchers: M'barck Agnaou, Lahcen Ait Mahdi, Rachida Baballah, Nadir Bajouri, Khalid Bennaji, Hanane Chafik, Soufiane Chagdali, Ahmed Eddarkaoui, Amal Elhouasni, Hassan Elhouz, Mohamed Elmoussaoui, Nora Ennah, Salim Hmimnat, Zouhir Marossi, Badiha Nahass, Mahfoud Souaidi, and Mohamed Wazif. *Shukran* and *tanmirt*, my friends! Further invaluable support and companionship in Morocco were provided by Sven Christens, David García Barrero, and Jenia Gutova. A key figure for access to the field, both physically and

intellectually, was Mohamed Mahdi, who has become a good friend since. I also thank Lakhdar Hamzaoui, Mohamed Idergane, and Abderrahmane Mejdoubi for taking their time and answering my questions, as well as the municipal officials in eastern Morocco who greatly facilitated a smooth research process. My largest debt of gratitude is owed to the hundreds of local pastoralists and tribespeople who generously welcomed us into their homes and patiently shared their stories and experiences, more often than not accompanied with food and drinks.

Thanks are also due to the technologies that I relied on while assembling this text; they include my trusty ThinkPad laptop, the LibreOffice, SPSS, and Citavi software programs, but also various voice recorders, four-wheel drives that had to take some blows while keeping me safe, and questionnaires. The office, administrative, and library infrastructures at the University of Leipzig and the Helmholtz Center for Environmental Research – UFZ also supported me throughout the research process, as did my lovely colleagues at both institutions. Sven Christens and Timo Kleemann were of great help with the data entry. Friends and family, especially my amazing wife Nihal and the folks at our housing cooperative in Leipzig, reliably supplied welcome distraction and equilibrium. This dissertation was written at quite different places apart from Leipzig and Morocco, including the forests of the Ore Mountains and the Spreewald, the cities of İzmir and Tunis, and the islands of Borkum, Samos, and Sardinia. I am grateful for the inspiration and tranquility these locations provided.

Several kind people commented on earlier drafts of my manuscript, which helped improve my overall argument and style. Johannes Frische, Felix John, Stefan Kreuer, Meike Will, Anna Wyss: thank you for your critical feedback!

I dedicate this thesis to my grandmother, Maria-Regina, whose inquisitiveness about the world has clearly inspired my own scholarly endeavors. She is now 98, but her curiosity is as keen as ever.

## **Transcription and Terminology**

The interviews quoted in this study were mostly conducted in colloquial Arabic and sometimes in French; all English translations are mine. In the variants of Arabic spoken in eastern Morocco, pronunciation and vocabulary can differ markedly from Modern Standard Arabic and even from western Moroccan vernacular (*darīja*). My transcription is nevertheless often based on the Standard Arabic forms of words in order to increase comprehensibility and because straightforward transcription systems exist. I adhere to the rules established for the International Journal of Middle East Studies, without indicating diacritics or the length of vowels (the latter is often irrelevant in local dialects anyway, cf. Maas and Procházka 2012). This system is practiced by several authors (e.g., Mitchell 2002; Holden 2009) and should make Arabic terms easily legible to readers without knowledge of the language, but equally clear to those who do speak Arabic.

For names of people and bigger cities, I rely on the French-based transcription that is routinely used in Moroccan official contexts and everyday situations. Competing spelling variants may exist, however, since this transcription is not standardized. I have changed some, but not all individual names in order to protect my informants' privacy. The time lag between my research in the field (2008-12) and the final drafting of this manuscript adds another cushioning layer between personal concerns at the time and my description of them in this thesis.

Parts of my economic analysis rely on monetary values, expressed in the national currency. One Moroccan dirham (short: dh) consists of 100 santim (French *centime*). Exchange rates in the early 2010s saw the value of one euro oscillating around 11 dirhams, while one US dollar was worth between 8 and 10 dirhams. There are various colloquial ways of counting money: one dirham equals, for instance, 20 riyal (from Spanish *real*, mostly in western Morocco), 20 doro (Spanish *duro*, mostly in northern Morocco), or 100 frank (French *franc*, mostly in eastern Morocco). Larger amounts are commonly quoted in santim/frank, so that 10,000 dh will be referred to as 'one million.'

Photographs, tables, charts, and illustrations stem from my own fieldwork, unless otherwise noted. They are meant to enhance and complement the textual information by providing additional perspectives on the matters I discuss.



# 1 Introduction: Exploring Drought

Drought, in the arid highland plains of eastern Morocco, appears to be responsible for many things. As I traveled in the region and talked to locals, the topic of drought would almost inevitably come up at some point in every conversation – no matter whether my interlocutors were nomadic pastoralists or settled merchants.

Asked about his definition of drought, a senior figure from the tribe of Awlad Sidi 'Abd al-Hakim summarized the key narrative in just a few words:

'Drought means: there is a lack of rain, so the soil gets dry, so the plants don't grow, so the animals don't find anything to eat.' (Conversation with tribal elder, Awlad Sidi 'Abd al-Hakim, November 1, 2011)

Implicitly, this causal chain extends at least one step further to the pastoralists who raise these animals: they become obliged to buy extra fodder to feed their herd. To obtain cash for the fodder purchase, they usually need to sell some animals. This tends to become a vicious circle where more and more animals are sold to feed the remaining ones; eventually, people start quitting the livestock business altogether.

They also quit the steppe, as it offers no alternative livelihoods, and end up moving to towns and cities. This has led to the establishment of entire new neighborhoods. Just on the outskirts of 'Ayn Bani Mathar, the market town at the heart of my study area, is the growing community of Hayy al-Ziyani. It basically owes its existence to drought – this was explained to me by a young police officer who had grown up in the area.

A related consequence of drought, in such narratives, is poverty. There may no longer be any money to be made out of raising sheep and goats for some families as a consequence of drought damage, but this does not mean that they easily find alternative income sources in their new urban environments. Nor do they typically have any professional experience that would make the transition to a job in trade or services easier.

Adding another element to the story as it is told by locals, drought in the Moroccan highlands has pushed increasing numbers of people to emigrate to Spain and other European countries. Whenever they return to their homeland, whether on vacation or permanently, they do not only import fresh capital, but also new ideas. One example is a wedding hall that has recently opened in 'Ayn Bani Mathar, accompanied by a new demand for wedding-related beauty. Thus, a women's hairdresser first appeared in the steppe around 2007 – another surprising effect of the massive transforming force named 'drought.'

If drought has the power to create entire neighborhoods, drive families into poverty, and bring into existence new economic fields, one should assume that it is a well-studied phenomenon. And there are indeed numerous studies from different academic fields devoted to drought. However, they tend to assume rather narrow perspectives on a complex reality, and

thus overlook numerous aspects that drought is just as intimately connected to. To present some evidence for this claim, I give a brief overview of the current state of drought literature below (chapter 1.4, p. 38).

In part due to this widespread lack of perceptiveness, I argue, drought has been allowed to continue having serious harmful effects. Hence, a core goal of this thesis is to propose a new way of exploring drought. The key theoretical tools I enroll in this endeavor – and this has not been done before – are actor-network theory and assemblage thinking, two related, comparatively novel approaches which I will introduce early on (in chapters 1.2 and 1.3, p. 20). But first, I will further establish the significance of this topic by addressing global aspects of drought and then zooming in on my study region.

Defining drought may seem trivial. Evidently, drought regularly happens all over the world, from the Horn of Africa to California and Australia. Development programs and agencies are devoted to dealing with it, such as the National Drought Management Authority in Kenya; Morocco does not currently have a similar institution. Despite this manifest relevance and visibility, a standard definition of drought has not been agreed upon; the word ‘means different things to different people’ (Heathcote 1969, 176). As with many complex real-life phenomena, there are various competing notions rather than one single definition that is widely accepted. In a first approach, each notion should be taken seriously in its own right and should only be judged by its usefulness in dealing with a specific question.

If you search for ‘drought’ images on an internet search engine, you will be presented with countless variations of the same stereotypical photograph: a dried-up riverbed or water-hole with cracks in the ground, sometimes featuring a dead animal or a desperate farmer. Enter corresponding terms in different languages and you will obtain the same outcome: جفاف (or the synonymous قحط) in Arabic, 干旱 in Chinese, *sécheresse* in French, *засуха* in Russian, or *sequía* in Spanish, to name just the official languages of the United Nations. Such pictures have been ‘the standard photographs of drought’ for many decades (Heathcote 1969, 191). Apparently, a powerful imagery is operative on a global scale. Development and disaster relief programs tap into this imagery. As a pragmatic consequence, I will treat the non-English terms encountered in the field (in my case, mostly Arabic *jafaf*) and in the literature (often French *sécheresse*) as equivalent to English *drought*; there are some language-specific connotations, however, which I address in the next paragraph.

This thesis sets out to go several steps beyond the cracked earth cliché. Mud cracks are seen in places where there used to be water until recently. In zones that are arid to begin with, drought can be much more subtle and take very different shapes. In many languages spoken in arid regions, there is no clear distinction between the words used for dry conditions in general and for drought in particular (e.g., Swahili: Slegers 2008, Maasai: Goldman, Daly, and Lovell 2016, and various Berber languages: Chiche 2003). Even Arabic-speaking nomads in Morocco used to employ more general terms like *jadb* (drought, dearth, scarcity) or *shidda* (hardship, misfortune) to describe drought conditions before the term *jafaf* (dry-

ness) gained currency (Chiche 2003, 246; Wehr and Cowan 1994). Compared to more local terms, *jafaf* has been popularized through media channels and by administrative personnel, and can thus be seen as a ‘national’ concept (Skounti 2012, 189) – or rather a global one, following the above observations.



Figure 1: Mud cracks in the High Atlas, Morocco, October 2008

Generally speaking, drought is not imagined as something material that can be touched, heard, seen, smelled, or tasted. However, drought seems to have numerous effects and consequences. Drought *does* things to soils, plants, animals, and people. Table 1 gives a list of things that various people attribute to drought in eastern Morocco and that are indeed perceivable through the senses; this list is by no means complete.

Drought does...	(according to...)
...reduce vegetation	(tribe elder)
...make people move	(student Ahmad)
...create neighborhoods	(young policeman)
...drive people into poverty and mendicancy	(Al-‘Arabi’s wife)
...promote migration and thus bring new ideas	(adolescent Muhammad)
...reduce livestock numbers	(nomadic herder ‘Ali)
...put an end to camel breeding	(Ramadan’s wife)
...make herders buy fodder	(former nomad Al-Husayn)
...make things complicated	(Farraji’s wife)
...reduce the number of weddings	(meteorologist Bilal)

Table 1: What drought does

Most, but not all of these drought effects are unequivocally negative. At the same time, they hint at the vast range of different areas that can be touched by drought. Being able to do all these things, what is the essence of drought itself, then? This is one way of formulating my

key research question (further discussed in ch. 1.3 below). A number of conceptual and practical questions arise: Is the notion of 'drought' merely a shortcut for a collection of things which might as well be examined individually, or is it more than the sum of its parts? What other things is drought entangled with, and in what ways do they reinforce its destructive capacities? Can we humans learn to handle the consequences of drought better if we modify our general understanding of drought? To broach such problems, I present and discuss insights from my fieldwork in the Moroccan high plateaus (Figure 2 below) in this thesis. The manifold actors that populate this study area serve as my empirical foundation and hence as the key example that I will refer to throughout the text.

In an earlier publication, my colleague Ingo Breuer and I have characterized the high plateaus of eastern Morocco as a 'globalizing periphery.'<sup>1</sup> This notion refers to unequal economic ties and asymmetrical power relations, paralleled by the region's physical distance from the political and economic core it depends on. Geographically, the steppes lie at the margins of Morocco; and yet, contemporary globalization has touched and transformed the region just like any other.



Figure 2: Location of the study area in eastern Morocco

Map tiles by Stamen Design, under CC BY 3.0; data by OpenStreetMap, under CC BY SA

As the Kingdom of Morocco is characterized by a wide range of semi-arid and arid landscapes, a variety of pastoral production systems can be found ranging from vertical transhumance to horizontal steppe pastoralism, and from semi-intensive agropastoral systems to more extensive forms relying almost entirely on natural rangelands. These systems differ widely with regards to natural diversity, the degree of market integration, and state intervention. However, the main pastoral areas share several commonalities: they are prone to high inter-annual variability in precipitation; they are at the periphery of the country, for example

---

1 The following paragraphs are modified passages from that chapter (Breuer and Kreuer 2011).

in mountain, steppe, and desert regions far away from the major cities; and the prevalence of poverty and illiteracy is exceptionally high (Gertel and Breuer 2007).

The eastern Moroccan high plateaus, with over 5 million hectares of arid rangeland, are one of these pastoral areas. They are home to about 100,000 people and 2 million small ruminants (Mahdi 2007; USAID 2006) and fall almost entirely within the administrative Eastern Region (*jihat al-Sharq* in Arabic, *région de l'Oriental* in French). Historically, the area was characterized by extensive, nomadic livestock breeding where people and their herds would move along routes of water points and forage availability (Guessous et al. 1989). Rangelands were in general collectively owned and used by tribal groups. A number of parallel developments – technical, political, socio-economic, and ecological – meant these old ways had mostly disappeared by the 1990s (Rachik 2000). Tenets of former times, the nomadic mobility of livestock and people as well as the collective access to land, have been widely modified or abandoned altogether.

The region's peripheral position has not precluded regular interventions by government institutions and development agencies that have affected local pastoral livelihoods, often inducing processes of social and spatial restructuring (Chiche 2007; Gertel and Breuer 2007). Pastoral cooperatives were established top-down throughout the high plateaus in the 1990s as a response to the perceived dysfunctional state of tribal institutions and to the administration's demand for solid governance structures, framed within a global development discourse. Their main function was to regulate the usage of rangelands and to declare temporarily protected areas in the fight against degradation. Where enforced, this has affected land use patterns; access to the pastures now has to be paid for (Mahdi 2007). Yet, many cooperatives have failed to create the desired level of coordination (see chapter 2.8, p. 98).

Such institutional change has been paralleled by technological manifestations of globalization. From the mid-twentieth century onward, trucks have been used to transport people, animals, water, and fodder rapidly over long distances, replacing the dromedary in this function and making new pasture grounds accessible for those who can afford to buy or rent a vehicle. In combination with other technical innovations and the growing tendency to permanently settle in one of the towns, this had contributed to an increased polarization between wealthy pastoral entrepreneurs on the one hand and impoverished ex-nomads on the other (Rachik 2000).

Another important aspect of globalization concerns the opening up of international labor markets. Since the 1990s, labor migration from the eastern Moroccan highlands has reached a large scale. According to data published by sociologist Mohamed Mahdi (2007), thousands of locals have either become international migrants working in Spain as agricultural laborers or are employed in bigger cities neighboring the high plateaus. This concerns about one in two families in Mahdi's sample. Both forms of migration are temporary, and emigrants do not generally cut their ties with their home communities; many of them go back and forth between Spain and Morocco several times a year. The flow of people and capital between the

two countries is asymmetrical, however, and has therefore not fundamentally affected the peripheral status of the steppes.

It is thus in a double sense that the notion of a *globalizing periphery* can be read: a domestically marginalized area that takes part in globalizing processes; and, in turn, an unprecedented integration that does not automatically establish a more balanced power structure or a more advantageous economic position for the region.

In spite of these changes, the region has remained mainly pastoral, producing sheep and – to a lesser extent – goats. On the whole, it maintains an important role in supplying Morocco's urban centers with meat. But are things really staying the same, as this macro perspective might suggest, or are they changing? What can be said beyond the statement that globalization is an uneven process? And what is the role of drought in this story?

### ***1.1 The Ubiquity of Drought in Eastern Morocco***

The first time I was introduced to the topic of drought in the high plateaus was during the presentation of a film at the French Cultural Center in Oujda, the regional capital of the Oriental (Eastern Morocco), in November 2008. The movie addressed the current state of nomadism in the region. It asked the question what could be done to improve the situation of the livestock breeders in a challenging environment of increasing drought and degradation of rangelands. In the subsequent panel discussion, local teacher and artist Lakhdar Hamzaoui presented a narrative that appeared somewhat folkloristic, romanticizing an ideal society that is under threat and needs to be protected. His pessimistic view was that 'nomadism will disappear.' In contrast, Abderrahmane Mejdoubi, a livestock functionary whose organization had produced the film, was convinced that 'nomadism will change' rather than go away. Both men thus shared a basic premise – that change is happening – but disagreed about the opportunities and threats inherent in this process.

More specifically, Hamzaoui singled out two reasons for the decline: 'trucks and drought.' To him, the combination of technological and climatic factors seems particularly dangerous, not just for the nomadic families, but also for the environment they live in. On his personal website, he states that the principal problems faced by this society come from the outside, those 'that threaten the very existence of the nomadic way of life, fauna, and flora in a region that is afflicted by numerous exogenous factors (drought, poaching...). These problems push tribes toward rural exodus and emigration' (Hamzaoui 2010, 4, my translation). The key elements of this drought narrative were going to become very familiar to me over the course of the following years, but I gradually came to the conclusion that things were not that simple and one-sided.

The next year, in the summer of 2009, I traveled to the high plateaus on another field trip with two Moroccan researchers to interview sheep producers in the steppe; we were aiming at a more detailed picture of the ongoing disappearance – or transformation – of nomadism.

We conducted brief, semi-structured interviews with 16 families who lived in woolen tents near the main roads connecting 'Ayn Bani Mathar to Murayja in my study area (Figure 5, p. 46) and Tendrara to Ma'tarka further south. Seven interviewees brought up the topic of drought although we never asked for it; their names and tribes do not have explanatory value, but are given for illustrative purpose at this stage:

1. 'Ali and his wife from the tribe of Awlad Sidi 'Ali stated that drought had been present for a few years now. Only in the current year, it had attenuated to 'just a little' drought. In case of drought, the family would move westward. Some of their kin had moved up all the way to Jurf al-Milha (400 km away) two or three years ago. Due to drought, livestock numbers had gone down. However, the current year (2008-9) was considered the best since 1985 thanks to plentiful precipitation, so vegetation had become abundant.
2. Al-Shadhili from tribe of Awlad Ahmad mentioned that the municipality had given them some fodder in times of drought.
3. Al-Husayn, Awlad Jabir tribe: 'Most herders buy fodder for their livestock because of the long years of drought.'
4. The wife of Al-'Arabi from the Jababira tribe said that her household had not migrated to the west of the country for three years. They used to go there in drought years to herd for other people or to graze their own livestock. When drought made it necessary, they would even resort to *si'aya*, asking help from others, in places such as Sidi Sulayman or Suq al-Arbi'a' in the west.
5. Ahmad from the Bani Gil tribal confederation: 'We relocate our tent according to drought.'
6. Ramadan's wife from the tribe of Awlad 'Ali ibn Yasin: 'We do not use supplementary fodder unless there is a drought and vegetation becomes scarce. Because of drought, camel breeding has ceased to exist in the area.'
7. The wife of Farraji, Awlad 'Ali ibn Yasin: 'Life used to be better than it is now. Things have become complicated with drought.'

Common themes across these and other accounts are nostalgia for the past, a description of mobility strategies, and a wide range of changes ascribed to the force of drought. The observation about the demise of camel breeding is surprising and sadly ironic: fundamentally, camels are more drought resistant than cattle or small livestock (Fratkin and Roth 1990). So there must be other explanatory factors involved. This pattern, that drought alone cannot possibly be responsible for all the negative change, kept repeating. It also became clear from these encounters that drought is not necessarily a matter of one single dry season, but can continue for years.

During another visit to the region, I met Bilal, the local meteorologist in ‘Ayn Bani Mathar, who shared with me the daily precipitation data he had meticulously recorded for the past eight years, aggregated into monthly totals. Presumably, years with exceptionally low precipitation levels are drought years. To verify this commonsensical assumption, I compared Bilal’s data to the experience of major drought-induced livestock losses among respondents to my 2009 household survey (cf. chapter 1.5, p. 45). Although this survey covered an area much larger than the tiny surfaces of the measuring instruments of this one particular meteorological station, weather trends can be extrapolated for the region. Table 2 juxtaposes annual precipitation measurements and the number of households that reported a massive livestock loss, caused by drought, for the respective year. Each household was restricted to naming one year only, so the list only includes particularly dramatic losses. This analysis is based on agricultural years. My questionnaire simply asked for ‘years,’ but farmers and pastoralists in this region typically calculate in agricultural years (that start and end in fall) rather than calendar years. I followed a classical study of the same region as well as a more recent project report in assuming periods from September to August (Paskoff 1957; DPA Figuiq 2006) and aggregated the meteorological data accordingly.

Agricultural year	Precipitation (mm)	Households reporting major drought-related livestock loss
2002-3	217	7
2003-4	266	15
2004-5	125	14
2005-6	280	9
2006-7	210	12
2007-8	257	8
2008-9	345	3

Table 2: Precipitation and drought years (from my 2009 survey)

What stands out is, first, the large variability of rainfall (snowfall does also occur in these areas, but is the exception and will never last for more than a few days). The wettest year in this period received almost three times as much precipitation as the driest one. The seven-year mean of 243 mm is somewhat above long-term observations for this region, which average 210 mm (FIDA 2002). For better comparison, the same figures can be displayed in a graph (Figure 3). I reversed the left scale (precipitation) to bring both curves into the same logic: thus, ‘less rain’ can be interpreted as ‘more drought’ and results in a higher curve point. The interpolation lines between the dots are merely a visual aid and have no deeper meaning.



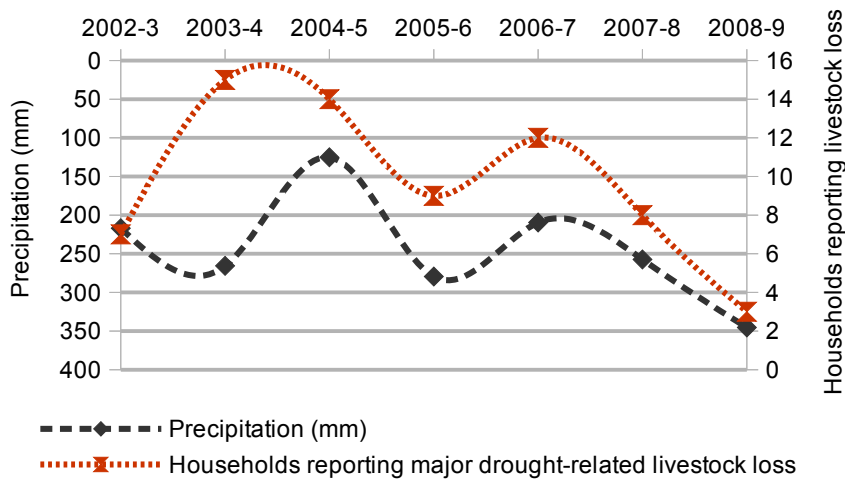


Figure 3: Precipitation and drought years

As assumed, the two curves follow the same general trend: years with little overall rain account for more producers losing their animals than wetter years do. There seems to be no time lag; deficient winter rains immediately affect plants and animals in the following summer, thus within the same agricultural year. A striking exception is 2003-4 which was quite wet (266 mm overall) but is the year quoted by 15 families as the worst in terms of drought-related livestock loss. How could this be? One possible explanation is that the precipitation occurred in an uneven way throughout the year. In this case, a more detailed look is necessary. While overall annual precipitation gives a rough idea, it is no reliable indicator of drought; rather, the distribution of rainfall events across and within seasons needs to be taken into account. A drought year, therefore, is not necessarily a dry year (Yacoubi et al. 1998).

In fact, the irregular character of precipitations ‘weighs heavily on the strategies of nomadic livestock keepers’ (Kamil 1993, 4, my translation) and they pay more importance to the distribution of rainfall than to its overall amount. During some periods of the year, rain is decisive for plant growth, while in others, it hardly makes a difference. In the region of Misour at the western edge of the high plateaus, for instance, a good year is characterized by ample rainfall in both fall and spring: ‘October rains permit the survival of seeds, those of March the emergence of seedlings’ (Kamil 1993, 5, my translation). On the other hand, rain in May and early summer is not seen as very useful for the vegetation (Kamil 1993, 5). This partly explains why 2004 was a bad year for my interviewees despite good overall precipitation levels: one fifth of the annual precipitation occurred in May alone and therefore did not have much effect.

A second part of the explanation is a high occurrence of animal disease in 2004 and particularly 2005 that combined with the drought to produce disastrous effects. According to my informants, an additional difficulty in those very years was demographic in nature: many families had to distribute their estates to their children after the decease of the head of house-

hold, resulting in smaller herds. This would be pure coincidence, as demographic events such as births and deaths, when aggregated, are expected to be distributed evenly over time.

The 2008-9 agricultural year, in turn, was a good one with plentiful rain at the right time. People did not have to buy large amounts of supplemental feed for their animals; and given the economic crisis in Spain, many eastern Moroccans who used to work there as seasonal laborers preferred to stay home and live off their livestock that year.

Apart from the high variability of rainfall, another crucial finding emerges from my data. For every single year since 1992, at least one respondent reported major drought-induced losses, meaning that in 18 out of 18 years, someone was stricken exceptionally hard by drought. Rather than being a discrete event that only recurs once every couple of years, drought appears to be deeply entrenched as a permanently looming threat for members of the pastoral community in the Moroccan steppe. Therefore, I prefer speaking of 'drought' in the abstract rather than clearly distinguishable 'droughts' in the plural. Different households will be affected at different points in time, however, depending on a bundle of related circumstances. What could those be?

In large countries or on the scale of continents, drought will typically affect some, but not all regions in any given year due to the spatial distribution of precipitation deficits (Wilhite 2000). In a study area as small as mine (about 4,000 km<sup>2</sup>), which features a rather uniform and flat landscape and a homogeneous climate (Müller-Hohenstein 1978a, 38), such an explanation can be ruled out. As many authors have pointed out before, it becomes clear that drought cannot be properly understood in isolation from social, political, ecological, or economic circumstances; it 'can occur even when meteorological conditions remain normal' (Swearingen 1992, 401; see also Goldman, Daly, and Lovell 2016). To unfold its full devastating potential even in years with ample precipitation, then, drought must combine forces with other actors. How this happens is one of the key questions addressed by this thesis.

Meteorological conditions should be the starting point, nevertheless. A recent study states that about one in three years can be considered a drought year in the Bani Mathar municipality in my study area. This figure is similar to that of the 1930s; dry years had gradually become less frequent until the 1970s, when the trend reversed (Bechchari et al. 2014a). Depending on the scope of one's historical perspective, the current annual rainfall rates that 'have prevailed since about the mid-1970s' may therefore appear well below average (Schilling et al. 2012, 13). For Moroccan agriculture in general, one in three years was considered exceptionally dry during the 20<sup>th</sup> century (Yacoubi et al. 1998), and one in two during the 1990s (Chaarani and Mahi 2008, 49).

Drought seems to be located on a level somewhere between the day-to-day temperature, precipitation, cloud cover, wind, or humidity conditions of *weather* and the long-run, cyclical patterns of *climate*. Generally, however, 'drought is recognized to be part of the climate process' (Heathcote 2013, 228). In consequence, contemporary scientific studies are mostly

concerned with drought in the context of longer-term climate change (chapter 1.4, p. 38). As a complement to these studies, I tried to tap into local knowledge. One instance of such knowledge is documented in the neatly written notes of Bilal, the meteorologist responsible for the weather station on the main road north of 'Ayn Bani Mathar. He sums up his decades-long experience observing weather patterns in the high plateaus as follows:

'The climate of the 'Ayn Bani Mathar zone is a Saharan climate. Locals refer to it as "the four seasons:" i.e., sometimes during summer, the weather is nice in the morning; from 12 to 3 pm it is very hot with a sand storm and very strong wind; then from 3 to 6 pm there is a thunderstorm followed by torrential rain and inundation of roads; the night is calm and cold.' (Bilal's notes, my translation)

Indeed, what sets the arid climate of the high plateaus apart from other regions at this latitude is 'their relative "openness" to Saharan influences on the one hand and their comparatively strong *shelteredness from Atlantic and Mediterranean influences* on the other' (Müller-Hohenstein 1978a, 26, my translation). This circumstance is linked to the existence of mountain chains west and north of the plains and their absence in the south and east. Nearly constant air movements are another distinct climatic feature of the high plateaus (Müller-Hohenstein 1978a, 34). Bilal, in his notes, goes on to describe the four winds and what they typically herald for this region:

'Winds: (1) Northern wind: cold and sometimes icy, 50 to 60 kph. (2) Eastern wind (*shargi*): dry and hot, dusty, 20 to 40 kph. (3) Southern wind: very severe, Saharan, very hot, carries red sand and brings thunderstorms, 70 to 90 kph. (4) Western wind: very strong and very cold, carries rain and snow, between 30 and 80 kph.' (Bilal's notes, my translation)

This formulation is very similar to the one found in a study of the same region from the 1950s, which shows that there has not been a fundamental change in meteorological conditions, at least (Paskoff 1957, 35). The social, economic, and environmental transformation that everybody seems to agree about, and that seems to be so heavily influenced by drought, cannot be found in altered wind patterns. Then and now, western winds tend to be wet and eastern winds dry in the high plateaus of Morocco; northern winds are usually cold and southern winds hot. Such characterizations are known in practically all societies whose economic activity is strongly linked to weather conditions, although the specifics vary from one place to another. An old English adage goes: 'Wind east or west / Is a sign of a blast; / Wind north or south / Is a sign of a drought' (quoted in McCartney 1934, 18). To give another example, the Ghareghani nomads in Iran know: 'When the North clouds come the rain will fall' (Emadi 1995, 146).

One crucial aspect should not be forgotten when conceptualizing drought as a harmful lack of rain: its opposite is not necessarily desirable, either. Excessive rain may bring about floods and inundations, which can be as detrimental or even disastrous as drought. I have seen fields and bridges destroyed by floods in Morocco, and large numbers of fatalities peri-

odically occur when homes are washed away (Johnstone 1997). In the wake of contemporary climate change, both drought and extreme rainfall events are expected to increase as weather patterns become more erratic; I will further discuss such projections below (chapter 1.4, p. 38). A close connection between drought and flooding has been established and documented since Greek antiquity, at least, where drought 'and another destructive agent, excessive rainfall, [were] often mentioned in one and the same breath' (McCartney 1934, 17). It is intriguing to note that drought is labeled a 'destructive agent' in this article which was published in 1934, decades before accounts of nonhuman agency came to be considered controversial (see next chapter).



Figure 4: 'Ayn Bani Mathar flood, 1993 (Bilal's photo)

Given the ubiquity of drought in eastern Morocco, combined with the observation that there are vastly different notions involved, the elementary question I follow in this study is in what ways drought is able to have the negative impacts it does. Since drought acts together with countless other entities it is linked to, an examination of those links is an integral part of that task. Before refining my research question(s) further, I should introduce the theoretical approach that I found most helpful and that will serve as a conceptual anchor for my subsequent analysis. It also more clearly positions my work within the academic field of Middle East studies.

## ***1.2 Theoretical Positions: Actor-Networks in the Middle East and North Africa***

Through the course of my higher education, I have come to equate my home discipline of *Arabistik*, as it is referred to within the University of Leipzig, with the Anglo-Saxon concept of Middle East studies (rather than Arab studies). Despite distinct institutional histories, both fields today combine a solid knowledge of the same world region, skills in local languages above all, with methodological tools and theoretical insights from the whole spectrum of humanities and social science disciplines. These include anthropology, economics, geography, history, law, linguistics, literature, political science, psychology, religious studies, soci-

ology, and others, depending on specific research interests and questions. North Africa, itself a vast and diverse region, is routinely subsumed under Middle East studies rather than African studies, privileging ethnic and linguistic ties and a shared commercial and political history over geographical coincidence.

My eastern Moroccan case study is relevant to the wider field of Middle East studies for several reasons. For one, comparable steppe ecosystems and pastoral economies exist in numerous countries of the region, stretching from neighboring Algeria to distant Iraq and beyond. These drylands and their inhabitants are often at the margins of public perception, both internationally and domestically, but they hold a potential for major social unrest. The so-called Arab spring serves as a recent example, originating in part from protest movements in the Tunisian hinterland. What is more, my research touches upon multiple political, economic, social, historical, linguistic, and environmental questions that preoccupy Middle Easterners and North Africans as much as outsiders who study the region. I address the most pertinent of these points in the concluding part. And finally, I hope to connect to theoretical debates in the field, such as the proclaimed 'spatial turn within Middle East studies' (Hammond 2017, 319) and what may come next.

At the 2011 annual meeting of the Middle East Studies Association of North America, arguably the most influential professional association in this research domain, president Suad Joseph summarized the state of the field, the issues that were being debated, and the approaches that were needed in Middle East studies. One of the challenging tasks the anthropologist laid out was the questioning and undoing of dichotomies of all forms, given their often misleading nature and harmful potential. Joseph argued that scholars should never 'appropriate such political tools as analytical tools' (Joseph 2012, 19–20) lest they become complicit in the perpetuation of unbalanced power structures. Her list of problematic binaries that operate in the field of Middle East studies is long:

'Islam versus Christianity; Middle East versus West; modern [versus] traditional or modern versus anti-modern[;] religion versus science; secularism versus religion; civilized versus uncivilized; masculine versus feminine; public versus private; civil society versus state; youth versus elders; formal parties versus networks; informal economies versus formal economies.' (Joseph 2012, 19)

Not all of these dualisms are relevant to my concerns in this thesis, but the argument holds when I add more pertinent examples: nomadic versus sedentary people; natural versus man-made disasters; the state versus the tribe; or backwardness versus development. None of these have proven to be very insightful or even innocent in dividing up the world into opposing camps. Yet, they remain widely in circulation. Not just in area studies, adding nuance and depth to our understanding of the world is a key task of academic research.

A second important mission in our strongly interconnected world, according to Joseph, is to analyze the multifarious ways in which all kinds of different people and settings are linked together. Hence, Middle East scholars 'need to understand the technology of connec-

tion, the economics of connection, and the politics of connection' (Joseph 2012, 20). Otherwise, we risk losing track of reality, which will meanwhile keep producing more and more of these connections.

Working against binaries and studying connection are essential motifs for the work I am presenting here. In this regard, I identified actor-network theory (ANT) as a suitable and inspiring approach. This label is applied to a growing body of work that quintessentially addresses connections, and has been keen to think outside long-standing binaries. Among the dichotomies that have been rejected by ANT scholars, the most salient are perhaps: 'macro/micro, subject/object, human/nonhuman, nature/society, local/global, theory/method, and structure/agency' (Kirsch and Mitchell 2004, 688) – all of which seem to constitute basic tenets of accepted sociological knowledge.

ANT emerged from the study of science, technology, and society; it has been described as a method to study society, but also as a meta-theory on what society is. As a two-line summary cannot adequately capture this multi-faceted worldview, I will use the next pages to gradually flesh out those ideas that matter to my study of drought and socio-economic change. The most influential author in the field of ANT is philosopher, anthropologist and sociologist of science Bruno Latour who started developing his ideas in the late 1970s while he was engaged in an 'anthropological' observation of a group of laboratory scientists in the United States. Alongside Latour, other authors have contributed their works to build a sizable corpus of ANT-inspired studies and essays.

There has been some persistent confusion as to what ANT precisely is, partly due to its name that lends itself to misunderstandings (Latour 1999a). First, it may not actually be a *theory*:

'Theories usually try to explain why something happens, but actor network theory is descriptive rather than foundational in explanatory terms, which means that it is a disappointment for those seeking strong accounts.' (Law 2009, 141)

Second, it is neither about *actors* in a conventional sociological or political sense, nor about *networks* understood as topographical structures composed of clearly identifiable nodes and edges that can be evaluated using mathematical methods. What is more, an actor-network is *not* a network of actors – but rather an entity that acts on other entities it is connected to. And this characterization can apply to nonhumans just as well as humans.

ANT's rootedness in anthropology is clearly reflected in many of its core principles. Instead of a rigid theoretical framework that predetermines its outcomes to a large extent, actor-network theory aspires to be 'a toolkit for telling interesting stories' about very concrete, often fragile relations and how they are held together (Law 2009, 142). Description is emphasized over explanation; or rather, the explanation is to be found in the description. This goes hand in hand with a joyful 'willingness to be surprised by the actors and connections one is tracing' (Felski 2016, 749). Therefore, ANT accounts should be informed by alert-

ness, on the part of the researcher, 'to the messy practices of relationality and materiality of the world. Along with this sensibility comes a wariness of the large-scale claims common in social theory,' which seem overly simplistic (Law 2009, 142).

The lofty position of some social scientists that enables them to put forward grand structural explanations is frowned upon by actor-network theorists and replaced with a more anti-like behavior: myopic but untiring in detecting and following ever more paths and traces. This is based on the recognition that

'actors know what they do and we have to learn from them not only what they do, but how and why they do it. It is *us*, the social scientists, who lack knowledge of what they do, and not *they* who are missing the explanation of why they are unwittingly manipulated by forces exterior to themselves and known [only] to the social scientist's powerful gaze and methods.' (Latour 1999a, 19)

In order 'to learn from the actors without imposing on them an *a priori* definition of their world-building capacities' (Latour 1999a, 20), ANT scholars have tended to use a simple and unrefined conceptual vocabulary. Crude terms like 'association, translation, alliance, [or] obligatory passage point' serve to avoid replacing an actor's own social ontology with that of the social scientist (Latour 1999a, 20). This view, while it may challenge conventional wisdom and practice in the social sciences and humanities in some ways, is central to my own appreciation of ANT.

A textbook example of ANT thinking that involves one of those primitive terms, translation, illustrates how humans and nonhumans can 'fold into' each other. It touches upon an old political debate in the United States, the question being whether 'guns kill people' or 'people kill people' – in other words, should the number of firearms be more heavily restricted in order to reduce the number of murders? Or is the problem a social one and a ban on certain weapons would simply push people into different methods of killing or harming others? The approach Latour proposes instead acknowledges that the gun and the shooter together form a new, hybrid actant, which possesses properties that neither of them has on its own. *Actant* can be used as a synonym for actor-network, and to emphasize that recognized and institutionalized *actors* are not the only ones who act (Latour 2017). In this example, the weapon and its user both impose their own scripts, programs of action, propensities, and thus transform each other. The way a gun feels, looks, and behaves entices the gunman to use it. His original goals may become displaced in an act of *translation*: 'You only wanted to injure but, with a gun now in your hand, you want to kill' (Latour 1999b, 178–79). The basic ANT answer to the ideologically fraught binary question is, therefore: 'It is neither people nor guns that kill. Responsibility for action must be shared among the various actants' (Latour 1999b, 180). A successful policy should hence aim at a lower number not of guns *per se*, but of harmful people-gun hybrids – which can be achieved in more than one way. This perspective can hence open up new avenues, I contend, for political decision mak-

ing. In the same way, a new, ANT-inspired appreciation of drought could help establish better policies for the nomads of Morocco (ch. 4.3, p. 169).

Understood in this broad sense, translation is an integral part of life whenever two things interact in the pursuit of their respective interests. My somewhat casual declaration that I will treat the notions of *jafaf* – drought – *sécheresse* etc. as equivalent can be justified from this angle: everything is translated all the time (Felski 2016), and the transfer of a concept from one language to another is just one more link in a long chain of transmission, where the involved items are slightly modified at most steps. Translation between languages is not, in itself, more meaningful than any translation that happens when a word (with its attached notions) travels within a single linguistic community.

With this concept in mind, the following quote by political ecologist Giorgos Kallis seems to capture the multiple translations that drought is involved in at all times, even if the vocabulary used is different. It is from his seminal 2008 review of the academic literature on drought:

‘Droughts combine with other stressors to affect unevenly, either directly or indirectly, a multitude of social and ecological functions [...].’ (Kallis 2008, 109)

This combined influence of actants (i.e., actor-networks) on yet other actants is the essence of translation. For eastern Morocco, the coincidence of drought and animal disease in 2004 and 2005, as mentioned above, is a typical example. In the face of vast and complex webs of translation, one task of social science, as seen by actor-network theorists, could be to account for all these connections and interactions. They can be made visible because their establishment and maintenance require energy, effort, labor, often against resistances and challenges by other actants. Latour therefore proposes thinking of every actor-network as a ‘worknet’ or ‘action net’ (Latour 2005, 132). By tracing the effort that other actors invest into stabilizing it, any connection can be documented. Conversely, something that is not connected to anything, has no effect whatsoever on anything, is of no interest – and arguably not even real. This may change anytime, however, when a hitherto unknown actant jumps onto the stage, causing trouble and confusion, from the vast uncharted territory Latour calls ‘plasma’ – ‘that which is not yet formatted, not yet measured, not yet socialized, not yet engaged in metrological chains, and not yet covered, surveyed, mobilized, or subjectified’ (Latour 2005, 244).

The statement that ‘to be real is to have causal powers’ is known in philosophy as Alexander’s dictum (Kim 1993, 348). Things ‘become real by amassing allies, expanding ties, and thereby sustaining their existence’ (Felski 2016, 760). An actant, hence, is ‘a source of action [...]; it is that which has efficacy, can do things, has sufficient coherence to make a difference, produce effects, alter the course of events’ (Bennett 2010, viii). In consequence, everything that is real can be analyzed as an actant; and ‘since for ANT everything is social, including non-humans and nature, the entire world appears as a “collective” of actor-networks’ (Krieger and Belliger 2014, 8).



What sociology refers to as a society, then, is usually a collective of humans; but it cannot be understood without all the nonhuman materials that are an integral part of it. For ‘material-semiotic’ approaches (Law 2009, 141) such as ANT, where all actions are relational effects, ‘the social is *nothing other than patterned networks of heterogeneous materials*’ (Law 1992, 381). Allegories used in everyday speech or expert jargon actually hint at this fundamental sameness. Thus, a geographer may write about ‘North African arid steppe societies’ (Müller-Hohenstein 1978b) and refer almost exclusively to plants.

In sum, actor-network theory provides a fundamental, minimal ontology, where *everything* (barring the yet unknown ‘plasma’) is an actant or actor-network. Similarly to Marxism in a sense, ANT is based on ‘a radical shift to a relational ontology, a world of relations and processes and not things-in-themselves’ (Kirsch and Mitchell 2004, 689). In contemporary philosophy, research into the ramifications of quantum physics has led in comparable directions, where some scholars argue in favor of ‘a metaphysics of relations in contrast to a metaphysics of individual things’ (Esfeld 2004, 601).

In the field of Middle East studies, Timothy Mitchell provides a rare example of ANT-like thinking (although he does not use this label) when he asks: ‘Can the Mosquito Speak?’ (Mitchell 2002, 19–53). One of the important arguments he makes is that history, when being recorded and retold, tends to focus on political actors – the British, national elites, and occasionally certain subaltern communities. Nonhumans such as the anopheles mosquitoes that brought malaria to Egypt, on the other hand, are ‘said to belong to nature. [They] cannot speak’ (Mitchell 2002, 50). But studying the complex interactions between humans and mosquitoes, tanks and parasites, dams and synthetic nitrates makes it possible to more fully appreciate certain political and social transformations, as Mitchell convincingly demonstrates.

Another early study from the Middle East and North Africa (MENA) region that deploys elements of actor-network theory is Gil Eyal’s account of Israeli military intelligence (Eyal 2002). More recently, several authors in the field have begun to show an increasing awareness and interest in analyses of connectivity, translation, nonhuman agency, or assemblages (El-Kazaz 2017), even if their texts do not necessarily discuss actor-network theory. Such insightful work notwithstanding, I argue that ANT approaches remain largely underutilized in Middle East studies today, which may also be due to some controversies surrounding this line of thinking.

The controversial status of ANT has several reasons. Since its inception, actor-network theory has been critiqued by other scholars, with varying arguments and degrees of harshness. Their criticism has regularly been responded to in subsequent publications by ANTians, who often used such opportunities to further elaborate their viewpoints. Three related arguments are commonly associated with such critique. First, the pledge to treat humans and nonhumans symmetrically purportedly runs into a dead end. In the view of some critics, ‘stable and distinctive differences inevitably emerge between humans and non-

humans; [and] the denial of these differences leads to a failure to understand the social and ethical dimensions of the 'nature-cultures' under study' (Murdoch 2001, 128). Second, ANT has been accused of being 'politically inert' (Kirsch and Mitchell 2004, 694) with its supposed use of a technocratic vocabulary, leveling of hierarchies, relativism, and blindness to power issues. Third, and quite polemically, the approach has been associated with objectionable neoliberal and even fascist ways of thinking for much the same reasons (Fuller 2000).

On all three accounts, I agree with defenders of actor-network theory. Why would a sharp, ANT-informed observation of how the world works (including the production of power, inequality, suffering, etc.) preclude taking moral stances, making normative judgments, or engaging for political aims? In my perception, there is no such inherent tendency. Quite to the contrary, once we 'understand how size and power are manufactured then we can understand how they can be transformed' (Murdoch 1997, 335). Accounting for the multitude of materials that lend stability to configurations of domination will provide a fuller picture of those, and stories about unintended consequences and surprising resistance by actants that are difficult to control, such as the mosquitoes in Egypt, may inspire alternative social, political, and economic scenarios. In a related debate, feminist scholar Donna Haraway has argued in favor of 'partial, locatable, critical knowledges sustaining the possibility of webs of connections called solidarity in politics and shared conversations in epistemology' (Haraway 1988, 584) as a third alternative to relativism and totalization, two forms of misguidedly laying claim to scientific objectivity. This multiplication of partial standpoints and perspectives is very much in the spirit of ANT. What is more, the goal has never been to abolish other forms of scholarly inquiry or of conceptualizing and categorizing the world, when ANT merely questions some of their hidden assumptions. Instead, 'the stress lies on the making of ties rather than the breaking of ties' (Felski 2016, 760) for ANT analysts.

For Middle East scholars, I therefore claim, these approaches represent a useful and innovative way of generating knowledge about many issues of regional and global concern, including climate change and socioeconomic transformations in the highlands of eastern Morocco. By writing this thesis, I make an attempt at demonstrating this usefulness. I could have tried to play it safe by sticking with an uncontroversial theory and simply going through the motions. Choosing a less conventional take instead made the analytical process more meaningful to me, and my aspiration is that it will result in a more interesting and relevant study in the end.

To be sure, my explicit reference to actor-network thinking will be selective rather than exhaustive throughout most parts of this text, given its role as an ontological foundation rather than an artisanal method that must be rigorously applied to every observation one makes. The bulk of my empirical findings are meaningful and understandable on their own terms, without recourse to this particular perspective and vocabulary. For data generation and analysis, likewise, I have relied on time-tested methods of quantitative social research and descriptive statistics. But the anchoring in actor-network theory and assemblage think-

ing (see next chapter) adds coherence and depth that could not have been achieved otherwise to the material I present, and opens up new ways of conceptualizing drought in a nomadic community. This is decisive.

I am not a proponent of conceptual monoculture, *nota bene*; a diversity of perspectives will always help collect and connect pieces of information and forge them into a more solid knowledge structure. Therefore, I do engage with other bodies of theory where they seem helpful to obtain a more wholesome picture of what is going on in eastern Morocco. Numerous non-ANT texts have influenced my thinking and fundamentally informed my fieldwork. In a way, the ANT perspective is able to accommodate other theories: a household's access to resources, for example, which is seen as a key explanatory element by my project directors (Gertel 2007), can fundamentally be expressed in terms of this household's connections to the actor-networks that are those resources. My impression is that ANT thinking is less rigid in prematurely defining limits between categories, and is thus able to capture nuances that are easily overlooked otherwise.

Theoretical concepts should generally serve as guidelines that open up new perspectives, not to prematurely shut down possible alternative accounts of reality. Admittedly, this comes with a certain degree of vagueness, which may be unsatisfactory when dealing with very precise practical questions. I will of course use very specific concepts and analytical terms when discussing concrete actor-network constellations. But for some of the broader questions behind this study, a more generic approach seems most appropriate.

Some of the theoretical directions I draw on do not explicitly refer to one another, but seem to fall into a similar category of ideas. In a way, they reflect the observation that the currently dominant ways of doing things in our late modern world, with their emphasis on free market capitalism, are coming to a dead end. They have not been able to bring about democracy, justice, peace, or prosperity on a global scale, nor have they been able to prevent or attenuate disasters of various kinds, including natural calamities like drought. And while alternative, Marxism-inspired views have contributed important critical insights into histories of power and exploitation, they have also failed to make a lasting impact with statements of the following type: 'natural disasters are not physical phenomena. They are a social phenomenon induced by physical events' (García 1981, xiii). Proponents of such views might claim, in the example above, that only people kill people and guns play no special role, being a completely 'neutral carrier of human will' (Latour 1999b, 177). The lines of reasoning that I subscribe to, by contrast, maintain that drought is both physical and social. Three core ideas I adopt from non-ANT or loosely ANT-related thinkers will be outlined in the remainder of this chapter: silent transformations, propensities, and smooth spaces. They help make more sense of drought and of the related socio-economic dynamics that I will describe and analyze later on.

Man-made climate change and similar risks may have been allowed to reach such critical levels because they are omnipresent and subtle at the same time, which makes them imper-

ceptible on a day-to-day basis. This is an explanation forwarded by philosopher and sinologist François Jullien, who has become well-known with his project of putting elements of ancient Chinese philosophy into a dialog with occidental ways of thinking. One of his essays, 'The Silent Transformations' (Jullien 2009), starts from the observation that many of life's most fundamental processes – the seasons of the year, growing up or growing old, processes of maturation and decay, friends and lovers growing apart, snow in the process of melting – tend to go unnoticed even though they happen in front of our eyes. The sudden realization that one has grown old, which entails much more than a few anecdotal gray hairs and only works through comparison with a much earlier state of affairs, may then come as a shock and surprise.

Chinese philosophy appears to perceive and conceptualize these silent transformations better than Western traditions. A key difference, in Jullien's interpretation, is the conception of change. Transformation (and, in fact, life) was viewed like movement by the ancient Greeks: it starts from a point and ends at a point (*telos*). Chinese philosophers, in contrast, were not concerned with beginnings and endings, with the enigma of Creation and the drama of Apocalypse. For them, every beginning growth phase carries within it the decline that will inevitably follow, and every decline already prepares the next ascent; 'the world dies every day, the world is born every day' (Jullien 2009, 73, my translation). Hence, continuity and change are in a dialectic relation. They are opposed, yet depend on each other. In a somewhat similar fashion, actor-network theorists have concentrated on movement or circulation as a way to bypass sterile dichotomies such as the agency-versus-structure debate (Latour 1999a).

A recently popular author, political theorist Jane Bennett, expands on these ideas. She focuses on vital materiality as 'the capacity of things—edibles, commodities, storms, metals—not only to impede or block the will and designs of humans but also to act as quasi agents or forces with trajectories, propensities, or tendencies of their own' (Bennett 2010, vii–viii). Since droughts belong to roughly the same category as storms, analyzing them in similar ways should be possible. To delineate these quasi-agents or forces, Bennett borrows the notion of *shi* (勢) from Jullien's translation work. *Shi* is described as 'the style, energy, propensity, trajectory, or élan inherent to a specific arrangement of things' (Bennett 2010, 35). This idea of *shi* may play a similar role as ANT's *plasma*, the uncharted territory of yet unknown actants and their future connections; but I think it does a better job at conceptualizing the virtual as an 'ever-present potential' (Müller and Schurr 2016, 222). The concept of *shi* also resonates with the late work of Karl Popper, the renowned philosopher of science. His view of propensities, corroborated by quantum physics and chaos theory, implies that the 'world is no longer a causal machine' (Popper 1990, 18), but rather a world brimming with possibilities that try 'to realize themselves' in time (Popper 1990, 22). The figure of the assemblage (see next chapter) allows fusing this notion of propensities with actor-network theory.

The assumption that ‘arrangements of entities’ are the fundamental building blocks of social life, according to one analyst (Schatzki 2002, XIII), constitutes a common basis not just for the theories elaborated by Latour and his ANT colleagues, but also the highly influential writings of Foucault, Deleuze and Guattari, and others. The latter pair’s notion of a minor science, in fact, opens up questions akin to those asked by actor-network theory and has been an inspiration to its development from early on. Both approaches centrally deal with innovation, improvisation, and surprise – after all, ‘the slight surprise of action’ (Latour 1999b, 266) is a recurrent theme in ANT texts.

Crucially for my study of a nomadic community in Morocco, actor-network theory has been categorized as ‘an empirical version of Gilles Deleuze’s nomadic philosophy’ (Law 2009, 145). What is meant by nomadic philosophy? Since Deleuze and Guattari’s dense prose is not easy to summarize or even to fully understand, I will limit my account to a few key words. Building on notions elaborated earlier by Michel Serres, the idea is that there is a ‘minor’ or ‘nomadic’ science as opposed to the ‘royal’ science. It has a hydraulic model instead of a theory of solids; a model of becoming and heterogeneity which is opposed to the stable, the eternal, the identical, the constant; a model which is problem-oriented rather than theorem-oriented. In this model, ‘each figure designates an “event” much more than an essence’ (Deleuze and Guattari [1980] 1987, 362). While royal science is related to the ‘striated’ space of agriculture, central administration, and standardization, the open rangelands of the nomads serve as an image for ‘smooth’ space where other things are possible.

‘Of course, smooth spaces are not in themselves liberatory. But the struggle is changed or displaced in them, and life reconstitutes its stakes, confronts new obstacles, invents new paces, switches adversaries.’ (Deleuze and Guattari [1980] 1987, 500)

Another fruit of Deleuze and Guattari’s work is the notion of ‘assemblage’ and a blossoming academic literature inspired by ‘assemblage thinking’ in a broader sense (Müller and Schurr 2016). It is akin to actor-network thinking in many ways and will help me in my analysis of what drought is. If drought is indeed ‘a combined hydroclimatic, environmental, and socio-economic product’ (Kallis 2008, 87), theories that are able to reach across these different spheres are needed. Latour’s often-cited characterization of cross-cutting, hybrid networks holds equally true for drought (Downing and Bakker 2000, 87):

‘The ozone hole is too social and too narrated to be truly natural; the strategy of industrial firms and heads of state is too full of chemical reactions to be reduced to power and interest; the discourse of the ecosphere is too real and too social to boil down to meaning effects. Is it our fault if the networks are *simultaneously real, like nature, narrated, like discourse, and collective, like society?*’ (Latour 1993, 6)

This realization seems to call for a maximal open-mindedness on the part of any researcher or team of scholars who study drought. I take assemblage thinking, vital materiality, and Chinese philosophy to be helpful extensions of ANT in this sense.

### 1.3 Conceptual Focus: Drought as a Punctualization and Assemblage

After this delineation of an epistemological and theoretical background, I now come back to my embryonal research question: What is drought? Rather than defining drought in its presumed essence or trying to catalog all the components it can be broken down into, I endeavor to describe its relations and connections to other actants. These connections are inherently unstable and open to modification. I will explore a multitude of existing actor-network *assemblages* (more on this term below) that involve drought, from fairly obvious to rather unexpected ones. This will result in an enhanced, relational understanding that might even help stakeholders and analysts better deal with future drought events. My study can provide a contribution to a number of ongoing debates in political and academic communities as well as the wider public. Taking the high plateaus as a case study also promises some opportunity for knowledge construction through extrapolation and generalization: Morocco has been portrayed, after all, as ‘a representative drought-prone developing country’ (Swearingen 1992, 401) similar to other places across the world.

Importantly, my goal is not to elaborate an authoritative definition of what kind of thing drought is – to settle its ontological status once and for all. Such a general consensus does not exist and a ‘universal definition of drought is an unrealistic expectation’ (Wilhite 2000, 10), as generations of scholars have realized. To give a few examples, drought has been characterized by various analysts as being:

an exogenous factor that threatens nomadic communities (Hamzaoui 2010)
‘a recurring extreme climate event over land’ (Dai 2011, 45)
a process rather than an event (Al-Madhari and Elberier 1996)
a natural hazard (Wilhite 2000)
‘a relative concept, defined as a departure from the historical record’ (Kallis 2008, 88)
‘a complex process,’ brought about by changes in animal and plant appearance and behavior (Castillo and Ladio 2017, 9)
‘the social perception of a water deficiency with reference to a normal condition socially defined’ (García 1981, xii)
‘covariate shocks’ that affect many families at the same time (Devereux 2007, 56)

Table 3: What drought is

Although such definitions are not by necessity mutually exclusive, they focus on very different qualities of drought and emanate from quite specific standpoints: that of an artist and activist in Oujda, an atmospheric scientist in the United States, a pastoral community in Argentina, a development economist in Sussex, and so on. In this study, I will propose additional designations, relating and thus ‘translating’ the insights that pastoralists in eastern Morocco shared with me and my fieldwork team.

One way of dealing with this great diversity of drought definitions has recently been proposed in the field of geography. According to an ‘ontological strategy’ (Goldman, Daly, and Lovell 2016, 28) that builds upon work done by Annemarie Mol and colleagues, there are not just different epistemologies (ways of knowing) or explanations of the one stable ontological entity that is drought. Rather, multiple ontologies and thus realities exist at the same time, which are constantly being ‘enacted’ (Goldman, Daly, and Lovell 2016, 28) by different communities. To me, the term *enactment* sounds as if the script has already been written elsewhere and individuals can do nothing but follow it with a small margin of interpretation, even though this is probably not what the authors mean. Moreover, their introduction of a new academic metaphor, *fluid space* (Goldman, Daly, and Lovell 2016, 31), to explain how an object can gradually change appearances without losing its identity while moving across different networks, raises more questions than it answers. But the idea of acknowledging and exploring multiple ontologies of drought that are stabilized through daily practices is helpful in assembling my own approach.

Another perspective can be gained from ancient Chinese Taoism, once more, which is primarily concerned with *transition*, as a complementary alternative to ancient Greek ontology which focuses on determined forms of being and tends to neglect the in-between (Jullien 2009). As I argue below, the concept of *assemblage* is able to capture this idea.

To come up with a working definition of drought for this study, I will follow ‘traditional ANT scholarship’ (Goldman, Daly, and Lovell 2016, 31) and assume that any entity that is connected to others can be analyzed, ontologically, as an *actor-network* or *actant* (provided that it has some effect, however tiny this effect may be). In the most fundamental sense, every social thing is an actor-network. This statement is similar to the claim, I would argue, that every physical material is made up of elementary particles. Both statements should be uncontroversial, even though this fundamental level tends to be neglected whenever we deal with aggregations at higher scales. In the social realm, those could be large *collectives* or shifting *assemblages* that involve many actors, *hybrid objects* that are composed of both human and nonhuman actants, or *punctualizations* (*black boxes*) that are so routinely used as shortcuts that it is hard to disassemble and rethink them in terms of actor-networks. In this context, the twin notions of *punctualization* and *assemblage* appear particularly apt to capture the character of drought in eastern Morocco. Following from the arguments presented so far, I claim that drought is both of these things.

The common metaphor of a ‘black box’ has a specific history within the ANT field. It is related to ubiquitous processes of ‘summing up’ (Latour 1999a, 17); blackboxing or punctualization

‘refers to the way scientific and technical work is made invisible by its own success. When a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity.’ (Latour 1999b, 304)

As smooth as a technical device may operate in everyday life, however, this punctualization 'is always precarious' (Law 1992, 385). When the device fails, the different parts it is composed of become visible as possible sources of the error, and its user must invest energy to diagnose, intervene, and possibly enroll replacement pieces into the network to restore its previous state. Changing social conditions, technical developments, economic calculations, or preferences of other actors may also make the device obsolete and any repair attempt futile. The same can be said of punctualizations that are not machines but political institutions, legal conventions, or entirely abstract concepts.

Opening such a 'black box' to reexamine what is inside can be useful when it is widely used as a shortcut to explain all sorts of things, but there seems to be little agreement on its actual contents. As contradictions appear and multiply, a continued use of the routinized, abbreviated punctualization or 'package' (Law 2004, 33) becomes dangerous or at least misleading; it stops being useful. To give an example, I generally try to avoid using the blanket notion of 'culture' because, despite its universal use, the exact meaning of this term is quite unclear. Geographer Don Mitchell has convincingly argued that 'there is no such thing as culture' (Mitchell 1995). The same may be true for drought in the eastern Moroccan steppes. This is not to say that people misunderstand one another all the time because they mean vastly different things when they say 'drought' (or '*jafaf*'). They would quickly realize this and try to align their respective understandings in any given dialog. But if a concept is complex and vague enough, different communities that do not regularly interact will develop their own distinct webs of association and meaning over time, with a quite restricted overlap. One of my goals in carrying out this research is to explore these different webs, beyond the narrow consensus – to figure out what people talk about when we talk about drought.

Of course, there are tremendous benefits to using punctualizations. Contemporary human life would be completely impractical without them. In the words of John Law, 'punctualized resources offer a way of drawing quickly on the networks of the social without having to deal with endless complexity' (Law 1992, 385). Accordingly, while I set out to unpack one such bundle – drought – in this text, I leave other questionable punctualizations untouched because they are merely at the margin of my interest. *The Middle East*, a notion that carries 'a complicated inheritance of imperialism, Orientalism, and Cold War area studies scholarship' (Hammond 2017, 319) and often does not even relate to Morocco, is just one example. A complete deconstruction of all notions is not the goal of this study.

To refine my blunt research question about what drought is from this perspective, a more precise wording would be: **When the black box of 'drought' is opened, what connections can be found between drought and other actants?** As stated before, I refer to the Moroccan plateaus in the early 21<sup>st</sup> century as a concrete starting point for my inquiry.

The second key concept for my analysis of drought, *assemblage*, is not exclusive to actor-network theory, either. This term was once chosen as the English translation of Deleuze & Guattari's *agencement* (Law 2004), and 'assemblage thinking' has since been advanced in vari-



ous fields of the social sciences and humanities. There is no standardized terminology, as different authors have focused on different aspects and examples. Notions such as *assemblage*, *network*, *cyborg*, *capillary*, *the body multiple*, or *rhizome* refer to a similar idea, nevertheless: they denote ‘complex systems that refuse encapsulation’ within boundaries (Roosth and Silbey 2009, 459).

In an emphatically ANT-like outlook, assemblage ‘flags agency, the hard work required to draw heterogeneous elements together, forge connections between them and sustain these connections in the face of tension’ (Li 2007, 264). In this sense, assemblage denotes the process as much as the resulting structure, namely ‘a process of bundling, of assembling, or better of recursive self-assembling in which the elements put together are not fixed in shape, do not belong to a larger pre-given list but are constructed at least in part as they are entangled together’ (Law 2004, 42). Rather than guided by a singular master plan, assemblages are often the contingent results of countless distributed mundane practices, ‘a matter of habit, accretion, and bricolage’ (Li 2007, 265).

Two geographers, summarizing the use of the term *assemblage* in their field, present it as an alternative to ANT’s ‘notions of network’ (Anderson and McFarlane 2011, 126) but do not support this claim with a clear argument. They also outline an ethical dimension of assemblage thinking, which resonates better with my own ideas about social science research. Ideally, studying something as an assemblage

‘opens the researcher up to risk, embraces uncertainty, expresses something of the fragility of composition, and strives to listen to what Deleuze and Guattari term ‘the sound of a cont[igu]ous future, the murmur (*rumeur*) of new assemblages [...]’ (Anderson and McFarlane 2011, 126)

It is crucial to resist any urge to draw premature conclusions, force the world into a predefined grid, and look for ultimate explanations and answers. Even though such an approach may work in some areas of the natural sciences, and may be what we all do in our daily lives to cope with the complexities of our world, research in the social sciences should be allowed to play a different role, to be flexible in its methods, to rejoice in little discoveries of the unexpected, the overflowing, the improvised. In this regard, the notion of assemblage is close to ANT, which ‘leaves ample room for surprise’ thanks to its awareness of the ‘contingency and variability of associations’ (Felski 2016, 763).

Assemblage thinking seems to distinguish itself clearly, in the social sciences, from the influential analytical perspective of Pierre Bourdieu, Anthony Giddens, and others who strongly focus on *practices*. By contrast and complement, the notions of network, assemblage, and apparatus can all be characterized as focusing on *arrangements* (Schatzki 2002). Translation scholar H el ene Buzelin uses a different categorization: Bourdieu’s analytical apparatus is more concerned with *structures* and Latour’s with *agency*. She agrees that both schools of thought have often been seen as antagonistic (Buzelin 2005). Combining these appraisals, both approaches appear to resolve the old structure-agency debate in different ways: Bour-

dieusian sociology pays close attention to structures and practices, whereas assemblage and actor-network thinking looks at arrangements and agency. The former seems, simply by choice of words, to focus more on stability and the latter on fragility. Many assumptions are shared between both currents, nevertheless.

But is assemblage thinking only a different shade of actor-network theory? John Law would essentially say so. He sees little difference between the terms of assemblage and actor-network: both 'refer to the provisional assembly of productive, heterogeneous, and (this is the crucial point) quite limited forms of ordering located in no larger overall order' (Law 2009, 146). Further obvious similarities between actor-network and assemblage approaches include their shared assumption of emergent properties, meaning that drought, for instance, is more than the sum of its parts; and a 'topological view of space, in which distance is a function of the intensity of a relation' (Müller and Schurr 2016, 217). On the other hand, there have also been claims that assemblage thinking and ANT are incompatible. In their review of this relationship, however, Müller and Schurr argue in favor of synthesis and cross-fertilization as the best way forward (Müller and Schurr 2016), a call which I heed here.

Accordingly, they identify several important differences between both conceptualizations. These informed my decision to employ the *assemblage* term, as I feel it adds valuable facets to basic actor-network theory. Where ANT focuses on actuality and presence, assemblage thinking is more about virtuality and potentials (Müller and Schurr 2016). A further difference is, purportedly, that 'ANT is better attuned to fluidity, meaning change without rupture, whereas assemblage thinking shows a greater openness towards the aleatory and unpredictable, towards the event' (Müller and Schurr 2016, 226). In a study of drought, both aspects can be addressed: the slow and gradual development of a drought and its shifting network links from an ANT angle, and its unexpected, event-like character which may establish surprising new connections and disrupt others from an assemblage perspective.

There have been attempts at characterizing assemblages on an abstract level beyond descriptive accounts of single case studies. One crucial question is how assemblages are forged, and how all the elements are then held together in them. Anthropologist Tania Li lists six common practices within this process, namely: 'forging alignments, rendering technical, authorizing knowledge, managing failures, re-posing political questions and reassembling as the ground shifts' (Li 2007, 286). I will occasionally refer to these six steps in my text. The sequence is reminiscent of the 'due process' Latour proposes for the democratic elaboration of the collective (or society, or assemblage) in the *Parliament of Things* (Latour 2004). A new potential member of the collective (a 'proposition') first causes perplexity, which then leads to consultation about admitting it in. If successful, the third stage is hierarchization (negotiating its exact place in the collective), which may then be followed by institution: the new element is fully integrated into the collective and its presence henceforth taken for granted – nevertheless, this cycle may start over at any time. Rejected propositions (outdated concepts, for example) that have been excluded from the collective during a previous cycle may file for

readmission and thus shake up the current configuration just as hitherto unknown actants will.

A further crucial question addressed by assemblage scholars fills a perceived gap in actor-network theory. We may well be able to describe what the process looks like, but what kind of forces are responsible for the emergence of an assemblage? What drives actors and makes them do the required work? For assemblage thinkers, the answer would be: a combination of desires/wishes (Deleuze's *désir*) in multiple forms (Müller and Schurr 2016). Desire/wish and assemblage emerge together, are 'co-constitutive' in this view (Müller and Schurr 2016, 226). My attempt to combine the ideas of silent transformation and *shi* or propensity with actor-network thinking stem from a similar feeling that there are driving forces inherent to any configuration that need to be acknowledged, even if it is hard to precisely pin them down.

For these reasons, I specifically conceptualize drought as an assemblage and not just a generic actor-network. While ANT provides the underlying ontology and theoretical foundation of my study, the particular figure of the assemblage increases its explanatory scope and makes a more perceptive analysis possible.

In light of this discussion, a second specification of the research question has guided my inquiry: **What other assemblages is drought being enrolled into, and how are these stabilized within changing economic and societal configurations?** The continual transformations undergone by the nomadic economy and the tribal community in the high plateaus of Morocco provide a theater or even 'a living laboratory' (Vidal-González and Nahhass 2018, 1079) where the assemblage process of drought becomes visible.

Moreover, I focus on *unexpected* assemblages in order to produce genuinely new insights. But why are some connections unexpected? Is it because I found them on the ground in Morocco, but not in the literature? This would make them unexpected for the academic community only. Conversely, some assemblage relations may be evident to trained scientists but unheard of by livestock owners. But first and foremost, this label is a testimony to my own initial ignorance and the subsequent learning process as my personal 'drought network' was continually enriched and modified.

Drought is a highly complex matter that supports different viewpoints. When people use the word 'drought' (or '*jafaf*') in a specific setting, they implicitly emphasize certain aspects of drought while neglecting others. As all aspects equally contribute to characterizations of drought, however, I will not prematurely limit myself to a narrow definition. Instead, by gradually increasing the possible perspectives on drought, I try to capture the entire range of notions that exist in my study area. Rather than proposing a limited number of mutually exclusive and clearly distinguishable academic definitions of drought, which would have little basis in reality, I essentially need the full length of my thesis to answer the question what drought is. There is no shortcut. Moving through viewpoints in this way, I will assemble a

renewed description of drought. ANT scholars recognize ‘that actors themselves make everything, including their own frames, their own theories, their own contexts, their own metaphysics, even their own ontologies’ (Latour 2005, 147). Instead of discarding conceptualizations that do not conform to my assumptions, I try to document them as extensively as necessary. Each additional notion of drought in this catalog then represents a slightly different assemblage of elements.

ANT encourages researchers to trace associations (Latour 2005) by following the actors wherever they go. You should therefore not expect to encounter the word *drought* on every page of this thesis. Rather, I will venture out and explore many of the other actants and assemblages that surround notions of drought. In the end, these accumulated descriptions are expected to contribute to a richer understanding of drought itself. Practically, this investigation often entails looking at what drought *does* (the effects that are attributed to it) in order to better understand what it *is*.

This approach leads to a practical challenge: where does the network end? Or, if it does not actually end anywhere, where is its description allowed to end? There is no general recipe to determine this point. Ultimately, one should ‘try to understand reality in terms of the most limited number of ingredients possible, while also making sure that one does not forget any’ (Tiercelin 2011, 248, my translation). Latour gives a pragmatic recommendation: ‘You stop when you have written your 50,000 words or whatever is the format’ (Latour 2005, 148). In his view, an account can never be truly complete anyway: a researcher will inevitably miss important things and misunderstand others. Moreover, things keep changing after she leaves. And yet, carrying out studies and producing texts is probably the best shot we have at understanding the social world. According to Haraway, ‘it is precisely in the politics and epistemology of partial perspectives that the possibility of sustained, rational, objective inquiry rests’ (Haraway 1988, 584)

In addition to the strong empirical focus of this work, which offers detailed quantitative and qualitative insights into an under-studied and marginalized pastoral community in rural Morocco, the main contribution to knowledge I hope to make is of a conceptual nature. By deploying a range of theoretical and methodological tools from ANT and assemblage thinking, which have largely been absent from studies of the Middle East and North Africa, I hope to build a bridge between ANT-inspired researchers and the existing communities of Middle East scholars. As my assemblage perspective of drought in eastern Morocco demonstrates, a disciplinary toolkit thus expanded can generate innovative insights into important social and economic dynamics unfolding in the region. And beyond the confines of a single discipline or geographic region, I propose a new way of thinking about drought – a phenomenon of pressing global concern. In the final chapters of this thesis, I outline some political and philosophical ramifications of this approach.

Through my work, hence, I also aim to contribute to drought studies in a broad sense. The accumulation and comparison of case studies could eventually produce ‘integrated theo-

ries of drought' one day (Kallis 2008, 109). While interdisciplinary, synthesized, integrated theories are beyond the scope of a single doctoral thesis, my case study may provide a building block for future endeavors in this direction. An enhanced understanding of notions and assemblages, which pays particular attention to nonhuman actants, can inform subsequent drought analyses in other parts of the world. Existing approaches in policymaking and research may then become better able to curb the disastrous outcomes droughts too often have.

One crucial point should be emphasized: as network links are not unidirectional, the expanded understanding of drought that I propose here works in reverse, too. If an appreciation of social and economic constellations is essential to a fuller understanding of drought, as I claim, this improved notion of drought will equally contribute to a more adequate analysis of the pastoral economy and the tribal community themselves. There is, hence, a decidedly sociological contribution my thesis offers to readers interested in human collectives.

My findings are based on several sources. Most importantly, my research team and I conducted fieldwork: a standardized survey questionnaire was completed, in Arabic, by hundreds of households in the high plateaus. Although none of the questions mentioned the term 'drought,' many of the answers did – drought silently forced its way into my research. This quantitative survey was complemented by over a dozen in-depth qualitative interviews that we prepared, conducted and recorded in 'Ayn Bani Mathar and surroundings, most of them in June 2010. Moroccan colleagues subsequently transcribed them and I translated relevant sections from Moroccan Arabic to English. In addition, I had numerous more or less informal conversations with experts, official representatives, and practitioners in the administration over the course of multiple visits to the region from 2008 to 2012. In the ANT spirit, I do not only consider people who have achieved high levels of formal education to be experts; quite to the contrary, all human beings are superior experts on matters that concern their daily lives.

Apart from my own fieldwork, I draw on written documents in different languages. They include project reports, newspaper articles, and of course scholarly literature from the natural as well as the social sciences and humanities. My academic training in diverse fields of study, ranging from linguistics to social geography and computer science, has probably nudged me toward multi- and interdisciplinary thinking over the years.

I carried out the bulk of my empirical investigation and started preparing this thesis within a large research project: Collaborative Research Center (*Sonderforschungsbereich*) 586, funded by the German Research Foundation (DFG) and based at the universities of Halle-Wittenberg and Leipzig, Germany. It was titled 'Difference and Integration: Interaction Between Nomadic and Settled Forms of Life in the Civilizations of the Old World' and brought together disciplines as diverse as anthropology, archaeology, ecological-economic modeling, geography, history, Islamic and oriental studies. A number of insightful doctoral dissertations have come out of this collaborative project (e.g., Calkins 2016; Bretan 2010;

Breuer 2007a; Gruschke 2012; Büssow-Schmitz 2016). My own endeavor started out with the intention to investigate the political ecology of rangeland – more specifically, to analyze pasture management and conflicts. I was a member of sub-projects A4 ‘Nomads Without Pasture? Key Issues of Sustainable Development: Political Ecology and Human Security’ and E10 ‘Sustainability of (Post-)Nomadic Resource Utilization Under Global Change – Conceptual Understanding Through Ecological-Economic Modeling.’ My focus gradually shifted toward drought and actor-networks due to my accumulating insights from both literature review and empirical fieldwork. In other words, drought turned out to be such a powerful actor that it imposed its presence in the fragile assemblage that is my research project while I was trying to piece it together, and even ended up occupying a central position.

In the next chapter, I review some of the academic literature that has been produced on drought in general, not least on drought in Morocco. After a discussion, in the subsequent chapter, of my research methods and specifically the survey questionnaire I used, the main body of this study is divided up into two large parts. The first of them (part two) takes on a broadly economic perspective of drought in eastern Morocco with attention paid to pastoral-nomadic production, exchange, and consumption processes in this landscape. Part three focuses on the human (and more-than-human) society as the setting in which the assemblage of drought takes place. Each part consists of multiple chapters that take a closer look at specific issues and themes.

## ***1.4 A Brief History of Drought Studies***

Drought is by no means a new phenomenon. Its huge practical relevance for many human communities has, over the centuries, resulted in a considerable body of scientific literature. And yet, humanity seems to be very far from a point where everything will have been said about drought, as this statement from Giorgos Kallis’s comprehensive review of drought literature suggests:

‘A lot has been written about droughts, but our understanding remains, at best, patchy.’ (Kallis 2008, 86)

Adding another study to this corpus thus seems like a worthwhile enterprise. In order to avoid lengthy repetitions of work that others have done before me, I will keep my own review brief and illustrative here, tracing the most important approaches and findings of drought research. Even so, this immense body of work constitutes one of the foundations that I build on.

Concerning the notion of ‘water crisis,’ political scientist Julie Trottier observes that different disciplines have come up with a range of understandings based on ‘a great disparity of methodologies and fundamental hypotheses’ (Trottier 2008, 197). I would put forward a similar claim regarding drought, although the term may seem less contested and politically laden in comparison. Trottier, who is extremely critical of water crisis discourses, sees

drought as a simple 'natural phenomenon' (2008, 208) by contrast. As outlined above, I prefer treating drought as an assemblage or a hybrid object just like a water crisis, since its physical reality 'is inextricably entangled with social and political aspects' (Trottier 2008, 198) and cannot be considered in isolation. To my knowledge, an explicitly ANT-inspired analysis of drought has not been undertaken so far.

Some droughts are responsible for massive suffering and starvation. Even though not every drought leads to famine and not every famine actually kills people (Waal 1989), drought and famine are often related. Australian drought expert Ronald Heathcote argues that 'while the significance of drought as a factor in human loss of life through famine is clearly debateable, a link cannot be denied' (Heathcote 2013, 92). Another author shows that famine can be analyzed as a 'complex disaster' which may emerge, for instance, out of a combination of drought, crop failure, food hoarding, and poverty (Hewitt 1997, 58). He suggests that 'natural' catastrophes, in fact, can no longer be separated from 'other types and causes of disaster' (Hewitt 2013, 10) in today's closely interconnected world.

The global significance of droughts, thus, cannot be underestimated. Drought events even exceed all other natural hazards in the number of people affected across the globe (Hewitt 1997). They have not only contributed to famines now and again, but have likely played decisive roles in the decline and collapse of entire civilizations (Heathcote 2013; Diamond 2005). This is not the scale of my investigation in this thesis, however. Instead, I take a look at more mundane notions of drought as they unfold in a small community of a few thousand families in the early 21<sup>st</sup> century. In Morocco today, drought does not kill people.

Drought never comes as a sudden shock, either. In a satirical guidebook for future visitors to planet Earth after humanity has annihilated itself, there is a section on Hollywood action movies about natural catastrophes. The authors muse on why drought never made it into one of them: 'Alas, droughts were slow-motion disasters, and thus unsuited as the subjects for summer blockbusters' (Stewart et al. 2010, 15). This characterization dovetails with Jullien's notion of silent transformations – they may not produce spectacular events, but still are extremely powerful agents by virtue of their persistence. Due to this cumulative nature, a drought 'is not recognised or declared until a dry spell has gone on for a long time, though each preceding day without rain has actually contributed to its severity' (Hewitt 1997, 87). Another corollary of this silent accumulation is that droughts, once established, always 'embrace extensive regions' (Hewitt 1997, 88). If sufficient water (or food) were available nearby, their drought-induced lack could simply be offset through small-scale relief efforts and there would be no disaster. From an actor-network perspective, topographical space is less important than the reliability and strength of links in a network. Hence, droughts may erode and interrupt fragile links of food provision; and they always interact with (or 'embrace') extensive actor-networks. I will therefore address, in this study, quite disparate aspects of drought that may at first seem unrelated.

Early discussions of drought have been preserved from ancient Greece, where drought was seen as intimately connected to earthquakes, comet sightings, winds, preceding bloodshed, or demons (McCartney 1934). It was often attributed to divine agency and seen as a punishment for objectionable behavior by groups or individuals. The motif of punishment was and still is connected to drought in many communities around the globe (McCartney 1934; Heathcote 2013; Slegers 2008). It causes farmers to pray, dance, make sacrifices, or hold processions in order to appease the higher powers. Prayers for rain were not uncommon in the United States of the early 20<sup>th</sup> century (McCartney 1934) or in present-day Israel (O'Connor 2017) or Australia, and processions still take place in Sicily (Heathcote 2013). Rain prayers and sacrifices can also be observed in eastern Morocco today, although such practices are controversial from an orthodox Islamic point of view (see ch. 3.3, p. 129).

In the contemporary academic literature, four types of drought are commonly distinguished according to the ways in which they can be recognized. The shortest possible definition is given by Kallis in this sentence:

‘There are meteorological droughts (abnormal precipitation deficits), agricultural droughts (abnormal soil moisture deficits), hydrological droughts (abnormal stream-flow, groundwater, reservoir, or lake deficits), and water supply droughts (abnormal, temporary failures of supply to meet demands).’ (Kallis 2008, 87)

Most authors routinely refer to the fourth type as *socioeconomic* drought; however, this label may speak to the causes rather than the visible consequences of drought (Heathcote 2013) and hence operates within a different logic. While the exact meaning of ‘abnormal’ in each of these definitions leaves much room for debate (Heathcote 2013), an important feature of the four types is that they may, but do not necessarily, coincide. It is also worth noting that meteorological or hydrological drought alone hardly seem a matter of concern – they only become one when they lead (or threaten to lead) to a water supply drought that negatively affects a community. Water shortages do not exist independently of their being identified as such; water ‘is short only when social actors have decided it is so for a variety of reasons’ (Trottier 2008, 198). Reports of drought are unlikely to ever emerge from the middle of the Sahara or from the Antarctic desert, as there are hardly any living beings who depend on precipitation in these places.

As a social scientist, I am not trained to analyze the metrics of meteorological, hydrological, or agricultural drought in detail. But even such studies are ultimately motivated by social requirements; ‘all droughts that we humans care about are socioeconomic’ in their effects (Kallis 2008, 87). The structure of my thesis reflects this key concern insofar as its two main parts are devoted to economic and social entanglements of drought, respectively.

It may be useful to distinguish conceptual definitions of drought, such as the four types presented above, from operational definitions. The former seek to capture general characteristics of drought but remain vague, whereas the latter aim to define exact measurements and thresholds but risk a loss in generality (Wilhite 2000). By and large, scholarly publications



about drought in Morocco are of the second, technical type: preoccupied with standardized measurements, the construction of indices, early warning systems, and mechanisms to mitigate the effect of a drought on agriculturalists (e.g., Yacoubi et al. 1998; Chaarani and Mahi 2008; Ezzine, Bouziane, and Ouazar 2014). They focus on numbers and statistics in the vein of late modernity's overall emphasis on commensuration, countability, calculability, and predictability. One quite sophisticated drought measure is the Palmer Drought Severity Index; it is tailored to the Great Plains of the United States and thus typically requires adaptation in order to be useful for other regions. This index takes into account precipitation, temperature, evapotranspiration, soil moisture, and runoff (Kallis 2008, 91) and has provided a basis for comparing different drought events across geography and history. Such comparisons are by necessity quite technical in nature. Even on this level, a universal standard for measuring and comparing droughts seems elusive, as 'the extreme complexity of drought confounds single metrics and assessments' (Kallis 2008, 88).

New actors have found their way into the academic and administrative assemblages that study drought and produce knowledge about it – notably, remote sensing and computer technologies. They have by now firmly embedded themselves in these institutionalized *centers of calculation*, as they are often called in the ANT literature. Technologies have set new agendas and created new hopes, especially in the development of early warning systems since the late 1970s. Two critical observers describe this process in the following terms, highlighting the agential power of technological devices and procedures and the way they became connected, via the calculation centers, to livestock producers in drylands:

'As rich, multi- (false)-coloured satellite images of desert areas began to appear, the illusion of omniscience appeared with them. Looking down onto the plain like the Nazca deities, the pattern of vegetation seemed evident. The [institutions and systems] could tell pastoralists that vegetation was going to be in short supply through the mysterious agency of the 'normalised difference vegetation index' [...].' (Blench and Marriage 1999, 24)

In parallel, there has been immense progress in global climate modeling, also facilitated by continuous technological innovation. One important purpose of such complex models is to better understand and then predict the emergence of meteorological droughts. Scientists have been investigating causal links between El Niño Southern Oscillation (ENSO) phenomena over the central Pacific and droughts in Africa, for instance. But there remains a great deal of uncertainty 'in simulating ENSO and other tropical variability' (Dai 2011, 56), which also concerns the question about the extent of man-made climate change. A recently observed ENSO shift connected to drying over land might have anthropogenic causes, but might also be explained by natural variance (Dai 2011). At any rate, it is likely that anthropogenic greenhouse gases have contributed, via surface warming and thus an increased evaporative demand as well as a warming of oceans, to a trend of drying over land observed in the early 21<sup>st</sup> century (Dai 2011).

There were indications back in the 1990s that drought phenomena in Morocco are linked to global climate change and particularly the North Atlantic Oscillation, but the interplay of factors is very complex (Bahou 1996). Studies have since found that Morocco receives most of its precipitation from 'extratropical synoptic [i.e., large-scale] disturbances' in the winter, the frequency of which 'strongly depends on the phase and strength of the North Atlantic Oscillation' (Knippertz et al. 2003, 116). Rainfall during late summer and early fall, in turn, seems to obey a different mechanism. Moisture is picked up in the tropics, transported into the subtropics, and then, under certain conditions, comes down as precipitation in Morocco. Convection above the Atlas mountains seems to play an important role in this precipitation generation (Knippertz et al. 2003). Volcanic eruptions have been studied as another cause of climate irregularities including droughts (Heathcote 2013), although there seems to be no indication that this is relevant to the Moroccan study region.

For the time being, no completely certain explanation can be given and no reliable prediction made about the emergence of meteorological droughts in Morocco. As climate models become more diverse and more powerful, the accumulating bits and pieces of evidence will eventually converge and form a tissue of knowledge that is increasingly robust and dependable as a whole, even if each single factor remains somewhat uncertain (Latour 2017). But still, heavy 'reliance upon technology, to the virtual exclusion of other strategies, has rarely insulated society against the threat from droughts' (Heathcote 2013, 252). A diversified mix of drought policies and risk-management strategies seems more appropriate, combined with a re-thought conceptualization as proposed in this study.

In Morocco, an observer has noted that there are no proper drought policies, but mere reactions to the immediate consequences of drought (Tarik 2012). This is more or less the situation a scholar described fifty years ago for Australia, writing that 'each new drought is greeted with indignant surprise' (Heathcote 1969, 194). Such an attitude, still prevalent today among administrative institutions, but also scholars across the globe, results in responses that treat 'consequences, not causes' (Blench and Marriage 1999, 5) and thus do little to improve drought coping capacities in the long run. The Moroccan situation is compounded by 'a lack of coordination between the ministerial departments concerned with drought adaptation' (Tarik 2012, 15, my translation). As a case in point, the National Drought Observatory (ONS), established in 2001, has since been disbanded (Tarik 2012).

Morocco's climate tends to be very heterogeneous due to the country's sheer size, diverse geography, and competing climatic influences (Yacoubi et al. 1998). A major drought in one area may barely be noticed by people who live a few hundred miles away. The year 1941, for instance, is etched in the collective memory of older people in the Rif mountains in north-eastern Morocco as a year of severe drought and famine. Numerous families were forced to emigrate, and the region of Oran (Wahran) in Algeria became a key destination for them (Daoudi 2015). Other parts of Morocco remained untouched by this drought. This is quite typical: a tree-ring study published in 1995 identified ten recurring patterns of drought

that affect different parts of the country in specific ways. The period from the mid-1960 to the mid-1970s, for example, was dominated by an overly dry type of anomaly where 'the eastern part of the country has the worst deficits' in terms of moisture (Chbouki, Stockton, and Myers 1995, 200). This matches the time period generally associated with the beginning decline of traditional nomadism in my study region. Yet, the concurrence of this decline with increased drought is not the full explanation. Other agents of change have consistently interfered with the old ways as well, as I argue throughout this text.

Changing market conditions may be one of them. A study that seeks to identify Moroccan drought indicators shows how feed and animal prices have differed between dry and humid years, suggesting causation (drought is responsible for price trends) rather than mere correlation (Chaarani and Mahi 2008). The years selected for comparison vary across indicators; this makes it appear as if those with the clearest effects were purposely selected to make the point. Drought, in this instance, is inscribed with considerable power to change markets; but the simple causative links proposed by the authors are not entirely convincing. Things are more complicated, as my discussion of price formation patterns will reveal (ch. 2.6, p. 89).

Professionals generally agree that 'drought has become a structural natural phenomenon in Morocco' (Tarik 2012, 15, my translation) since the 1980s. This phrase implies that drought is always looming these days. It forms part of stable networks that involve countless actors, and should be acknowledged as an integral part of the collective rather than an exceptional intruder. In contrast to this nationwide recognition of drought as a structural phenomenon, a project evaluation report from 2006 states that there is no evidence of 'large, spectacular changes in rainfall' in the high plateaus over the past decades (DPA Figuié 2006, 24, my translation). Adding more perspective, analyses of tree ring data have produced evidence that drought conditions in late 20<sup>th</sup> century Morocco do appear 'exceptional in context of the past 500 years,' but are not untypical when compared to the prevailing climatic patterns before 1400 C.E. (Esper et al. 2007, 3).

In more recent historical periods, drought discourses have been politically laden since colonial times (Davis 2007). One important intellectual influence came from desiccation theory. The once fertile Middle East and adjacent regions had, in this view, been turned into a barren wasteland through centuries of neglectful management by culturally misguided natives. Desiccation theory is also linked to the idea that forests are able to capture and retain atmospheric moisture, and thus to make it rain more frequently in arid regions. Accordingly, deforestation must lead to a decrease in precipitation and the land dries out. Colonial authorities used such narratives as political tools against pastoral nomads and other local groups, in French colonies as much as in British-controlled parts of Africa (Endfield and Nash 2002). Blaming their supposedly irrational land use for the disappearance of (fictitious) vast forests and fields of yore often served as a pretext to deprive such groups of land ownership and usage rights. In North Africa, Arab pastoralists and their livestock were preferred targets of such accusations (Burke, III 2009).

This theory was later replaced by the concept of *desertification*, which can be understood ‘as extreme soil degradation’ (Blench and Marriage 1999, 13) or, more specifically, as a process of ‘land degradation under arid to dry sub-humid climates’ (Le Houérou 1996, 137). In a sense, desertification is ‘the opposite’ of drought (Le Houérou 1996, 158) in that it has long-term or even irreversible consequences on an ecosystem’s productivity. Drought, on the other hand, is seen as a short-term crisis, with production conditions returning to their normal state once a drought is over.

Notions of desertification are directly related to the so-called tragedy of the commons (Hardin 1968). Arguing against the human freedom to reproduce in the face of continuing population growth, biologist Garrett Hardin quoted the example of livestock herders on a freely accessible pasture. While herders benefit from each additional animal they keep, the costs of pasture degradation are borne by the entire community. Perfectly rational behavior by all individuals thus does not prevent a disaster:

‘Each man is locked into a system that compels him to increase his herd without limit  
— in a world that is limited.’ (Hardin 1968, 1244)

Hardin’s argument has extensively been criticized by researchers who showed that in practice, collective regulation mechanisms do exist and are very effective in most communities (Fratkin 1997). Another line of criticism has emerged from newer observations in the Sahel region. Here, large expanses of land had been thought to be irreversibly lost to desertification starting in the 1970s. But they started becoming green once again in the 2000s thanks to nothing but shifting rainfall patterns. The effects of a long-lasting drought turned out to be reversible (Behnke and Mortimore 2016a). Thus, the desertification concept may have ‘lost its analytical utility for science and practice’ altogether (Behnke and Mortimore 2016a, 3).

Regardless of such recent developments, the basic assumption of a complicity of human overexploitation and drought in producing desertification are alive and well in current administrative practices and parts of the academic literature. In the states of the Maghreb in general, government policies and academic discourses have ‘tended to replicate French colonial views, ascribing land degradation to overgrazing’ (Burke, III 2009, 106). Paradigmatically, a recent scholarly paper on the pastoral system of eastern Morocco states that the ‘abusive use of resources weakened by drought has engendered a sometimes alarming desertification’ (Bechchari et al. 2014a, 2573, my translation). While the authors mention drought as a contributing factor, they also complain in a second text that most pastoralists in the region ‘prefer blaming episodes of drought’ (Bechchari et al. 2014b, 158, my translation) rather than acknowledging their own role in degradation processes. Another, older analysis points to a more complex interplay of causes:

‘The drought hazard in Morocco has been progressively increasing during most of the twentieth century, largely because of the effects of European colonization, population pressure, the scarcity of viable new cropland, agricultural intensification, and governmental policies.’ (Swearingen 1992, 402)

For this author, climate phenomena do not seem to be a matter of primary concern in the study of drought. Instead, social and political processes need to be examined as drivers of vulnerability. There is no easily identifiable single culprit. Given the insights from assemblage analysis presented earlier, I assume a similar starting point for my research.

As this chapter's discussion suggests, a diverse range of contributions have been made over the decades to the study of drought. They illustrate vastly different perspectives. Even if I attempt to synthesize them to some extent in this thesis, I will end up adding yet another account to this corpus – but this does not have to be futile:

'By adding new dimensions to our knowledge, we move another step forward in taming the wickedness of droughts.' (Wandel et al. 2016, 32)

## 1.5 My 'Method Assemblage'

At the core of my research is a household survey in the high plateaus of eastern Morocco. The interviews took place from October 27 to November 7, 2009 in four rural municipalities (*jama'at qarawiyya* or *communes rurales*). These are, from east to west: Awlad Sidi 'Abd al-Hakim, Bani Mathar, Murayja, and Awlad Ghuzayyil (Figure 5 below; typical French spelling variants: Oulad Sidi Abdelhakem, Beni Mathar, Merija, Oulad Ghziyel). My fieldwork team consisted of sixteen interviewers (5 female, 11 male) from the south and west of Morocco. Most were in their twenties like myself at the time, which facilitated communication and coherence, and had a social-sciences background. Some were actual or prospective doctoral students themselves, others were political activists or were about to start a career in public administration. Their motivation, therefore, included a genuine academic and civic interest and went far beyond the financial remuneration they received out of my project funds. I had recruited them through an existing network of young researchers; they all had previous experience in conducting surveys in rural Morocco. For most of them, this included having been part of a research campaign in the High Atlas mountains earlier that year, together with me and my project directors from the University of Leipzig, the findings of which have been published in German (Gertel and Breuer 2012).

Rather than just traveling to my study area and starting the interview process with random people on the street or in the steppe, I chose a more cumbersome way. Thanks to the support of a partner organization cooperating with our research center, the National School of Agriculture in Meknès, I was registered as a visiting researcher with the Ministry of the Interior. With the help of various pieces of correspondence documenting this procedure, I was then able to inform the local authorities about each upcoming visit to the field. My first stop would always be the seat of the respective local administrative unit (*da'ira*, *qiyada*, *jama'a...*), where I would explain my planned research and sometimes coordinate the logistical details of the following days. Importantly, the authorities were often able to put me in touch with lower-level representatives (*muqaddimin* or *shuyukh*) who would act as guides for our team, sometimes for several days in a row.

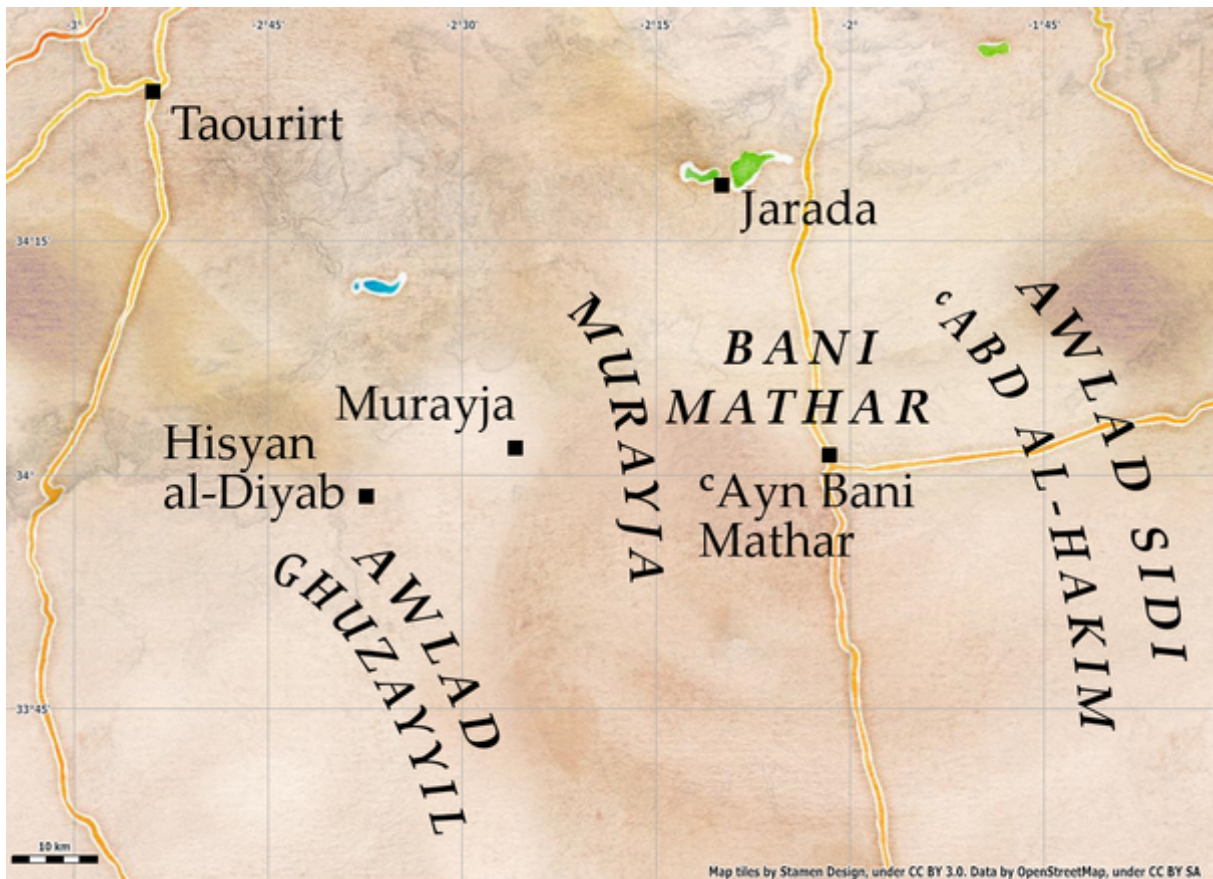


Figure 5: Overview of the study area

Map tiles by Stamen Design, under CC BY 3.0; data by OpenStreetMap, under CC BY SA

Approaching the population via the authorities was arguably the only viable way to conduct fieldwork in this region. This strategy provided at least four benefits: first, we were able to drive around, thanks to the guides accompanying us, without losing our way or getting stuck with our cars. As an outsider, it is not easy to navigate the grassland and its features, to distinguish viable tracks from dangerous dead-ends, and to know which speed limit is advisable on a given type of underground. Second, we actually found the homes of the families we wanted to speak to. These were dispersed over a large area, sometimes hidden away in little valleys, and often consisted of mobile tents that might disappear and be found in a very different location from one day to the next; but our guides knew where they were. Third, being introduced by a well-known senior tribesman with an official function was helpful in establishing trust with the interviewees. Otherwise, being asked a series of private questions by a complete stranger might have provoked less accommodating and patient reactions. Fourth, we avoided suspicion by the various authorities and security apparatuses present in the politically sensitive border zone (cf. chapter 2.5, p. 82). This included a safety aspect, as it prevented us from inadvertently crossing into Algerian territory.

In turn, the *muqaddimin* profited from an additional opportunity of seeing their fellow tribespeople in remote areas. Some of the people we interviewed used one of our vehicles to

travel to ‘Ayn Bani Mathar or to visit another relative. Occasionally, they would bring along bags of goods or a few live sheep that they loaded onto the roof of our car.

Another effect of our traveling with an escort regarded the sampling of households. While we had obtained lists from the DPA (Provincial Department of Agriculture) containing the number of households per lineage registered in pastoral cooperatives, we depended on the help of local officials to find and interview a sufficient number of respondents. These representatives had the most accurate overview of the families belonging to their respective lineage. The numbers of households we encountered always stayed within the range of the DPA lists on the cooperative level (Table 4). However, the percentage of households we were able to interview ranged from zero to over fifty percent of a certain cooperative. These numbers reflect the willingness of the respective officials who accompanied us, but also the ease of access to particular groups compared to others.

Municipality	Cooperative	HH on list	HH interviewed	Percent interviewed
Bani Mathar	Al-Sa‘ada	43	–	–
	Al-Rahma	183	89	49%
	Al-Rashad	56	24	43%
	Al-Jamal	92	3	3%
	Al-Mataf	75	19	25%
	<i>unknown</i>	–	29	–
	<b>Subtotal</b>	<b>449</b>	<b>164</b>	<b>37%</b>
Awlad Sidi ‘Abd al-Hakim	Al-Hamyaniyya	134	38	28%
	Al-Mustaqbal	96	24	25%
	Al-Amal	318	13	4%
	Al-Tayyibiyya	94	49	52%
	<i>unknown</i>	–	5	–
	<b>Subtotal</b>	<b>642</b>	<b>129</b>	<b>20%</b>
Murayja	Al-Shanafiyya	226	21	9%
	Al-Qadiriyya	408	47	12%
	<i>unknown</i>	–	7	–
	<b>Subtotal</b>	<b>634</b>	<b>75</b>	<b>12%</b>
Awlad Ghuzayyil	Al-Wahda	374	49	13%
	Al-‘Azz	397	38	10%
	<i>unknown</i>	–	10	–
	<b>Subtotal</b>	<b>771</b>	<b>97</b>	<b>13%</b>
<b>Total</b>	<b>13</b>	<b>2,496</b>	<b>465</b>	<b>19%</b>

Table 4: Households interviewed per cooperative

Overall, nearly one in five of all pastoral households in the region took part in my survey. The image is skewed in favor of the more accessible Bani Mathar area, while the fourth largest cooperative, Al-Amal in Awlad Sidi ‘Abd al-Hakim, is badly under-represented. The cases with unknown cooperative affiliations hint at the disparate levels of functioning and presence displayed by the various cooperatives (cf. ch. 2.8, p. 98) – some interviewees who were supposed to be formally enrolled claimed that they had never heard of this institution. In general, the size of my sample compared to the overall population should yield statistically very solid results, assuming a near-random sampling method.

Beyond the semi-official lists on cooperative membership, official statistics give a quite different impression of total population numbers in the region. My survey took place halfway between two censuses, that of 2004 and the subsequent one of 2014. The number of households living in each municipality, according to the censuses, developed as follows within this decade: Bani Mathar grew from 1,152 to 1,469 households; Murayja increased from 453 to 581; Awlad Ghuzayyil considerably grew from 819 to 1,074 households; and Awlad Sidi ‘Abd al-Hakim shrunk slightly from 401 to 392 households (HCP 2007, 2015). These official population figures are significantly higher for Bani Mathar and still slightly higher for Awlad Ghuzayyil compared to the DPA lists. The likely reason is that they include many families without any livestock-related activity, a type of household that is increasingly common and also appeared in my sample. More strikingly, Awlad Sidi ‘Abd al-Hakim and Murayja have considerably more cooperative members than total households. This may be due to families inscribing multiple members in order to benefit from free services; but I would not rule out typing errors in the cooperative membership list either.

In the obvious absence of reliable population numbers, let alone more detailed criteria to stratify the households into subgroups, I had no basis for defining weighting procedures. Hence, I use my survey data unweighted; every case counts the same.

Out of nearly five hundred completed questionnaires, I finally kept 465; some of the discarded ones were incomplete, overly inconsistent, or had been filled out by families living outside the study area. In one case, two members of the same household had simultaneously given interviews to my team; this duplicate was also eliminated during an early round of quality checks. The data were manually entered into an SPSS (Statistical Package for the Social Sciences) data sheet by two student assistants and me back in Leipzig, which brought with it new challenges of deciphering and correctly interpreting small notes and remarks on the paper questionnaires. Moreover, we were native German speakers working with Arabic and French material, but we managed to find a consensus in most unclear cases and produced missing values in the data set whenever we were not sure.

An important question concerning the reliability of the survey data is whether the respondents could speak openly and freely. This appears to have been largely the case. In the first interviews, a *muqaddim* would sometimes try to take part in the discussion, but after a few repetitions, the officials tended to occupy themselves with other activities. Sometimes



they would gather a group of men from the neighborhood and discuss various affairs with them as the household heads waited for their turn to be interviewed. Thus, 39% of the 465 interviews were conducted with no other people around, while 26% were partially and 35% permanently attended by others.

Conducting interviews on a market day, on October 29, 2009 in Murayja, turned out to be not such a good idea. We had imagined it would be an efficient way to meet a lot of potential respondents at the same time, rather than driving around to visit them one by one. And indeed, people at the market showed interest at first and flocked around our group of interviewers, but as soon as they found out how long the questioning was going to take many of them became reluctant, urged the interviewers to hurry up, or in some cases abandoned the interview and left. They had traveled a long way and had many errands to run on this day, they explained. The fact that there was no material benefit in it for them also seemed to play a role in this particular setting; we heard anecdotes about earlier visits and surveys by development organizations and the empty promises made by their representatives. Some locals were visibly fed up with interviews that produced no tangible results for them. My team responded in the only honest way possible: participating in the survey would not make any difference to the respondents, but it would to our team of young researchers. However, the overwhelming majority of participants were accommodating and friendly; they patiently sat through the interview. The interviewers noted in 63% of the cases that their interlocutors had been very focused throughout the interview, and for another 29% this was true for part of the interview.

Relying on standardized questionnaires in sociological research opens up fundamental methodological and epistemological questions. Why carry out quantitative research at all? How to deal with this peculiar form of knowledge? After all, it means cherry-picking selected aspects out of an overwhelmingly complex and constantly challenged social reality, then subjecting them to an astounding chain of 'mediations' (Latour 1999b), twisting them to fulfill predetermined formal requirements, subjecting them to various calculations, until a percentage value or a neat-looking curved graph appears on my screen and, after more rounds of filtering and selection, makes it into this text which then purportedly speaks on behalf of all those actors (Murdoch 1997). Social relation systems are quite abruptly transformed into mathematical relation systems (Gertel 2005). Can such an approach of simplification, abstraction, and creating new facts out of the blue be useful at all – or is it a dangerous tool of manipulation that should best be avoided by honest science? There are several responses to such doubts.

First, the development of my standardized questionnaire took many iterations of proof-reading, testing, and readjusting, and builds on decades of accumulated fieldwork experience by Moroccan and German researchers including myself. Previous studies abound (e.g., Rachik 2000; Breuer 2007a; Mahdi 2007; Gertel and Breuer 2012) whose authors I consulted at various stages of the drafting process. My questionnaire still contains several open-ended

questions to capture complexities and non-standard information, and the interviewers were instructed to note down any observation that struck them as peculiar or surprising. During the fieldwork phase, the entire team met every evening to recapitulate the day, solve ambiguities regarding the questionnaire, learn from one another, and harmonize the survey process as much as possible.

A second crucial aspect is contextualization. The in-depth interviews and focus-group discussions conducted by my team and me, as well as our everyday observations, put the quantitative findings into perspective and allow for an assessment of their reliability. Ideally, different methods complement one another in order to paint a more nuanced, more realistic picture of our messy world than any narrow approach could. Sociologist John Law advocates, in this sense, for ‘method assemblages’ that serve to detect (and simultaneously reinforce) ‘particular patterns of relations in the excessive and overwhelming fluxes of the real’ (Law 2004, 14).

Third, facts are not just there, but have to be produced (cf. Latour 1999b); the etymology of the Latin word hints at this (*factum* = something done or performed). Nor can facts and values be clearly separated, but tend to ‘interpenetrate’ one another (Tiercelin 2011, 121, my translation). Scholarly honesty means communicating this knowledge-generation process in a transparent way and not presenting graphs and figures, with their inherent semblance of authority, as more than they are. I have often chosen graphical representations over tables because bare numbers tend to suggest a higher degree of precision than my limited sample warrants. The way in which I use my survey data set throughout this study is not as something representative of any singular truth. Rather, I attempt to look at the data from different angles to extract many partial truths. Each of them may be valid only at certain moments or from the perspective of a certain actor. This process of exploring a data set is a good reminder of how complex the world is: more often than not, hypotheses are not confirmed and seemingly characteristic behavioral patterns turn out to be unrelated to location, age, or social status differences among interviewees, for instance. Like a story-teller, I will focus on those connections that I did find, and especially on the unexpected ones. This means that whenever my text remains silent about seemingly plausible correlations that go beyond mere tautologies, chances are I have not found them confirmed by the survey data.

In the setup of my questionnaire, there is no rigid theoretical framework that separates dependent from independent variables – although common sense dictates these roles in many cases. I mostly relied on Pearson Chi-Square tests as a rough indicator of statistical significance. But since correlation does not say much about causation, I will be careful and offer several alternative interpretations wherever appropriate. In contrast to deductive (where an observed effect is explained by a general rule) and inductive reasoning (where observed probabilities are used to formulate a general rule), this approach is known as abductive reasoning (where a tentative causal explanation is found based on a limited number of observations).



Figure 6: Assistants carrying out the survey, October 2009

What follows now is a brief description of the questionnaire's main sections. I will use this opportunity for a general characterization of the sample population as well – namely, by presenting simple descriptive statistics (frequencies and means) for selected questions. This will serve as a further introduction to the nomad territories of eastern Morocco, their inhabitants, and the ongoing changes that help understand what drought is and does.

The questionnaire that we printed out in a copy shop in Oujda was formulated in French, the dominant language of academia in Morocco, and contained an Arabic translation of all questions for the actual interviews. It consisted of thirteen sections and a total of 40 questions. I employed various question types and formats, ranging from simple yes/no questions to Likert-scale assessments, matrix tables, and open-ended questions. Each interview took forty minutes on average, with only a few cases requiring more than an hour (the median value was at 37 minutes). The sections were titled: demography (2 questions), housing and equipment (3), remunerated activities (1), livestock breeding (11), water (1), mobility and sedentarization (2), land (1), agriculture (2), income sources (2), expenses (3), social activities (4), perceptions and opinions (3), and finally: family, past and future (5).

Our goal was to interview household heads, a title usually associated with a family's patriarch, as we assumed them to have the most complete overview over their respective socioeconomic situation. In cases where the family head was not available, we would try to interview another household member instead. This happened in 11% of the interviews.

The first set of questions concerns basic demographic information about the interviewed household (*kanun*, hearth in Moroccan Arabic – this relates to the idea of shared meals). For each household member, we wrote down his or her name, gender, age, marital status, education level, and current activity or work. The average household size amounts to 7.8 persons

in my sample. Of these, 36% were children (below 16 years of age), 59% adults (aged 16-64), and 5% elderly people (aged 65 to 95). This distribution perfectly matches nationwide census data on nomadic households (HCP 2016, 1). There were more men than women in my sample (53 versus 47 percent), which runs counter to official statistics from the 2004 census where only the municipality of Awlad Sidi ‘Abd al-Hakim had a male surplus. However, in the subsequent 2014 census, Bani Mathar and Awlad Ghuzayyil were also composed of more men than women and the ratio in Awlad Sidi ‘Abd al-Hakim had even climbed (to 52 percent). An existing trend seems thus to have been reflected, if in a slightly exaggerated way, in my 2009 survey. More recently, the public statistics authority has suggested that 52% of Morocco’s nomads are men, without providing an interpretation (HCP 2016, 1). This gender distribution is reflected in the population pyramid of my sample (Figure 7), which represents the ages of 3,558 individuals and shows an additional unexpected feature: there are remarkable spikes, especially among women, for ages divisible by ten. This is explained by the fact that birthdays are not considered important in this society (although this is changing – see ch. 3.6, p. 150), and that the exact age of family members is often unknown. Many people do not even know their own year of birth; but anyone’s age can be well estimated in ten-year steps.

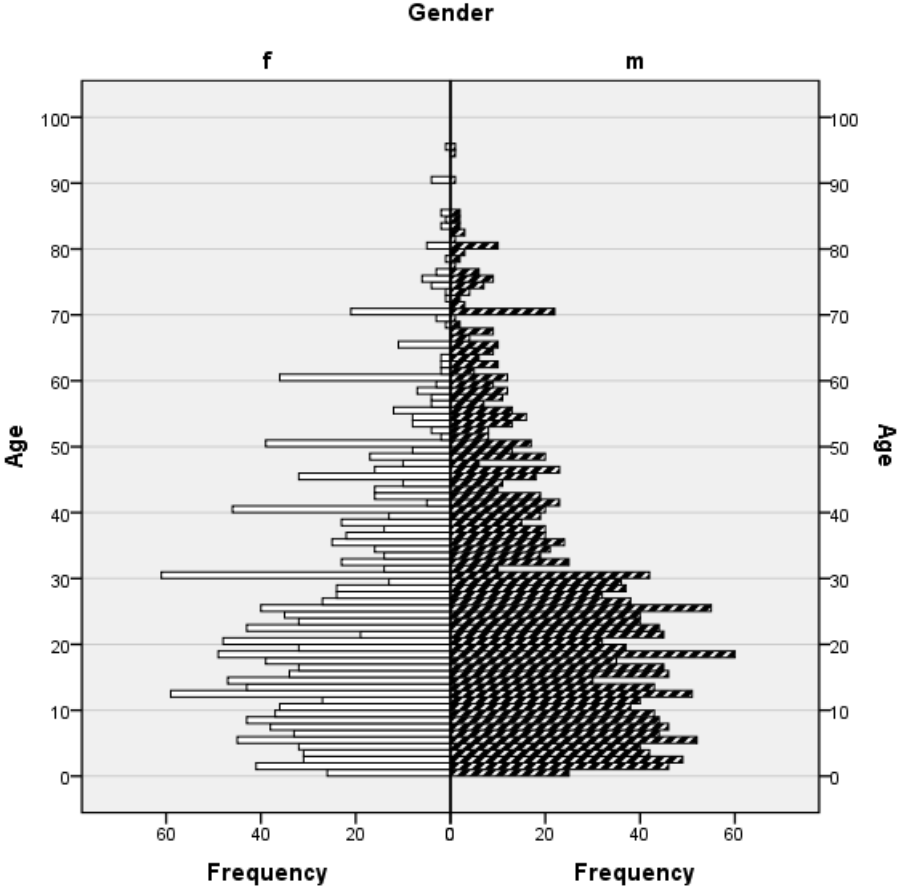


Figure 7: Population pyramid of the survey sample

The population pyramid further reflects the onset of a new trend that has been observed across the Middle East and North Africa and also in Morocco: as both birth rates and mortality rates are on the decline, population growth slows down and the average age increases. The base of the pyramid is no longer its widest part; the largest group is now made up of working-age people. This situation has been termed ‘the demographic gift’ as it could be a motor of growth, supposing that all these people actually find employment opportunities (Elmorchid 2017).

Nine in ten household members in my sample live in the family home year-round. It is often younger men who partially live elsewhere, e.g. in towns and cities where they attend boarding schools. Two thirds of the adult population (aged 16-64) and nine in ten elderly people (aged 65 and above) are illiterate and have no formal education, with significant differences between men and women (51% of adult men versus 82% of women). These findings also correspond well with nationwide statistics on nomads, where eight in ten individuals were without any formal education in 2014 (HCP 2016, 2).



Figure 8: Tent and sheep, Awlad Sidi ‘Abd al-Hakim, October 2009

When asked about their housing conditions, one in three families (31%) in my sample responded that they exclusively live in a tent. The typical tent (*khayma*) of this region is composed of long panels, woven by the family’s female members out of sheep wool and dark goat hair, that are sewn together and then propped up by wooden poles (cf. Steinmann 2001). Industrial fabrics are also integrated into tents nowadays, with beneficial and adverse effects – a shifting assemblage of materials can be witnessed in this domestic space. The largest percentage of households in my sample, however, reside in a solid house (42%), while the remaining families (27%) combine both tent and house. About half of all the tents have

ceased being mobile; they permanently stay at the same place, often right next to a family's house. This may be due to a strong emotional attachment to the tent lifestyle. Where they exist next to a regular *khayma*, smaller tents (*'ushsha*) made from esparto grass are used for storage purposes or for receiving guests.

To get an impression of how people live their daily lives in these tents and houses, the questionnaire also inquired about available equipment and convenience items in each household. They range from universally available objects such as gas bottles for cooking (99% of households have them) and ovens for baking bread (96%) over fairly common appliances such as radios, TV sets, and motorcycles or mopeds (about 50% each) to much less frequent items: refrigerators (34%), satellite antennas (22%), automobiles (22%), trucks (20%), and tractors (15%) can almost be considered luxury goods, and computers or landline telephones are basically unheard of (2% each). Mobile phones, in turn, are widely prevalent (87%).

Before I examine, in the next part, the nomadic economy in depth, I would like to emphasize that my questionnaire was by no means flawless. The interviewees reported that questions asking for an assessment of things generally did not work well. Likewise, the topic of health was completely absent, which is regrettable in hindsight. Coming from different parts of the country, my team also complained about difficulties with the local dialect. An erroneous assumption I had made created confusion, too: the political slogan '*Al-Islam huwwa al-hall*' (Islam is the solution) is used by and associated with Islamist movements such as Hamas in the Palestinian territories (Kreuer 2014). My idea was to ask respondents whether they agreed with this slogan to obtain an indication of Islamist leanings; but the sentence was almost unknown in this rural Moroccan setting. One interviewee parsed the Standard Arabic phrase as dialectal '*Al-Islam huwwa ll hall*' (Islam is that which opened) and responded to this meaningless statement with a counter question: '*Ash hall?*' (What did it open?).

## 2 Drought and the Nomadic Economy

Drought is an important economic actor, deeply (and usually negatively) affecting rural livelihoods in eastern Morocco and beyond. A look at the diverse, vibrant assemblages that populate the economic sphere existing in this region is therefore an integral part of my drought analysis. This entire part focuses predominantly on quantitative data analysis to paint a broad picture, while the subsequent one on social questions relates several qualitative stories for a deeper (if selective) understanding of the various connections of drought. As my inquiry originated in a collaborative research center on nomadic peoples, the need for a characterization of the economic and livelihood strategies of the specific pastoral community I studied goes without saying. In this part, I will often analyze my survey data through three mutually exclusive categories. These are based on the interviewees' own identification as *rahhala* (nomads), with the basic choice in the questionnaire being whether they are *rahhala* or not. A negative answer triggered an immediate follow-up question: whether they have been *rahhala* in the past or not (i.e., have never been nomads). The survey households populate the resulting three categories in more or less equal proportions: 24% consider themselves to be nomads, 36% former nomads, and 39% non-nomads. Another 1% (four interviewees) did not answer the question, possibly because they felt that they were somewhere in between or that these categories were meaningless to them.

While the term *rahhala* is related to the notion of travel and migration (this is the semantic field of the *r-h-l* root in Arabic), the etymology of *nomads* stresses a different aspect: that of livestock.

'The Oxford English Dictionary traces the origins of the word 'nomad' back to the Greek *nemein* meaning 'to pasture', and defines a nomad as 'a member of a people continually moving to find fresh pasture for its animals and having no permanent home'. One central aspect of this definition is the link between a people on the move and the reason behind such movement, which is to find fresh pasture.' (Gilbert 2007, 683)

In the following discussion, mobility is an overarching theme. Many actors are on the move (vehicles, tents, water, fodder, fuel, money, ideas, and so on), but I want first to look at people and animals in an ideal-type pastoral nomadic community. For them, mobility allows access to a range of resources; and access to resources is 'the prerequisite for action' (Gertel 2007, 23). Once again, these observations can be expressed in actor-network themes by saying, for instance, that small ruminants need to enter into reliable connections with plant biomass in order to survive and reproduce and make a difference to a pastoralist household's economic situation. A peculiar feature of drylands is that these vital resources are usually dispersed over large areas, which makes mobility indispensable to guarantee a sufficient nutrient intake. What is more,

'concentrations of minerals may occur at places distant from water, and water may not be found in areas with the most nutritious forage. Mobility allows herbivores to obtain

these non-substitutable resources by selecting diets from different locations on the landscape.’ (Hobbs et al. 2008, 779)

Pastoralists who live in mountain regions have often developed seasonal transhumance strategies, moving to high altitude pastures in the summer and lower ranges in the winter. In landscapes that do not display much vertical diversity, such as the high plateaus of eastern Morocco, livestock breeders have instead resorted to large-scale ‘horizontal mobility’ (Steinmann 2001, 40). In addition, they have developed specific modes of cooperation. The term *duwwar*, the general Moroccan word for village or settlement, goes back to the nomad camps that used to consist of tents set up in a circle (basic meaning of the *d-w-r* root in Arabic). But rather than just a morphological description of a temporary settlement structure, *duwwar* refers to a more durable social assemblage of about half a dozen households that achieve coherence through close economic cooperation (Rachik 2002).

The method of mobile, extensive livestock rearing is opposed to sedentary, intensive breeding not just in terms of the mobility required to access resources. It also approaches drought differently: fundamentally, ‘nomadic pastoralists have a drought-evading strategy whilst farmers and ranchers have a drought-enduring strategy’ (Le Houérou 1996, 165). When nomads settle, their established methods of coping with drought will therefore have to be adjusted. This is exactly what has happened in the Moroccan steppes, where mobility patterns have profoundly changed. While more and more families become settled, animal herds have become increasingly mobile over time, largely thanks to motorization (Bourbouze 2003).

This brings me back to the connection between trucks and drought, as described by the nostalgic artist Lakhdar Hamzaoui (ch. 1.1, p. 14). Trucks started appearing in this region as early as 1925 (Paskoff 1957) and became omnipresent in the 1970s (Bourbouze 2006). This development has close parallels in other parts of the world, for example among Middle Eastern Bedouins (Chatty 1986) or Iranian nomads (Emadi 1995). Thanks to these vehicles, water and feed can be brought to the animals, rather than having to move the animals to the places where these resources are (Bourbouze 2006). Moreover, sheep can be transported to distant pastures in the wink of an eye. Using a truck does require some financial resources and may therefore not be suitable for everyday operations of small pastoralist families, but it can serve as a critical lifeline when a drought strikes. Even under non-drought conditions, truck users enjoy a greatly increased scope of mobility. According to my 2009 survey, nomadic families who had recently changed camps by foot had covered a mean distance of 23 km during each relocation; those who had used a truck had traveled 108 km on average. Trucks are most prevalent among nomads in my sample, where one in three households owns one; the ratio is only one in five families among former nomads, and one in nine among the non-nomad category.

The loss of household mobility in this society is often presented as closely connected to drought and degradation. Many sheep producers argue that nowadays, even trucks have



stopped making a difference. Several of my interlocutors commented: 'Where am I supposed to go with my animals? The pastures are the same everywhere.' Among the four rural municipalities in my study area, Awlad Sidi 'Abd al-Hakim is the one where this sentiment is strongest. About two thirds of the tents there have indeed become permanently fixed according to my survey data. A similar ratio is reached in Bani Mathar, whose population historically has a closer connection to the sedentary ways of the town, 'Ayn Bani Mathar. On the other hand, more than half of all residential tents are still considered mobile in the two remaining municipalities further west. I will analyze the differences between municipalities in considerably more detail in the third part below.

The largest block of questions in my survey concerns only those 388 households (83% of the sample) who currently raise livestock. Among those who do not, 60% were herders at a former time but no longer pursue this activity. Their acts of abandonment are distributed evenly over the years; they mainly happened for climatic (i.e., drought) and financial reasons, sometimes combined with personal misfortunes.

Quite different species of animals are currently being raised in the northern high plateaus. Sheep (97% of livestock-keeping households) and goats (71%) are extremely widespread, as are cows (60%) and donkeys (60%). Horses are less common (31%), and only one household in my sample still owns camels. On the small end of the animal size scale, chickens are almost omnipresent (84%) compared to turkeys (10%) and rabbits (6%). Dogs, geese, pigeons, and bees are infrequently kept. While sheep and goats are generally bred for the market, the remaining animals contribute to domestic consumption, entertainment, or labor force. Most of the livestock are owned by each household itself, but some families take care of sheep that belong to someone else, either against a salary or as associates. As their counterpart, other households in the sample have confided their own sheep to someone else, usually a paid herder. The imbalance between animal recipients (8%) and providers (17%) is explained by two facts: many paid herders come from the neighboring territories of the Bani Gil, are not part of local tribal structures and thus less likely to be sampled in my survey. In addition, a single shepherd may guard livestock for multiple owners at the same time.

I will have a more detailed look into the sheep and goat business in later chapters of this part. An important observation to make at this point, regarding livestock, is that drought is typically blamed for herd losses. But drought is not the only culprit: it interacts with numerous subtle transformations in society and economy, altering the ways in which water, land, and markets are being used. This corresponds to the ANT concept of translation, as discussed earlier (chapter 1.2, p. 20). In combination with other actants, drought has profoundly transformed the region's livestock economy, exposing people and sheep to new situations. To further set the stage for my account of these translations, what follows now is an exploration of my survey data regarding nomadic mobility and identity.

## 2.1 Being Nomadic: Mobility and Sedentarization

No more than one in four families in my sample currently consider themselves to be nomads (*rahhala*).<sup>2</sup> However, 31 percent of survey respondents live exclusively in tents; mathematically, not all of them can be nomads. A lack of money may prevent such families from building a house. By contrast, 27 percent of the households in my survey possess both a tent and a house, and the remaining 42 percent have a house only – either in the open steppe, in one of the villages surrounding ‘Ayn Bani Mathar, or in the town center. There is also a number of multilocal households where smaller children reside in town with their mother so that they can attend school, while the father and his older sons live ‘outside’ (*‘ala barra*) in a tent, herding the sheep. This multilocal model, greatly facilitated by the existence of mobile phones (Vidal-González and Nahhass 2018), is often pushed through by a family’s female members in my study area. In the 1990s, an observer noted that ‘there is a sort of female lobby in favor of sedentarization and the adoption of a solid home’ (Lazarev 2008, 28, my translation).

Moreover, there is a significant correlation between nomadism and household size, which was also found in earlier studies (Mahdi, Harrami, and Ablal 2007). Nomadic households have 8.5 members on average; large families can more easily be split up when they need to be present at different locations. The average household size is 8.2 persons among former nomads and much lower, 6.9 persons, among non-nomads.

Against this backdrop, Figure 9 shows the housing conditions of these three categories: almost all the nomads possess a tent. Interestingly, even among those families who have never been mobile, one in four lives exclusively in a tent. Drawing premature conclusions from a family’s type of habitat toward their type of mobility is therefore not advisable. My fieldwork team reported that many families would in fact like to construct solid buildings, but are not granted permission to do so and are thus forced to remain in their tents. At the same time, not all buildings are officially registered, even in the densely settled neighborhoods of ‘Ayn Bani Mathar. The former nomads occupy an intermediate position; this pattern repeats itself in other domains, as will become evident in the course of my analysis.

It must be noted that the issue of household mobility does not seem to touch the most fundamental sense of identity for many people in the region. Whether people are *rahhala* or not is considered more of a technical question; the important point is that they are *a‘rab*, a notion that is connected to living in the steppe (*‘urubiyya*) and associated with values and norms, certain linguistic features, and the tribe as frame of reference. In this sense, lifestyles may change ‘but identities remain’ (Métral 2000, 127).

---

2 Fragments of the following material have been published before (Kreuer 2011).

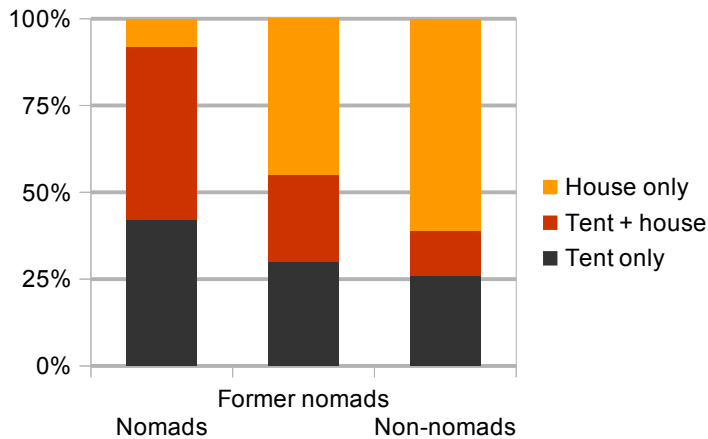


Figure 9: Form of habitat by mobility category

An episode from our fieldwork illustrates the linguistic aspect of this identity: one of the interviewed *a'rab* corrected an obvious speech defect of one of the interviewers from southwestern Morocco, an ethnic Berber. The latter had used the form *bi'ti* ('you sold') when addressing his male interlocutor, to whom this was improper Arabic: *bi't* is the correct form. As in many Eastern Arabic dialects, the *-ti* suffix is reserved for the second person feminine in the high plateaus, whereas western Moroccan *darija* uses it for both genders. Clearly, local dialects have 'preserved their Bedouin character' (Maas and Procházka 2012, 345). The tribesman further acknowledged: 'Our roots are in Yemen. Morocco is originally the land of Berbers (*shilh*).' Jokingly, he added: 'You guys could throw us out anytime.' The Bani Gil of the southern high plateaus can indeed be traced back to Hilalian tribes originating from the south of the Arabian peninsula. Two of the tribes in my study area, on the other hand, Awlad Sidi 'Ali Bu Shanafa and Awlad Sidi 'Abd al-Hakim, seem to have emerged in the 17<sup>th</sup> or 18<sup>th</sup> century around religious institutions (*zawiya*) and gained influence as mediators between other competing groups. The third tribe in this area, the Bani Mathar, mostly occupied their current territories during the 19<sup>th</sup> century, coming in from the region of Oran in Algeria (Lazarev 2008).

The three categories of nomadism are not stable, but change over time. This is obvious among the former nomads where the current household head decided to abandon seasonal movements at some point in the past. How long ago was this? In my data set, the earliest incidents go back to the 1960s (11 cases of abandonment), followed by a continued increase: 17 families permanently settled in the 1970s, 22 in the 1980s, 46 in the 1990s, and 63 during the 2000s. This does not necessarily mean that the phenomenon of sedentarization is spreading; an increase is to be expected due to social reproduction cycles. Family heads who had decided to settle in the 1970s, for instance, had by 2009 often been replaced by their children who then might consider themselves to be non-nomads; the renewed household(s) would disappear from the category of former nomads. Nonetheless, the figures indicate that the trend continued unabated until recently. The year in which most cases of sedentarization took place is 2000 (21 cases out of the 159 in my sample), when two consecutive dry years

coincided with the discontinuation of fodder subsidy programs (DPA Figuié 2006). Drought, hence, seems to play a role in this trend. Accordingly, the reasons people cite for permanent settlement often include drought. A recent study quotes a pastoralist from the southern high plateaus: ‘One of the primary reasons for sedentarization is drought, because it is important to be close to the highway to feed the livestock’ (Vidal-González and Nahass 2018, 1083). But my interlocutors also mentioned other pushing factors: the lack or bad condition of pastures, lack of capital or livestock, difficult conditions in general, and conflicts between tribes. More positive pulling aspects were also brought up: the wish to become ‘stable,’ find new job opportunities, and enable the schooling of children. A distinction between ‘sedentarization out of convenience’ on the one hand and ‘sedentarization out of necessity’ on the other seems very plausible (Mahdi, Harrami, and Ablal 2007, 74, my translation).

My 2009 survey data allow a closer look at the hypothesized correlation between the decision to settle down and the occurrence of drought. To do so, I compared the annual precipitation data from ‘Ayn Bani Mathar and the number of households that abandoned pastoral mobility per year (Figure 10). There seems to be a time lag between both curves: a year with little rain is often followed by a year with many instances of sedentarization. But even then, the correlation is not very solid and I would conclude, once more, that things are not as simple. Hence, the conclusion that drought ‘is not directly responsible for sedentarization; rather, it has accelerated a largely ongoing process’ (Skounti 2012, 287, my translation) seems justified. As for the choice of a specific location to settle, the usual reasoning by our respondents was: ‘This land belongs to my family,’ lineage, or tribe. The proximity to resources (such as water, the market, homes of friends) also plays a role in this decision. Except for people who move into a town, a certain degree of daily mobility remains essential to access these resources.

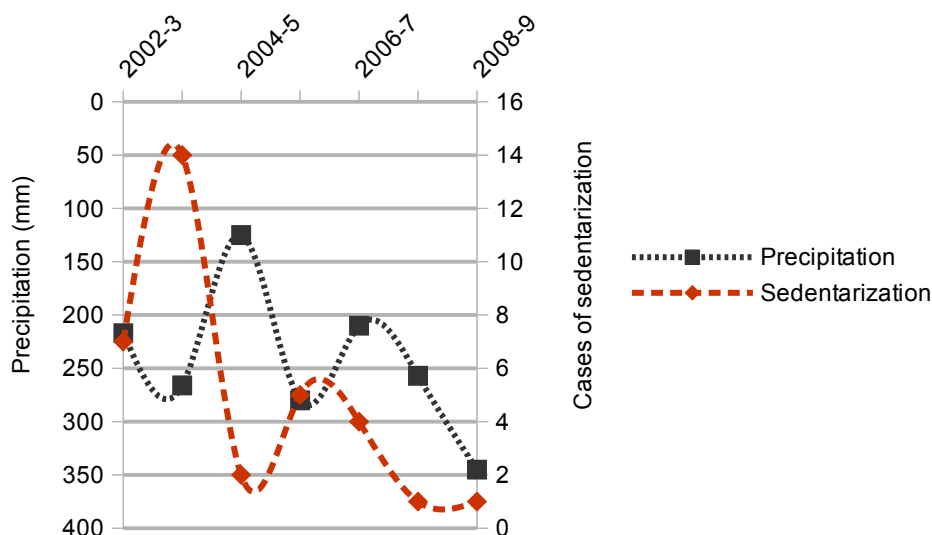


Figure 10: Precipitation and sedentarization

The choice to give up large-scale pastoral mobility does not have to be permanent. A typical sentiment is expressed by this middle-aged family head of the *former nomads* category: ‘When

the conditions are right, we will be on the move again.’ Underlining this possibility, ten nomadic households (2% of the sample) affirm that they had become sedentary at some point in the past but are now mobile once more.

A further question to examine is whether the families that live a sedentary life own more or less animals than their fully mobile counterparts – in other words, whether household mobility is related to differentiated production systems or wealth statuses (cf. ch. 2.6, p. 89). In my survey sample, sheep ownership over the last five and ten years has evolved in quite different directions for the three categories. The following table and graph give average live-stock holdings (for those households that have owned sheep).

		Sheep 1999	Sheep 2004	Sheep 2009
<b>Nomads</b>	<b>mean</b>	<b>264</b>	<b>239</b>	<b>242</b>
	HH	108	110	112
<b>Former nomads</b>	<b>mean</b>	<b>187</b>	<b>112</b>	<b>105</b>
	HH	144	147	141
<b>Non-nomads</b>	<b>mean</b>	<b>150</b>	<b>100</b>	<b>112</b>
	HH	134	134	134

Table 5: Sheep ownership over the last ten years

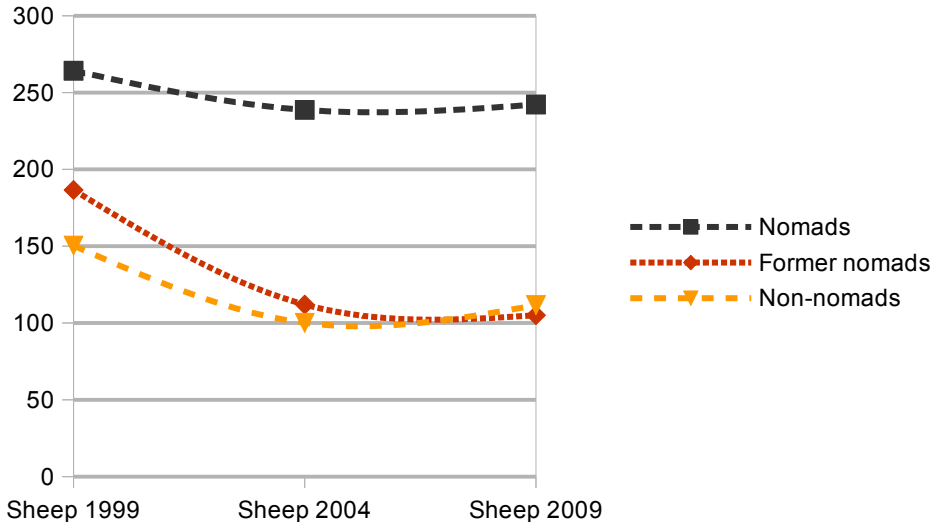


Figure 11: Sheep ownership over the last ten years by mobility category

Nomads have much more sheep than the other two groups on average, and they have witnessed less of a decline. For all groups, the average situation was better ten years ago but has not changed significantly over the past five. This is not true for every single household, however: 43% of them actually report a decline over the past five years, 33% an unchanged herd size, and 24% an increase in sheep. As usual, the picture becomes more messy and complicated when one looks at available data from additional angles. Another survey question shows that the loss of livestock is a very common experience: to the question whether their

herd had suffered a substantial loss during the past twenty years, two in three household heads (of those who used to own sheep or still do) responded ‘yes.’ Most attribute this loss to drought, disease, or a critical lack of money. Such an event is rather the norm than, and there must be mechanisms that assist affected households in recovering. In fact, charitable ‘social relationships existed in the pastoral economy to assist those most devastated by drought’ (Steinmann 2001, 46). These were often based on patron-client relationships (Lazarev 2008) that had a tendency to keep impoverished families in a position of dependence vis-à-vis large owners, while medium-wealth pastoralists had rational motives to cooperate among peers. But those institutions have more or less disappeared in favor of a monetary service economy centered on truck ownership (Rachik 2002).

A look at the respondent households’ income sources reveals further differences between nomads, former nomads and sedentary families. All interviewees were asked to estimate, often with the help of the interviewers, what percentage each income source contributed to their family budget. The average percentages are listed in the following table for the three categories.

	Animals	Crops	Wage herding	Wage labor	Trade	Independent	Rents	Pensions	Supports	Nat'l remittances	Int'l remittances	Others
Nomads	78	3	13	4	-	-	-	1	-	-	2	-
Former nomads	63	4	2	19	2	-	-	1	2	-	6	-
Non-nomads	53	6	3	26	1	6	-	2	-	-	3	-

Table 6: Income sources (percent) of nomads, former nomads, and non-nomads

Economic dependence on livestock marketing is almost absolute among nomadic families and still dominant among all other groups. However, 26% of former nomads and 38% of non-nomads derive less than half their incomes from livestock-related activities (compared to 1% of nomads). Herding someone else’s sheep for a wage is an activity that mostly nomads are engaged in, sustaining the age-old nexus between livestock raising and spatial mobility. It also becomes clear that remittances from relatives in other Moroccan regions play no role at all, which distinguishes the northern high plateaus from many other rural zones of Morocco. Income from rents is equally nonexistent in a community where private ownership of tents or houses is the rule as much as the common-property nature of rangeland.

Wage labor outside the livestock sector is an important pillar of sedentary livelihoods in this region, which clearly distinguishes them from nomadic families. Agricultural income from animals, on the other hand, declines with increasing sedentariness, while the share of crop-generated income moderately increases. But postulating a more or less deterministic successive transition from nomads to sedentary post-nomads would be too simple. Most

notably, families that were never nomadic are the only ones engaging in independent non-agricultural professions. Recently settled nomads, in turn, rely on international migrant remittances more than the other two groups, but also on public support programs (albeit to a small extent). It seems that some of the newly settled households have successfully transitioned to innovative income generation modes while others have fallen behind. The loss of pastoral mobility, if this is true, comes together with an increased social mobility, but this entails both upward and downward trajectories.

Identity construction often involves fragile assemblages of human and nonhuman actors. Ethnic and linguistic attributes, together with a number of lifestyle choices, strongly inform individual and collective identities in my study region. While the question of nomadic mobility does not seem to touch people's deepest sense of identity, it is an important indicator of contrasting economic strategies. Mobility patterns have evolved, moreover: many households have become sedentary, often with decreased livestock herds and added alternative income sources. Drought has played an important role in this transformation, as the next chapter on water issues will further demonstrate.

## *2.2 Water: Scarcity and Abundance at Once*

Drought is often defined as water shortage – a lack in one of the most fundamental substances for human, animal, and plant survival. It is important to note, however, that 'livestock generally die of starvation rather than of thirst' in severe drought settings (Blench and Marriage 1999, 12). Enough water for the animals' daily needs may still be stored in tanks or available from wells, but the plant communities on the rangeland are no longer able to produce sufficient biomass to feed them. For this reason, nomads usually refer to a lack of water in the specific form of precipitation when they speak about drought. The question of groundwater, on the other hand, is quite a different story. Surprisingly perhaps, my study area, the northern part of the arid high plateaus, sits atop one of the largest aquifers in North Africa, more than 6,500 km<sup>2</sup> in size (Bouazza et al. 2013). Several experts from outside the region assured me that all it would take was some investment effort to drill deep wells, and the steppes could be transformed into lush, blossoming landscapes!

Such development dreams always refer to settled agriculture rather than mobile pastoralism; watering the vast rangelands to make the vegetation grow for sheep to graze on is impractical and would never pay off. Similarly, 'artificial range or pasture reseeding is usually not feasible either technically or economically' in arid landscapes (Le Houérou 1996, 166), another argument in favor of intensive agriculture. Ironically, while the lack of water from above (i.e., the ubiquitous drought) threatens and destroys the livelihoods of numerous pastoralist families, the abundance of water from below may put additional pressure on them in the future if pieces of land are increasingly fenced off and converted to irrigated agricultural use. Although locals could, in principle, use this opportunity to start their own farms and plantations, the substantial initial investments required for this (in terms of land,

equipment, and skills) constitute a barrier for all but the wealthiest families. Moreover, once new water resources are tapped, this increased supply 'tends to generate demand through positive economic and political feedbacks' (Kallis 2008, 105), leading to questions about the sustainability of any such development. In the Souss plain in southern Morocco, excessive groundwater extraction for commercial agriculture has contributed to a continuous lowering of water tables, which is devastating for poorer farmers who cannot afford to drill ever deeper wells (Sippel 2014).

In fact, even with current usage, the underground water reserves in the north-east seem to be shrinking. Research conducted in the early 1980s concluded that the aquifer was slowly being depleted, as groundwater discharge exceeded groundwater recharge (Jungfer 1983). A newer study reiterates the observation that groundwater levels are slowly, but continuously decreasing by several centimeters per year, but the authors cautiously add that knowledge of this specific aquifer 'remains fragmentary and very insufficient' (Bouazza et al. 2013, 53). Recently, the existence of this water-bearing layer was one of the reasons why the 'Ayn Bani Mathar area was selected for the construction of a shiny new solar power plant (ch. 3.3, p. 129) which needs water for cooling and cleaning purposes (World Bank 2013).

Human exploitation of this deep aquifer, which consists of Jurassic dolomitic limestone, covered by 'a clay-marly impermeable layer of Mio-Plio-Quaternary age' (Bouazza et al. 2013, 53), dates back further. In the mid-1930s, under the French protectorate, the traditionally existing shallow water sources of the region were upgraded with hydraulic measures. One idea was to stabilize water supply in times of drought, and thus reduce the risks inherent in livestock breeding. In the mountain chain at the northern edge of the high plateaus, large amounts of water were also needed for the new coal mine in Jarada which was established in 1929 (Jungfer 1983, 588). A coal-fired power station was added in 1972 with support from the Soviet Union, which required additional water; in its heyday, it was responsible for one third of Morocco's total domestic electricity needs. While the mine was eventually shut down in 2004, the power station continues to run to this day (Province de Jérada 2007).

In the steppe, the pumping stations targeting the nomads and their needs were often insufficiently maintained and broke down. This meant that only two pumps were still functional across the high plateaus in 1980 (Jungfer 1983, 588). They were rehabilitated in the course of the PDPEO project (ch. 2.8, p. 98) starting in the 1990s (Daoudi 2015); however, my fieldwork team reported that many pumping stations were non-functional once again in 2009. Back then just as today, nomads were forced to find individual solutions for their water supply. In assembling alternative water provision networks to bypass the broken pumps, they often engaged trucks. In the 1980s, for example, a nomad who obtained his or her water from a well 14 km away – a distance out of reach for daily marches with their herd – would have to pay between thirty-five and seventy dirhams for one cubic meter (1,000 liters) of water, depending on the season. To put this into perspective, one sheep was worth around 500 dh at the time (Jungfer 1983, 590). By 1996, according to another source, water delivery



prices had multiplied to 150-200 dh per cubic meter (Lazarev 2008), while average sheep prices had only reached 1,000 dh in 2009 (my survey), indicating a slower price increase compared to water. If the relative scarcity of this vital resource has pushed up its price, as can be assumed in a market economy, the pastoralists' preoccupation with the palpable economic effects of drought appears well-founded. But water prices are not the best explanation.

Today, the respondents in my survey mostly get their freshwater from so-called *sondages* (Arabized as *sandajat*), artificial wells equipped with pumps. It turned out, in my fieldwork, that the water itself is often free of charge. However, the diesel fuel has to be paid whenever the water is delivered to a tent by truck. This is an important cost factor. Increasing fuel prices are therefore likely to be the main actual reason behind rising water prices for those who rely on motorized delivery. But who are those households? In the following paragraphs, I will analyze my survey data in more detail and try to discern patterns in water provision as one potentially important ingredient in the assemblage called drought.

The immediate sources of drinking water for humans and animals among my sample households are predominantly public wells (49% of households), private wells (18%), and tap water (16%). A smaller proportion rely on natural springs (7%) or rivers (5%). Other sources (16% overall; multiple responses were possible) include reservoirs, natural lakes, and water shared by a neighbor who has access. The distribution of the various types of water provision sources is not strongly differentiated between nomadic and sedentary families nor between richer and poorer ones; on the other hand, a household's spatial-administrative location as expressed by municipality affiliation does play a role. I will further explore this link in my exploration of power sources in the four municipalities (ch. 3.3, p. 129).

There are certain patterns, however. Nomads rely on public wells more often (63%) than former (46%) and non-nomads (45%). In addition, nomads hardly ever have access to tap water (5%) compared to former nomads (16%) and non-nomads (24%). Tap water, in this context, does not necessarily imply that a household is connected to the public water grid; access may be accomplished simply through a hose or pipe that connects the house to a running water source. When the sample households are differentiated by income generating activities, it becomes evident that pastoralism and tap water hardly go together: among the households that completely rely on livestock breeding, only 6% have access to tap water, compared to more than half of those without any livestock-generated income. The permanent freshwater sources that feed each tap can apparently provide enough liquid for a group of humans and their consumption needs, but not for dozens of sheep and goats every day.

When there is no pipe and faucet, water has to be transported by different means. These fall into three categories: hydrogen oxide may be carried in plastic cans (17% of households, mostly non-pastoralists or those with small herds), transported by horse or donkey cart (28%, mostly those with medium herd sizes), or delivered by water truck (39%, mostly by nomads with large herds in remote locations). Other actants involved in water transportation (19%; multiple responses were possible) include tractors pulling a tank and donkeys loaded with

jerrycans. The most frequent variant across my 465-household sample combines a public well with truck delivery (112 cases), putting a focus on monetary expenses for the vehicle. Just four decades ago, trucks were used for water transportation by the richest herders only (Müller-Hohenstein 1978a, 81); this situation has thoroughly changed. In my 2009 survey, the average price per water delivery is 40 dh, although this varies largely and is linked to the means of transportation. People who carry their water in plastic cans pay 2 dh on average; many of them do not pay any money, but invest considerable time and labor instead. Those who use a cart to fetch water pay 15 dh on average, and those who rely on water trucks, 71 dh. Evidently, the type of transportation is closely related to the amount of water per delivery, as a donkey cart replaces many plastic cans and a truck many donkey carts. Therefore, the different prices make sense from an economic point of view.

According to an earlier study of the high plateaus, the means of water transportation are linked to a household's remoteness from the nearest water source: while a distance of 8-10 km could be covered with a donkey cart, water trucks would usually travel 20-30 km from source to consumer (Lazarev 2008, 11). This observation is confirmed by my survey data, where the average distance to the water source amounts to 3 km among jerrycan bearers, 5 km among cart drivers, and 14.9 km among truck users. A related finding is that mobile nomads most often rely on trucks. Accordingly, the figures for each of the three groups show a very clear pattern: nomads, on average, live 11.8 km away from their currently used drinking water source. Former nomads are closer at 8.4 km, and non-nomads come into walking distance at 5.7 km. Please note that households with tap water access (distance = 0) are excluded from these averages.

Once arrived at the family's home, drinking water is stored in plastic cans and cisterns. Two in five households, mostly non-nomads with better access and lower daily consumption needs, use the former, and three in five, mostly nomads, rely on the latter: metal or plastic tanks with greater storage capacity. Old-fashioned waterskins, in turn, are very rarely used these days.

More than half of the families that do not have a tap available go to fetch water or have it delivered on a daily basis, and most of the remaining ones do so several times per week. An important question is which family members are responsible for this daily chore. In many pastoral communities, water collection has been seen as a feminine task. Among Iranian Qashqai nomads, for instance, this is exclusively so (Emadi 1995, 167), and water collection used to be a predominantly female duty among the Moroccan Bani Gil of the southern high plateaus before 1980. This pattern changed fundamentally with the shift to wells as primary water sources (Steinmann 2001, 106), even if there may still be seasonal variations which my survey as a snapshot is not able to capture. Nevertheless, the overall trend of reversed roles is supported by my data and it is predominantly men who are now charged with water collection in households without tap water. In 83 percent of the interviewed families, this has become a purely masculine task, compared with 11 percent where it is feminine and 6 per-

cent where both genders participate in this effort. Women are most often charged with going to private wells (30% women) or rivers (29% women) with plastic cans (39% women), while all other water sources and means of transportation are heavily dominated by men.

To summarize, the provision of sheep and humans with water is guaranteed by the deep aquifer below 'Ayn Bani Mathar, which, together with wells and trucks, forms a stable assemblage for the time being thanks to the daily efforts put into its functioning by men, women, pipes, plastic cans, and donkeys. Nomadic families tend to be more distant from the sources and thus rely more heavily on machines as intermediaries in their water provision chains. Depending on distance to the nearest well, labor and time investments may be substituted with monetary costs, which must then be recovered through income-generating activities. However, the respondents' general satisfaction with water access is equally high among the three groups: nomads, settled nomads, and non-nomads. From this point of view, drought is not primarily a problem of water scarcity in general, but of insufficient rainfall for the rangeland vegetation in particular – the topic of the next chapter.

### ***2.3 Vegetation: Forage and Food***

When drought threatens the steppe vegetation, the prospects for a successful pastoral economic exploitation of this landscape shrink. In this chapter, I will outline some of the ways in which insufficient biomass on the pastures ('insufficient' being a human-centered definition, once again) has been replaced with other forms of animal feed. Beside animal feed, the rangeland also offers food for humans, albeit at an unreliable level; the desert truffle is one example of a direct connection between human and vegetational communities.

Local pastoralists refer to the northern part of the high plateaus, my study area, as the *dahra* (upper part, backside) in contrast to the *sahra* (desert) further to the south. The treeless *dahra* steppe is characterized by two typical plant species. One is esparto grass (*stipa tenacissima*; *halfa* in Arabic), which has receded considerably in Morocco and is on the brink of extinction in neighboring Algeria. This regression appears to be caused by frequent drought events (Slimani, Aidoud, and Rozé 2010), even though esparto grass is considered to be more drought-tolerant than other plants of the region. The second characteristic species is white wormwood (*artemisia herba-alba*; *shih* in Arabic), a kind of sagebrush that prevails in the central part of the high plateaus. Thanks to its pleasant aroma, locals often add it to the heavily sugared green tea that is Morocco's staple drink.

A host of other plant species can be found on the high plateaus, including annual grasses, flowering, and leguminous plants, sometimes occupying particular niche conditions (Steinmann 2001). Certain plant communities prefer specific types of soil composition, which are found at variously inclined slopes (Müller-Hohenstein 1978b). The result is an intricate ecological landscape consisting of 'a set of gradients created by microconditions of the environment' (Acherkouk, Maâtougui, and El Houmaizi 2012, 106, my translation). Most peren-

nial plant species have developed strategies and morphological features that help them cope with prolonged drought periods. They are thus able to limit transpiration to a minimum and, moreover, to 'make use of the plant-available water of the upper soil layers in a wide perimeter' thanks to their shallow, ramified, and extensive root systems (Müller-Hohenstein 1978a, 45–46, my translation).

Just as certain plant types have their propensities and preferred attachments, so do sheep. While esparto grass is 'barely palatable' to them (Slimani, Aidoud, and Rozé 2010, 686), they thrive on the perennial sagebrush, in addition to annual grasses; the latter are, however, 'not very drought tolerant' in comparison (Steinmann 2001, 46). For this reason, sheep have commonly been complemented with goats which enjoy a wider range of forage plants, including more xerophytic (drought-resistant) ones. As the type and abundance of available forage 'influences the 'willingness' of [animals] to stay on the pasture' (Dwyer and Istomin 2008, 530), a herder needs to balance his or her own interests with theirs, which happens through continuous reevaluation of both. A mixed flock of sheep and goats requires additional herding skills and efforts to successfully hold the assemblage together, as herders now also have to reconcile the needs of different animals with one another.

Even the animals change over time, not just due to continued selection efforts by the breeders, but also as a consequence of innovation in veterinary medicine and nutrition. Improved productivity may come at a price, however, as an elder herder who is part of the local elites explains in ideal actor-network fashion. He stresses the transformative role of various nonhuman agents:

'The sheep were used to enduring hunger, they were used to not becoming sick. When you go back 15 or 20 years, the sheep would endure hunger and drought. Today, the injection needle has entered the sheep, chemicals and vitamins have entered it. The ewe has changed, it does not endure anymore. The herd has been transformed, it does not endure.' (Interview with Daoudi, 'Ayn Bani Mathar, June 2, 2010).

Chemical agents meant to support and protect the pastoralist livelihoods have occasionally turned against them. During my 2009 fieldwork, a herder gave an account of a recent incident that points out some uncomfortable, unintended, but enormously powerful connections between various nonhuman actors. Earlier, a locust invasion had been threatening the region's flora, especially crops cultivated in agricultural perimeters. A pesticide had been widely applied to fend off the insects, but had ended up annihilating the esparto grass vegetation. In addition, it had been ingested by goats and sheep and had done considerable damage to the animals.

While such cases of sudden vegetation destruction are the exception, a more slowly evolving phenomenon has been a key narrative around the world: the idea that overgrazing leads to rangeland degradation. A classical formulation by biologist William Allan from the 1960s lays much of the blame on short-sighted management methods:

‘Nomadic pastoralism is inherently self-destructive, since systems of management are based on the short-term objective of keeping as many animals as possible alive, without regard to the long-term conservation of land resources.’ (Allan [1965] 2004, 321)

The same basic idea was considered general knowledge in Iran in the 1990s (Emadi 1995); and in eastern Morocco at the turn of the millennium, ‘chronic overgrazing’ was routinely diagnosed as the reason behind ‘advanced degeneration’ (Lazarev 2008, 8, my translation). However, things are not that simple. On a very basic level, grazing in itself can be considered beneficial for the vegetation, as it helps maintain a specific plant composition. Entire landscapes that have eventually come to be seen as ‘natural’ and worthy of protection were created by continuous grazing (Robbins 2004). In addition, soils and plants can benefit from the manure left behind by grazing animals.

Climatic factors can drive degradation and are often more decisive than pasturing animals. A study carried out in the Algerian steppe found that grazing did accelerate rangeland degradation under certain conditions, but a subsequent drought-fueled generalization of such processes largely overrode the effects of grazing. In the period between 1993 and 2006, soil and plant community features changed within a 12-hectare enclosure in a similar way as they did in continually grazed lands next to it (Slimani, Aidoud, and Rozé 2010). In rangeland areas where precipitation varies widely, ‘ecosystem dynamics are driven by abiotic factors, with livestock typically having little or no large-scale, long-term impact’ (Sayre et al. 2017, 2). As a specific aspect of strongly fluctuating rainfall, drought has often been suspected to contribute to degradation and to lead to its more extreme and irreversible corollary, desertification (Heathcote 2013).

In pastoralist economies of past centuries, droughts could actually be seen as vital for an area’s vegetation. This paradox is explained by the resulting, often massive livestock and wildlife losses which forcibly led to a reduced grazing pressure post-drought; in turn, this eased pressure would allow the rangeland plant community to recover (cf. Heathcote 2013, 67–68). Such successive cycles would contribute to maintaining a certain balance between the needs of plants, animals, and humans. Thanks to the increasing availability of animal feed on the one hand and motorized transport on the other, this balance has been thoroughly altered. The direct feedback link between vegetation and animals is weakened or completely removed; external inputs allow livestock ‘to be maintained on land where they would have otherwise died or been removed’ (Hobbs et al. 2008, 779).

A modeling study conducted by colleagues of mine adds more detail to this argument. In the paper, we argue that there is a veritable ‘supplementary feeding controversy’ with proponents of the obvious economic benefits of unlimited supplementation counterbalanced by an increasing evidence of detrimental effects:

‘Maintaining the livestock number at high levels may decouple vegetation–livestock dynamics and lead to rangeland degradation. It may prevent the natural seeding of annual pasture species and minimize the (unintended but beneficial) rest periods

which usually occur directly after a drought due to a collapse in animal numbers and help to prevent pasture degradation' (Müller et al. 2015, 154).

Today, around 40% of the animals' nutritional needs are met with supplemental feed in Bani Mathar – mostly wheat bran and barley brought in from elsewhere (Bechchari et al. 2014b). These resources may stem from other regions within Morocco; on a national scale, the cultivation of wheat has been promoted and supported by many government initiatives since the mid-20<sup>th</sup> century, although wheat is more susceptible to drought than the traditionally dominant barley (Schilling et al. 2012, 20). The goal was to increase production, which represents a continuation of older colonial policies (Swearingen 1992). This equation has worked out in years with good rainfall; but higher profit margins, in this case, go hand in hand with an increased risk of losing most of the harvest in years with adverse weather conditions. In such years, cereals for both human and animal consumption have been imported from other countries such as the United States, facilitated in part by free-trade agreements that include flexible quotas (see ch. 2.7, p. 94). Imported grains may have their own side effects: according to one herder, they often cause a rash on the animals, making the sheep harder to sell even though the condition is harmless and will disappear after a while. Exacerbating fodder dependency for many producers, formerly existing state subsidies for supplementary feed (namely, barley) ended in 1991 (Kamil 1993, 18) and have only been sporadically revived as a temporary emergency measure during drought years.

Given this close link between drought and animal feed, many herders in the high plateaus blame drought for their dependency on supplementation. This conclusion is confirmed by scientists, too, when they explain that drought has 'modified livestock systems from extensive[,] based on pasture fallow and stubble[,] to intensive[,] based on feed supplement' (Chaarani and Mahi 2008, 53). As always, drought does things and is shown to be an influential actor.

In my 2009 survey, participants were given four options to assess how often they practiced supplementary feeding. A clear majority (58% of livestock owners) answered with 'always,' and another large faction (35%) rely on external feed inputs 'most of the time,' which leaves an almost negligible proportion of pastoralist families who 'usually do not' (6%) or 'never' (1%) supplement. Given these figures, it is apparent that the vast majority of the area's livestock keepers have come to depend directly on the functioning of fodder markets, while the natural vegetation cannot fulfill any buffering function in times of drought. The establishment of grazing reserves in the context of the PDPEO development project (ch. 2.8, p. 98) did not fundamentally change this situation.

Apart from forage for animals, the steppe of eastern Morocco provides a range of medicinal plants and wild herbs suitable for human consumption. One particular species is the so-called desert truffle, locally known as *tirfas*. These truffles (fungi of the *Terfeziaceae* family) are described by pastoralists as 'similar to potatoes' in taste and preparation, and are considered a local delicacy. Collecting and selling them on the market can therefore generate extra cash

income for families in the area. However, whether the *tirfas* will grow in any given year depends on humid soils and on specific parent plants for nutrients (Steinmann 2001); the possibility of harvesting it is thus directly threatened by drought (Norman 2015).

Among the households that took part in my survey, almost one in five had collected desert truffles in the previous year, a very humid one (cf. Table 2, p. 16). Most of them live in the Awlad Sidi 'Abd al-Hakim municipality in the east of my study region, where 40% of households had engaged in fungus harvesting. On the other end of the scale, the share is lowest in Awlad Ghuzayyil in the west (3%). Nomads, former nomads and non-nomads are equally involved, however. The activity is most pronounced among those families that depend predominantly, but not exclusively on livestock breeding for their livelihoods, and belong to lower and middle wealth groups. Richer and permanently settled families may still enjoy consuming the truffles, but prefer buying them at the market rather than collecting them outside. This pattern has been observed in an adjacent region, at least (Steinmann 2001).

In some aspects, the case of *tirfas* resembles that of *matsutake* in Japan (Faier 2011; Tsing 2015) or the caterpillar fungus in Tibet (Gruschke 2011; Linke 2017) which are both harvested by rural populations and have become the object of insightful academic research, not least through ANT-like approaches. Anthropologist Anna Tsing, for instance, has followed the *matsutake* mushroom across the globe to trace 'open-ended assemblages of entangled ways of life' (Tsing 2015, viii). The caterpillar fungus, on the other hand, is closely linked to pastoralist economies and ecologies in the Tibetan highlands. It is an animal-plant hybrid, a moth larva infested and killed by a fungus, and has become an important source of income for local nomads due to its high valuation in Chinese medicine. As the fungus cannot be cultivated, it has to be collected from the highland pastures, which have in turn become the object of unprecedented contestation. With prices rising, fungus harvesting has become more lucrative than yak herding for most families (Gruschke 2011). On a much smaller scale, this resonates with the Moroccan *tirfas* experience. In the truffle harvesting season, many young men who work as wage herders prefer going out to collect *tirfas* rather than herding, and it is difficult for herd owners to find someone who will take care of their sheep at all during this time.

Compared to the Tibetan fungus, the desert truffle does not seem to have a similar potential to bring financial wealth to the region, although some authors claim that its status 'as a traditional medicine and its fine taste [...] add to its high market value' (Norman 2015, 3). The families in my sample who did so collected an average of 126 kg in the previous year, with a few cases reaching up to 1,000 kg. They sold the mushrooms for a mean price of 24 dh per kg (ranging from 5 to 60 dh), usually at the weekly market in 'Ayn Bani Mathar. At best, the yearly extra income thus generated could amount to roughly  $1,000 \times 30 = 30,000$  dirhams, the price of a low-budget used car or a major medical operation. However, much time and labor force need to be invested which not all households can spare. And certain other forms

of wage labor are clearly more attractive: families that include an emigrant, in my sample, are significantly less likely to go out for truffles than those that do not.

Under common climate change scenarios, the conditions for *tirfas* growth may become worse in the future, although there are very few studies on the subject (Norman 2015). Claims that improved livestock management would slow down soil degradation and thus improve conditions for the truffle (Norman 2015; DPA Figuié 2006) seem to be based on anecdotal evidence rather than in-depth knowledge. What remains unclear is the exact mechanism of interaction between fungi, air temperatures, precipitation, drought, animals, and the additional dynamics of human decisions that result in certain land use patterns or market demands. If the economic value associated with the truffles were to increase, perhaps with the unlocking of reliable markets beyond the regional scale, scientific knowledge generation on its ecology would certainly multiply as well (Faier 2011).

In summary, the vegetation of the high plateaus is intimately involved in most existing assemblages/notions of drought. As the actual local biomass production often fails to meet the demands of sheep and goats, herders have increasingly relied on supplemental fodder, keeping herd numbers stable and thus also maintaining high pressure on the rangeland vegetation. An elderly notable narrates that the newly established grazing exclosures, showcased during a visit by King Mohamed VI to the region, give just a glimpse of what the entire landscape used to look like before drought imposed itself on the region, reshuffling the functioning balance between plants, sheep, and humans:

‘Well, we lived in the steppe. Back when we lived in the steppe, the pastoral regions were not like today. The land has changed. These protected areas (*mahmiyyat*) you saw on TV, the day our ruler came here – you saw that esparto grass? It used to be even more than that, all natural. But since the 1990s, we can say, drought has prevailed over the land.’ (Interview with Daoudi, ‘Ayn Bani Mathar, June 2, 2010)

For an additional perspective on the rangelands and their connections to drought assemblages, I will examine overlapping layers of past and current human land use in the next chapter.

## ***2.4 Land Use: Appropriation and Conflicts***

The arid steppe of the high plateaus, at altitudes of around 1,000 meters above sea level, is mainly used as grazing land in extensive livestock production.<sup>3</sup> But who owns these vast expanses of rangeland? Most of them are legally defined as state land; local communities are collectively granted the right to exploit specific areas. The legal text that still regulates these collective lands is an edict from 1919, which features rather vague and equivocal wording (Bendella 2009). The collective territories are referred to as *‘arshiyya* (tribal) lands where eligi-

---

3 This chapter is based on a previously published paper (Kreuer 2011) but has been substantially revised and expanded.



ble groups enjoy usage rights. On a wider regional scale, this recognition of 'the collective rights of tribes' has so far been unmatched in any other Arab country (Boutaleb and Firmian 2014, 100). With the status of collective territories more or less firmly established while people kept moving and communities changing, a certain dissociation between tribes and territories took place throughout the twentieth century (Bouderbala 2007). For the time being, there seems to be no political impetus on the part of the Moroccan government to change this status quo.

Within these configurations, each tribe and tribal subgroup has its habitual territory (*walf*, related to Standard Arabic *alf*, 'familiarity'), the boundaries of which are based on mutual acknowledgment and regulated by customary law (Mahdi 2009a). No legally binding documents exist that would delimit these tribal territories. A team of researchers started mapping them in the 1990s and encountered a highly complex 'social mosaic' of space occupation; they abandoned the endeavor soon after (Lazarev 2008, 21, my translation). Obvious legal gray areas continue to exist, and agricultural techniques and activities play an important role for those who want to stake their claim in this shifting spatial and legal assemblage.

Aside from their function as pasture, parts of the steppe have always been utilized for dry farming. Nomadic families would sow one or several patches of land every fall, usually with barley or wheat, and hope for sufficient winter rains to make it grow so they could harvest a few sacks of grain for their own subsistence or to feed the animals. One herder explains his straightforward approach: 'Just with the rain, that's all. When there is rain, we plow; when there isn't, we don't' (Interview with Abdelkader, Awlad Sidi 'Abd al-Hakim, June 3, 2010). Even a minor drought will usually undermine such dry farming endeavors, as the crop will not survive. Conversely, a good harvest can constitute a reserve for a coming drought, however limited it may be.

In addition to makeshift fields in the steppe, there is a place in the study area where irrigated farming is widely practiced thanks to abundant natural springs and a system of canals: the town of 'Ayn Bani Mathar and its surroundings. Irrigated land is private instead of collective property. A major crop, alongside barley and wheat, is alfalfa, which is used (or sold) by sedentary villagers as animal feed.

Over the past decades, the steppe has witnessed a wide-ranging creeping appropriation of collective rangelands. People claim large patches of land as theirs and prevent others from using it. This is happening *from below*, since there is no official encouragement, and neither is it an elite phenomenon. Rather, this appropriation is the result of day-to-day practices by most members of the community, which, in turn, acts as a reference group. The main spirit seems to be one of: 'Everyone around me is doing it so I will do the same.' It is ordinary tribespeople who thus take part in an ongoing negotiation and renegotiation of boundaries and spaces. And there is no basis in law for effectively stopping this practice: 'All these expanses that belong to everyone, after all, belong to no one, and can thus belong to anyone,' as one scholar puts it (Bendella 2009, 296, my translation). More and more land-use decisions

are made by individual households without consulting 'the collective tribe' (Steinmann 2001, 4). Attempts to stop this trend have been controversial, such as the ban on rangeland agriculture that some communities decided upon. Across the municipality of Awlad Sidi 'Abd al-Hakim, such a ban was in place from 2008 to 2011 and was going to be extended further. In my interviews, some herders were in favor of this intervention while others cited it as 'the biggest negative development' of the past 15 years.

The controversy around the ban on agriculture is explained as follows: the practice of dry farming usually serves to justify an individual's claim to a piece of land. 'Working the land is a means of affirming your authority over it,' as a local herder explains. This use of agriculture as a vehicle for privatization is old; it was mentioned, for instance, in a 1989 FAO report. That report warned against 'the encroachment of cropping land into rangeland' in the high plateaus, which was 'causing a significant reduction of the area available for grazing and therefore leading to more grazing pressure on the land' (Guessous et al. 1989, 34). In fact, this practice is linked to a centuries-old debate that was reiterated by Locke and Rousseau, among others. It revolves around the 'agricultural argument' which claims that cultivation is the only 'proper' way to use land; consequently, 'only agriculture can be regarded as a basis of a real land tenure system' in this view (Gilbert 2007, 685). While cultivation is obviously not the only legitimate form of land use in a pastoralist community that relies on livestock grazing, it is interesting to note that there is still a hierarchy in types of land occupation: agriculture is seen as more valuable and worthy of protection than pasturing. This reflects the amount of labor, capital, and/or time that has to be regularly invested into the cultivation of crops, I would argue, as opposed to the extremely low human efforts thought necessary for the maintenance of rangelands.

While there is widespread agreement that the phenomenon of rangeland cultivation is growing in the high plateaus, its extent is difficult to measure. A study that analyzed satellite imagery found the encroachment of agricultural fields to be less dramatic than assumed in 'Ayn Bani Mathar: over twelve years, about 1% of the municipal territory had been newly converted to agricultural use. Nevertheless, the condition of the area's pastures had massively declined between 1988 and 2000 (Thomas and Bounejmate 2005).

My 2009 survey includes information about 752 of these patches of land, as most families lay claim to several of them; the data is thus able to highlight some spatial and temporal dimensions of *de facto* privatization. When asked how long the land in question had been in the family's possession, most respondents answered that this had 'always' or 'for a long time' been the case. Those who gave an acquisition date sometimes traced it back to the early twentieth century; a constant rise in land acquisitions occurred from the 1940s to the 1970s, only to return gradually to lower levels in the more recent past. The number of land acquisitions by the households in my sample is given for each decade in Figure 12, differentiated by land use category: irrigated farming, dry farming, or other uses. A peak in the 1970s is clearly

visible – the time most commonly associated with the narratives of decline as drought turned into a constant threat looming over the nomads.

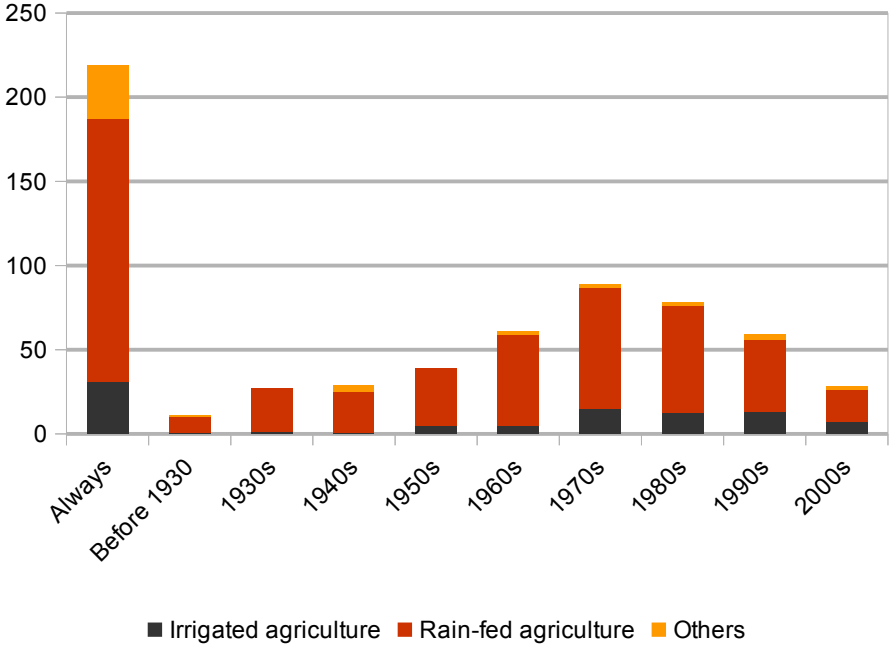


Figure 12: Private pieces of land by acquisition date

Scholars have discussed a possible role for drought as a catalyst that facilitates renegotiation and innovation in a community. Such a crisis might offer ‘an opportunity for a redefinition of the range and priority of property relations and claims’ (Solway 1994, 484), including land ownership. In a global context of increasing commodification, the movement commonly goes from collective toward individual rights, just as has been observed for the Moroccan steppes. In this process, ‘the legitimacy of narrow rights to exchange value take[s] precedence over wider communal rights’ (Solway 1994, 487). Can this pattern, drought interacting with wider economic trends, explain the privatization tendency in my study area? Possibly; but these are not the only ongoing silent transformations, and some additional actors deserve consideration.

Another observation emerges from my data set: not only the number, but also the average surface size of newly acquired patches of land has been shrinking. This trend started in the 1960s. It is possibly related to the nationalization of all communal rangeland resources in 1963, which ‘created ambiguities about land tenure and encouraged individuals to compete for land’ (Steinmann 2001, 60). In that year, the ‘*arshiyya* (tribal) lands were formally placed under the trusteeship of the Ministry of Interior.

Both declining trends, in patch numbers and sizes, imply that the most desirable plots have long been claimed. On the other hand, the percentage of real estate that was purchased – rather than claimed by tilling the land or inherited – has steadily increased, according to my survey data, to reach over a tenth of all land acquisitions in the 2000s. An explanation is again to be found in the growing scarcity of available land, and perhaps also in a generally

observable monetization and commercialization of exchange relations in the region (Rachik 2009). Strictly speaking, my data do not reveal how old this land grabbing phenomenon, or the discourse about it, is: they only represent a contemporary snapshot. Older acquisition times may theoretically have been given by respondents in order to underscore current claims. However, concerns about increasing cultivation and appropriation of rangelands in this area were already voiced in the 1950s (Paskoff 1957), so the timeline seems plausible.

Similar trends have been observed in other drylands of the world as well, for example among Syrian Bedouins. Parallels include the advent of the truck in the 1960s, changing economic activity patterns for households as a result (including an unprecedented accumulation of wealth and the emergence of livestock entrepreneurs), and a widespread 'desire to acquire land' (Chatty 1986, 127) from the 1970s on.

Among the pastoral households in my sample, 85 percent lay claim to some land, with an average surface area held per household of 22 hectares. On average, sedentarized herders hold slightly more land than mobile nomads, but the data do not suggest a strong link between sedentarization and land appropriation. Many former nomads state that they abandoned their mobility at some point because they 'had nowhere to go' any more, a symptom of landscape fragmentation that is found in many pastoral areas (Hobbs et al. 2008). Securing as much land as possible in this situation appears to be a normal reaction. Not surprisingly, there is a strong correlation between herd size and acreage: the more sheep you have, the more land you tend to own. So the notable elites enjoy an advantage in this regard.

Rangeland fragmentation is often a bad thing for pastoralists in arid regions because it 'can restrict access of people, livestock and wildlife to spatial heterogeneity in resources' (Hobbs et al. 2008, 777). In regions where such processes have occurred on a large scale, a re-aggregation and consolidation of fragmented lands in the hands of a few have sometimes emerged as a response to restore spatial heterogeneity (Hobbs et al. 2008); but this solution means that many small producers have to drop out, and is therefore undesirable from a social security and equality point of view.

As shown in the figure above, the appropriated patches of land are mainly used for dry farming in the high plateaus (over 80 percent, usually barley). However, my survey data suggest that agriculture is not so much an important part of the household's income portfolio as it is a pretext for asserting one's ownership of the land. Just one in twenty households that cultivate cereals ends up selling some of the harvest, and it hardly ever accounts for more than one fifth of a family's annual revenues. So what inspires the dynamic of appropriation? It can partly be viewed as a 'speculative game' in the risk-prone steppe environment (Métral 2000, 141), but more than expected financial gains, 'envy and social competition' (Chiche 2003, 215, my translation) seem to be the main drivers from the human side.

In this process, neighbors delineate boundaries and mark them with small piles of stones that can be seen in different parts of the high plateaus. Asked whether everyone was doing

this, a herder affirmed: 'Everyone. This is my *daya*, that is my *daya*, and so on' (Interview with Abdelkader, Awlad Sidi 'Abd al-Hakim, June 3, 2010). Locally, *daya* refers to a small basin or depression in the landscape with 'relatively humid sandy soils' (Steinmann 2001, 33) where rain-fed agriculture has reasonable chances of success and is conventionally practiced. Given such a setting, disputes seem hard to avoid, even when both parties belong to the same tribe. According to a public scrivener in 'Ayn Bani Mathar, conflicts over land are in fact, next to marital conflicts, the most common occasions on which his services are solicited. People regularly ask him to draft or certify documents testifying that they or their ancestors have worked a certain piece of land. These documents are then to be used as corroborating evidence in arbitration procedures (Interview with scrivener Idris, 'Ayn Bani Mathar, June 5, 2010).

In the gray area of legal pluralism that surrounds collective territories in Morocco, certain rules have been established over time. But even if they 'permit the attribution of parcels of land individually to a beneficiary, nothing exists that could secure this individual appropriation' (Bendella 2009, 295, my translation). Theoretically, the state can demand the return of the land at any moment, and most herders are aware of this fact. How secure each household's land ownership is from a legal point of view also depends on the type of land. One in two irrigated fields in my sample comes with some sort of official or semi-official documentation, whereas the ownership of rain-fed plots is undocumented in 92% of the cases.

The land use negotiation process becomes perhaps most visible in a conflict, when the mechanisms that usually regulate it fail. Whether conflicts and struggles should be seen as an exception or as the norm is a matter of debate; I agree with sociologist Jeanne Chiche who speaks, analyzing another pastoral region of Morocco, of a 'dialectic of conflicts and agreements' that should always be studied in the larger context of social relations (Chiche 2003, 13, my translation).

A brief digression into the hierarchy of the municipal administration is appropriate here, as it will help clarify a typical conflict resolution mechanism. The local authority is headed by a *qa'id* (literally: leader) or *khalifa* (deputy), who is appointed by the central government and is generally an outsider to the region. These functions are thus 'detrribalized' (Mahdi 2009a, 134, my translation). Below them rank a number of *shaykhs* (elders) and, below them, *muqaddims* (from *muqaddam*, supervisor), who are nominated by the local community itself and represent its different factions. Hence, they are in the position of mediators between the central state and the local population, which can be a thankless task. A *muqaddim*'s remuneration is rather symbolic at around one thousand dirhams per month, the equivalent of fourteen days' wages for an unskilled construction worker, so both the prestige and the actual political power linked to these positions are somewhat limited. My survey data suggest that most *muqaddims* and *shaykhs* are affluent individuals and belong to traditional notable lineages, but are by no means the wealthiest in terms of animals, equipment, education, or money.

A *khalifa* in one of the rural municipalities gave me the following account of a typical resolution scenario for land disputes where different groups of intratribal actors are involved:

‘All the land is tribal (*‘arshiyya*) land, but it is in fact divided among the households. The land is used as pasture or for agriculture. Boundaries between neighbors [...] create many disputes. For example, a herder might abandon one of his fields in a drought, only to come back in a better year and find someone else occupying and using that same piece of land. Cases of conflict about boundaries and prior claims are usually referred to us, the local authorities, but are then not resolved judicially in a court. Instead, we engage the tribe’s notables (*a‘yan*). We call upon them and ask them to examine the situation and bring about a reconciliation. When they eventually reach an agreement by way of their customary law (*‘urf*), all parties involved get together for a feast to demonstrate their good intentions.

‘A decision is always reached in favor of the party that can prove – through written or oral witness accounts – that they had worked the disputed piece of land prior to their adversary or, even better, that their fathers and grandfathers used to cultivate it. The central state, which we represent, remains neutral. We are thus not seen as unjust or biased, but rather as reliable, effective mediators.’ (Interview with *khalifa*, Hisyan al-Diyab, June 4, 2010)

My pastoralist interlocutors broadly confirmed this view of the state authorities’ role in land conflicts, while being skeptical about their performance in other areas. The tribal notables most closely involved with these conflict resolution mechanisms are those who hold the office of *na‘ib* (representative); they are competent in collective land matters (Mahdi 2009b).

This local policy of not intervening directly corresponds to the nationwide edict from 1919 mentioned above and still valid, under which the law-making state similarly shied away from taking up a clear position on these matters (Bendella 2009). The state does not give an opinion on the legitimacy of people’s land claims, but simply refers the case back to the tribe. This is probably wise in the sense that a hard and fast ruling on any one case would presumably trigger a cascade of follow-up complaints and litigation that could easily get out of hand and overwhelm the municipal personnel. ‘Don’t make waves’ rather seems to be the maxim, especially since any law enforcement by state agents would be difficult to implement in the vast steppes. This approach to conflict management seems to be a general feature of Moroccan authorities (Abaab et al. 1995).

Some conflicts over land in the eastern Moroccan high plateaus cannot be solved in the same elegant way: when a group’s notables are themselves implicated, who is going to mediate? There are examples of such intractable conflicts around the cooperatives that were established in the context of the PDPEO project (see ch. 2.8, p. 98). One effect of this development intervention has been a change in the logic of land access. Where grazing lands used to be freely accessible to all tribe members at all times, based on mutual recognition and agreement, the newly defined grassland resting areas are now members-only pastures and have to be paid for (Mahdi 2007) – currently at 4 dh per animal (Acherkouk, Maâtougui, and El

Houmaizi 2012). During their closure, moreover, they are off limits to everyone. When these rules are breached, there is no legal basis for sanctions by the state; despite occasional calls for it, a rangeland police force has never been established. The matter has to be settled within the cooperative, i.e., within the lineage.

During an informal group discussion with around ten local livestock producers, they complained about an unresolved conflict within their cooperative. It opposes small and medium livestock owners to three or four wealthy members of the same lineage, not present at the discussion, who blatantly disregard the resting rules. They refuse to take their sheep off the protected areas during closure times, and even evade the entry fees. This infuriates the others and they denounce the notables' corruption and unfairness, but feel powerless since the same notables run the cooperative and call the shots within the lineage, relying on their traditional status as leaders. Put plainly, the rule in this case is that for wealthy people, some regulations do not apply. They are successful in reaping personal benefits from the new institution, using their powerful positions to easily embed new elements into the extended actor-networks which sustain this power. In turn, they accuse their accusers of jealousy (*hasad*). Small and medium herders are left empty-handed and frustrated, and increasingly look for alternatives to the livestock business.

Are the rules of the land use game going to change in the foreseeable future? And what would such a change imply for the various actors and their relative positions of power? A possible scenario includes steps toward a formal privatization of land ownership. So far, successive Moroccan governments have been reluctant to implement or even discuss such steps, but the political debate is on the agenda in North Africa: should collective lands be broken up and privatized? While neoliberal theories predict more efficiency and improved land management, critics assume the exclusion of the weakest and inevitable processes of concentration. In ecologically similar grassland regions in Tunisia, such negative outcomes of privatization have been observed for a while now (Bourbouze 2003).

To capture these processes theoretically, I would like to refer to Deleuze and Guattari once more. In their model of *nomad thinking*, the open Moroccan steppe would be conceptualized as an ocean-like 'horizonless milieu that is a smooth space' (Deleuze and Guattari [1980] 1987, 379). This ideal type of milieu, dominated by people who organize themselves in tribes, is in their model opposed to striated space, which the authors associate with sedentary practices.

'In striated space, one closes off a surface and "allocates" it according to determinate intervals, assigned breaks; in the smooth, one "distributes" oneself in an open space, according to frequencies and in the course of one's crossings [...].' (Deleuze and Guattari [1980] 1987, 481)

The eastern Moroccan process of land appropriation through agriculture conforms to the notion of allocation and closing off, and thus signals a move from smooth toward striated space. This feeling is most strongly expressed by inhabitants of the Awlad Sidi 'Abd al-

Hakim municipality, who assured my assistants and me more than once that 'it is one of the most densely populated areas in the country.' This claim is not supported by official statistics, but nicely illustrates the perception of detrimental change. A similar shift in people's relations to their land has been observed across the border in Algeria, where attachment to a social group (i.e., the tribe) has gradually been superseded by attachment to a territory. This transformation was initiated as early as the 19<sup>th</sup> century through French colonial policies (Trautmann 1989).

Another actor in the competition about land use deserves a mention: the houbara bustard, a native desert bird. A closely related species, MacQueen's bustard, which migrates between the Arabian peninsula and central Asia, is endangered due to its being hunted there. In the highland steppes of eastern Morocco, the bustards are instead threatened by an increased year-round presence of grazing sheep and goats in the landscape, which disturb the birds and drive them away (Le Cuziat et al. 2005). This is where the late ruler of the oil-rich United Arab Emirates, Zayed bin Sultan Al Nahyan, together with 'a handful of passionate individuals' (ECWP 2014), comes in: under the banner of wildlife conservation, they established a research center in Missouri (at the western edge of the high plateaus) in 1995. The center portrays its mission as 'conciliating the pursuit of human, economic and cultural activities with the preservation of a species' (ECWP 2014) and has combined 'ecological research, [population] reinforcement using captive-bred houbara individuals and hunting management' to this end (Hardouin et al. 2014, 1495). The main reason why the Emiratis put so much effort into bringing the Moroccan landscape, a considerable technical infrastructure, international researchers, and thousands of bustards into a stable assemblage, however, is somewhat hidden behind the label of cultural activities. Rich men from the Gulf simply want to hunt these birds, and want to remain able to do so in the future. Their 'traditional Arab falconry' (Hardouin et al. 2014, 1495) may be condemned as being cruel to hunting and hunted birds alike, but is a proud national heritage. Moreover, bustard meat is supposed to have aphrodisiac qualities.

Currently, the program covers an area of 74,400 km<sup>2</sup> in the high plateaus (Hardouin et al. 2014, 1495). This area has remained open to use by pastoralists and their ruminants, and while hunting parties from the Gulf are not an uncommon sight in the steppes, I have not heard about serious conflicts between both groups. Yet, such a potential certainly exists, since sheep and houbara bustards have diverging needs and interests; and falconers from the Emirates command far more economic power and political influence than the average local shepherd. In a conflict scenario, the adverse effects drought already has on pastoral land use options may be aggravated by the birds and their protectors/hunters.

There are yet more players in the land use game. In a further manifestation of present-day globalization in eastern Morocco, international corporations have entered the arena. Their impact may not yet be large, but two Spanish firms have become extremely visible in the northern high plateaus. One is operating a gas pipeline that runs across the steppes, con-



necting Algerian gas fields to Southern Europe, and the other company opened what was then the world’s largest hybrid solar-gas power plant on the outskirts of ‘Ayn Bani Mathar in 2010 (see ch. 3.3, p. 129). Both projects occupy tracts of land that are no longer accessible for local pastoralists. The globally observable phenomenon of rangeland fragmentation proceeds in complex ways, given that ‘there is a tangle of jurisdictions and opposing incentives and disincentives’ (Hobbs et al. 2008, 783). Agricultural intensification targets contradict conservation-related goals, for instance:

‘When these policies meet in the same landscape, as they do in rangelands, conflicts arise and a patchwork of public and small landholdings appears.’ (Hobbs et al. 2008, 783)

As my survey reveals, perceptions about the prevalence of conflict are quite different across the three groups of nomads, former nomads, and non-nomads. The respondents were asked to evaluate the statement: ‘Conflicts have become less frequent compared to the past.’ Each group’s answers are depicted in Figure 13. Please note that the question was about conflicts (*niza’at*) in general, not specifically about those related to land use and ownership.

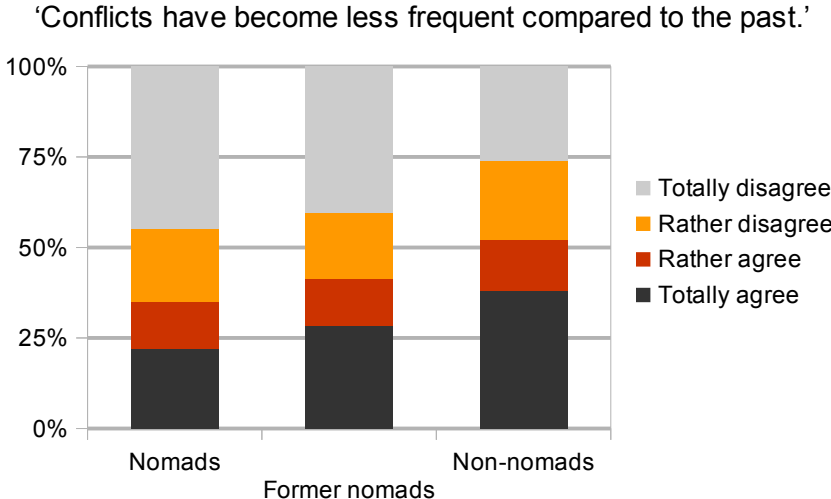


Figure 13: Perception of conflicts by category

It appears that mobile pastoralists experience the highest level of social tension, or alternatively the least amount of positive change in this sense – if conflicts are seen as something negative, that is. Typically, an outsider asking about conflicts will first get this default answer in rural communities across Morocco: ‘No, there are no conflicts at all!’ Stories of strife only tend to surface in the course of a more thorough investigation (cf. Kreuer 2012). In this sense, the high disagreement ratio among nomads in my survey is surprising, as they do not mince words. Over half of the families who have been settled for more than a generation, on the other end of the spectrum, rather or totally agree that the present is less conflict-ridden in their community than the past used to be. This may be related to a generally positive view of modern life in solid homes, combined with income-generating activities that are less dependent on commonly owned natural resources.

To sum up, household heads try to secure their land claims by enrolling diverse elements into fragile assemblages. These include practices of their ancestors, documents drafted and printed out in the scrivener's office in 'Ayn Bani Mathar, piles of stones placed on the ground to mark the boundaries between them and their neighbors, and other elements. In the absence of a universally accepted, enforceable, stable punctualization, i.e., an oligopticon or 'center of calculation' in ANT terminology, such as a central land register, the effort of holding together these bits and pieces is openly visible. Once more, drought is often a part of these particular land entitlement assemblages; combining forces with other actants, it has contributed to a fundamental alteration of land use and mobility patterns in this community. If land becomes scarce and increasingly fragmented in the future, droughts will possibly have more severe effects on those livestock breeders who cannot completely rely on supplementary feed and are reliant on the steppe vegetation.

## *2.5 Sheep and Markets in Eastern Morocco*

After my exploration of how drought is interwoven with water, vegetation, and land in the Moroccan plateaus, this and the following chapter describe and analyze the region's livestock-based economy in the narrow sense.<sup>4</sup> My research here is based on geographical approaches and assemblage thinking rather than classical economics. In this view, markets can be understood as a specific type of 'sociotechnical' assemblage (Berndt and Boeckler 2010, 560) that brings together various kinds of economic entities; these, in turn, are seen as 'never fully completed assemblages of heterogeneous elements' (Berndt and Boeckler 2010, 565). I will take stock of such market elements in this part of the thesis.

Pastoral nomadic peoples in drylands have almost never been completely self-sufficient; their survival routinely relied on exchange relations with sedentary communities. The various sub-projects of our Collaborative Research Center SFB 586 (ch. 1.3, p. 30) assembled evidence from different areas and time periods to corroborate this point. A summary statement by anthropologist Elliot Fratkin holds equally true for my study region:

'Pastoralists have traded or exchanged livestock products for grains, tools, clothing, and other commodities with agricultural or urban societies since the beginning of recorded history.' (Fratkin 1997, 247)

As demonstrated earlier, agriculture in the high plateaus plays only a marginal role in subsistence production, whereas sheep and goats have the function of a capital stock for many households. An etymological link between heads of livestock, 'the earliest medium of exchange,' and the word for capital or money exists in many of the world's languages (Menger [1871] 2007, 313). The size of a family's livestock holdings is often a good proxy for its overall wealth. A frequently heard expression in my study region describes the idea of a poverty trap linked to supplementary feeding, where more and more animals have to be sold

---

4 The bulk of both chapters is based on previously published material (Breuer and Kreuer 2011).

in order to feed the remaining ones: *'al-baha'im ta'kul ra'saha'* (the animals eat themselves up). This process is often linked to drought conditions, which necessitate the use of supplementary feed in the first place. Historically, one scholar narrates, the region's herders 'traded away livestock at the markets primarily during periods of drought' (Steinmann 2001, 120). Today, it is especially poorer breeders who sell sheep out of an immediate need for money. I will look at different types of producers more closely in the next chapter; what follows now is a more top-down description of how the relevant sheep markets operate, starting at the national level.

The Moroccan sheep meat sector is characterized by certain spatial and temporal fluctuations in supply and demand. On the supply side, most sheep originate from extensive pastoral systems, where production depends on factors such as the animals' reproductive cycles, and regionally specific seasonal variations in precipitation. On the marketing side, national sheep meat remains, so far, shut off from competition by the global economy due to import tariffs of 304 percent on live animals and processed meat (ADA 2010). The state restricts rural-urban and interurban meat transport, limiting the availability of refrigerated transport equipment. Throughout the meat-marketing system, animals are thus transported alive and are generally slaughtered in the place of consumption.

For centuries, weekly markets have been the key interface in the commerce of goods in rural Morocco. Roughly 850 markets, held on one or sometimes two set days of the week, are spread over the country. Almost all of them have a livestock section. Individual markets, however, differ greatly from one another in many respects, such as size, the traded animal species, but also types of suppliers and customers (Paulus 1994; Troin 1975). Morocco's weekly livestock markets are characterized by a clear spatial hierarchy, where markets of different sizes assume different functions in the commodity chain. Several attempts have been made to develop typologies of these markets (Khalil 2007; Paulus 1994; Breuer 2007b). Most often, three types are distinguished: small rural livestock markets located in remote community centers; middle-scale collector markets located in regional towns; and middle- and large-scale distributor markets located in bigger cities.

In many regions, the smallest markets play a subordinate role in interregional animal trade, functioning rather as food-provisioning markets for the rural population who often build up relations of trust with the merchants, enabling them to buy on credit when times are difficult. Full-time market vendors, in turn, tend to repeat the same circular itinerary, attending a different weekly market five or six times per week. The middle-scale markets, such as the one in 'Ayn Bani Mathar, have developed into the central interface between pastoralists and interregional traders, especially as they are often located in regional towns experiencing substantial population growth.

Moroccan pastoralists' marketing opportunities are closely linked to changes in demand and the country's consumption structure. There are several dimensions to this. Generally, annual meat consumption per capita in Morocco has continually increased in the 21<sup>st</sup> century

to 35 kg in 2013, but is still below the global average of 43 kg (FAO 2017). For the poor, both urban and rural – but especially in the countryside – meat remains a luxury item that is consumed rarely and in small quantities. However, Morocco has seen the emergence of a predominantly urban-based middle class with a higher meat demand (Chichaoui 2001). Hence, meat consumption is concentrated in the cities, and given the high rate of urbanization, meeting urban demand with rural meat is increasingly crucial. Most importantly, consumption patterns and tastes have changed. The share of mutton, goat, and bovine meat in total meat consumption has dramatically dropped within the last decades, from 81 percent of meat weight in 1970 to 35 percent in 2013 (calculated from FAO 2017). This decline is related to the state-subsidized development of a modern poultry sector, and the fact that poultry consumer prices are considerably lower than those of red meat. Despite the decline of its relative importance, the absolute volume of sheep meat production and consumption has increased during these last decades as a result of population growth and a greater overall meat intake.

There is also a social and religious dimension to Moroccan sheep meat consumption patterns. Male sheep, especially, are ‘a prestige product, sold at high prices, [...] reserved for special occasions’ (Chiche 2001, 266, my translation) such as ritual sacrifices. In the early days of Islam, the Prophet Muhammad ‘had sacrificed a ram, leading scholars to propose that it was better to sacrifice male animals than females’ (Holden 2009, 81). Accordingly, the meat of ewes and cows tends to achieve lower prices in Moroccan markets although they make up the bulk of all flocks, and herders may try to save their rams for sale before holidays when their prices go up even more (DPA Figuig 2006).

It is difficult to overstate the relevance of religious festivals to the entire meat-marketing system. The event most strongly influencing sheep demand is the Islamic festival of sacrifice (*‘id al-‘adha*, locally *al-‘id al-kabir*), where each household head who can afford to should slaughter a sacrificial animal. It is estimated that 50 percent of all annual sheep slaughters occur at the *‘id* (Brisebarre 2002). In November 2009, Moroccan newspapers reported an estimated demand of 5.1 million sheep and goats nationwide for the upcoming holiday, and total transactions were expected to exceed 7.2 billion dirhams in the few days preceding it (Boukhalef 2009). About half of the demand is thus concentrated in one very short period of the year. Dates for *‘id al-‘adha* follow the Islamic lunar calendar, in which a year has 354 days; consequently, the festival rotates backward through the Gregorian calendar. For example, while it was celebrated in mid-November in 2010, it had moved to early September in 2017. Its temporal position in relation to animal production cycles in different Moroccan regions thus differs from year to year. For many pastoralists, *‘id al-‘adha* is the single most important marketing season, although this does not seem to be the case in parts of eastern Morocco, as I will argue below.

Evaluating the position of sheep meat in urban every-day meat consumption outside of the festivals is not trivial. In Morocco, consumer preferences for certain kinds of meat are

based on a great variety of societal norms which may differ according to an individual's region of origin and his or her upbringing (Chiche 2001). Likewise, different sheep breeds may receive variable ratings for taste and quality from distinct consumer groups. As Mohamed Khalil (2007) points out, animals with specific traits may be preferred in certain cities and at certain festivals. Throughout the country, there are thus numerous local niches for the marketing of sheep of defined age, size, breed, and taste.

The Moroccan sheep meat market, in sum, offers considerable marketing possibilities for mobile livestock producers. Demographic change, domestic market protection, and consumption patterns tied to religious festivities have assured a meat demand that is, in the long run, relatively stable. In the short run, however, the Moroccan sheep meat sector is subject to considerable temporal fluctuations of supply and demand. Benefits from livestock marketing depend on the exploitation of price margins between different places or seasons, especially during Islamic festivals.

The typical sheep breed of the high plateaus, the Bani Gil, is named after the most important tribal confederation of the area; locally, it is also referred to as *daghma* (dark-colored). The Bani Gil breed enjoys a special reputation for its taste, which is mainly owed to its wormwood-heavy diet (Ben Hounet, Brisebarre, and Guinand 2016), and is considered 'one of the best Moroccan meat breeds' (Brisebarre 2002, 113, my translation). Moreover, these hardy sheep are well-adapted to the eastern Moroccan environment, 'can walk very long distances, have a high thirst tolerance, and fatten quickly under favorable conditions' (Steinmann 2001, 46). However, the past decades have seen the large-scale introduction of a different breed via Algeria, called Awlad Jalal after another tribal group. These sheep, *bayda* (white) in the local terminology, are less adapted to the climate of the steppe, but offer a better reproductive performance and are preferred by certain urban meat traders due to their slaughter-related qualities. According to one study, the Bani Gil breed is at high risk of disappearance through genetic erosion, while the Awlad Jalal breed is not considered to be threatened (Nefzaoui, Ben Salem, and El Mourid 2014, 43).

Unstable supply structure and fluctuating animal prices – varying according to the enforcement of border controls – have lent a considerable dynamism to local trading activities since the mid-1990s (Khalil 2007). According to one observer, the entry of *bayda* sheep from Algeria 'has shaken the principles of the region's livestock production' (Chiche 2007, 52). By the late 2000s, a crossbreed of *daghma* and *bayda* had become extremely widespread in the northern high plateaus. Its colloquial designation is *bargiyya* (gleaming, light-colored; not to be confused with the Timahdite breed from the Middle Atlas, which also goes by the name *bargi*). Moreover, local observers have noticed a partial reversal of cross-border sheep flows in the past couple of years, prompted by exchange rate developments between the Algerian and Moroccan currencies.

Although the informal sheep trade with Algeria is fairly recent, it should be noted that the region has a long history of transnational livestock trade. During the colonial period,

Bani Gil lambs were primarily produced for export. They were sought after in France for their high quality meat (Paskoff 1957), and were marketed there as 'Small Oranian' (*petit oranais*). This label was apparently invented to avoid 'the epithet of "Moroccan" depreciating them on French markets' (Célérier 1927, 465, my translation) as opposed to Oranian – the Algerian department of Oran was French territory. These exports, however, ceased in the early 1970s (Guessous et al. 1989) and it is only in the context of current liberalization efforts (chapter 2.7, p. 94) that they may be revived.

The recent history of the Moroccan-Algerian border is marked by three consecutive closures. Although Moroccans had fought alongside Algerian forces in the independence war – of which some of my older interlocutors can vividly recall episodes – against the French, the relations between both countries deteriorated quickly after Algeria's 1962 independence. In October 1963, the so-called 'War of the Sands' (*guerre des sables*) erupted about the exact border demarcation after the departure of the colonizers. While it ended with dozens of casualties on both sides, a closed border, and unchanged territories, it gave rise to concrete visions of a united Greater Maghreb for the first time (Daoudi 2015). However, the next conflict that led to a border closure followed in 1975, when Morocco annexed the Spanish-controlled areas of the Western Sahara. This was opposed by the Algerian government, which has supported a Saharan (*Sahrawi*) separatist movement, the Polisario Front, ever since. The borders remained closed until 1988, with exceptions for citizens who wished to visit their relatives on the other side. The third border closure between both countries came in the wake of a terrorist attack in Marrakesh in 1994; this time, all terrestrial borders were closed. Only air travel between both countries remained possible, and this border regime is still in place today (Daoudi 2015).

As in many parts of the world, political borders do not necessarily correspond to social segmentation. In the Moroccan-Algerian border area, many locals have relatives on both sides of the line (Daoudi 2015). Some of the nomads I talked to even hold an Algerian citizenship, others regularly visit their kin on the other side. This has to happen more or less clandestinely and is effectively organized through informal transportation networks. Apart from humans, goods are also smuggled across the border in large amounts. This business, locally called *trabando* from Spanish *contrabando*, 'has only existed in its current form since the 1994 closure' (Daoudi 2015, 44, my translation). Once more, a strong link to drought can be found: according to a recent study, persons engaged in *trabando* in north-eastern Morocco almost unanimously cite the rampant 'unemployment in the region and the quasi-permanent drought which makes agriculture aleatory' (Daoudi 2015, 100, my translation) as reasons for taking up this activity.

Political scientist Fatiha Daoudi, the author of said study, argues that smuggling is a normalized everyday activity that is central to many livelihoods in the Algerian-Moroccan borderlands. This status is only maintainable due to wide-ranging neglect, collusion, or even active participation by border officials on both sides. Her analysis identifies four categories of

key actors in the cross-border trade: smugglers, consumers within the populace, officials, and the civil society (Daoudi 2015). From an ANT perspective, I would advocate for an expansion of this list. The cars used in trafficking, typically decades-old Peugeot models nicknamed *muqatila* (female fighter), certainly bring their own needs and propensities into the equation. So do the trafficked goods. An example is given by one of Daoudi's informants: gasoline is one of the essential contraband goods and is typically transported across the border in jerrycans. Knowing this, members of the border patrol are reluctant to fire shots at vehicles as they might easily explode – which makes things easier and considerably less dangerous for the drivers. The gasoline's inherent interests, i.e. to explode when ignited, overwrite the regular program of border guard versus unlawful intruder. Another example is that the driver of a *muqatila* often consumes alcohol or psychotropic drugs before starting his journey in order to drive more carelessly. Why should these drugs not be considered as active participants in the smuggling business in their own right? Not least, the steppe landscape with its distinct, but shifting features that can hide or reveal, accelerate or slow down a vehicle, plays an important role in this cross-border navigation.

These movements mainly take place at the border near Oujda, outside of the high plateaus. The nomads I talked to had no problem acknowledging their use of smuggled materials, but did not seem to be heavily involved in trafficking themselves. One issue that came up in several discussions about the Algerian border, however, was the occasional theft of livestock through cross-border raids. In such cases, everybody on the Moroccan side displays solidarity with the victims and helps them reconstitute a herd. Moreover, the porous international border can be a resource for sheep traders.

The following characterization of sheep markets in the high plateaus is based on findings by Mohamed Khalil in the late 1990s (Khalil 2007). Sheep traded within the region originate from both the Moroccan high plateaus (43 percent) and, significantly, from the Algerian side of the border (57 percent). There is no evidence of any direct link between producers and consumers; one or more intermediaries are always involved in the marketing chain, although many of them are also livestock producers themselves. Khalil distinguishes three types of intermediaries (excluding local butchers who cater exclusively to markets within the study zone): local, regional, and external traders, who also buy and sell sheep among one another. This explains why the number of sheep transactions (1,481,000) in the region exceeds the total number of animals traded (931,000).

Main weekly markets in the high plateaus are held in Tandrara (southern part), 'Ayn Bani Mathar, and Tiouli (both in the northern part), and fall into the category of middle-scale collector markets. The livestock section of these markets is a masculine space by convention. Even though women may possess their own animals, they thus depend on male relatives for marketing them (Mahdi, Harrami, and Ablal 2007). On a larger spatial scale, the biggest hub linking the eastern Moroccan steppes to the rest of the country is the livestock exchange in Taourirt (USAID 2006). Close to two thirds of the sheep raised in the high plateaus are des-

tinued for consumption outside of the region of Eastern Morocco, while most of the remaining third goes to its urbanized areas – mainly the cities of Oujda, Nador, and Berkane. Due to a ban on meat transportation, they are trucked across the country alive. In this context, a second distinction needs to be made between two types of actors: middlemen who buy from the producers but do not slaughter themselves, and urban meat wholesalers who deal with slaughterhouses directly and then sell the carcass to butchers (Khalil 2007).



*Figure 14: Market in Tendirara, August 2009*

Local meat consumption within the eastern Moroccan highlands is almost insignificant: ‘Sheep and goats are slaughtered for consumption only on special occasions, such as weddings, special holidays, or when hosting important visitors’ (Steinmann 2001, 50). Accordingly, urban demand shapes the provisioning chain. The four most important urban destinations receive a large share of all sheep passing through the study zone. Most of this trade, once arrived in the city, is handled by wholesalers. Of the overall wholesaler trade originating from the study zone, 35 percent goes to Casablanca, 16 percent to Oujda, 15 percent to Tangier, and 12 percent to Rabat. The relative importance of this supply chain from the perspective of the cities is as follows: Casablanca receives a third of its sheep meat from the study area, Oujda two thirds, and Rabat one fourth (Khalil 2007).

In conclusion, three points stand out about regional sheep marketing structures. Firstly, most of the consumers are located in distant cities; secondly, this enables a complex network of intermediaries using fluctuations in demand and supply to enhance their profits; and thirdly, the high plateaus have become a major hub in trans-border livestock movements between Algeria and Morocco. As clear as this sounds in theory, practice is usually more messy, however; ‘commodity exchange does not occur through smoothly articulated chains, networks, or circuits. Rather, it is the product of contingent and uneasy relationships’ between diverse actants (Faier 2011, 1094). In the next chapter, I will take a closer look at one group of economic actors: the sheep and goat producers of my study area.



## 2.6 Pastoral Producers and Commercial Strategies

With these dynamics in mind, I now turn to the pastoral households at the core of this globalized periphery. Drawing on data from the 2009 survey, I take up three dimensions of market relations: the intra-Moroccan sheep commerce with its fluctuations in demand and price; the cross-border trade involving Algerian *bayda* sheep; and the question of innovation. In my sample, about three in four families engage in livestock breeding, with marked differences between *duwwars* (ethnically and/or locally defined subgroups of each tribe). Other livelihood strategies that can be found include seasonal labor migration to Europe, day labor in the region, work in the construction sector, but also trade and a few more specialized professions (ch. 3.4, p. 139).

In order to examine the pastoral society of the northern high plateaus, I propose four categories of livestock breeders in relation to the number of sheep they own. While this is, admittedly, a simplistic way of categorizing pastoral livelihoods, in terms of the questions that concern me here, it works well and allows for comparison with Khalil's work, who uses similar categories of producers (Khalil 2007). If I take all 359 households from my sample that own sheep<sup>5</sup> and divide them into four groups of about equal size, the results reveal some key characteristics of each quartile. Table 7 gives an overview of these groups, ranging from small herders with a maximum of 30 animals to owners of very large herds who have more than 150 sheep. The first thing that stands out is that animal wealth directly corresponds, at least on the aggregate level, to wealth in various other resources (such as trucks owned, migrants in the family, owning both a tent and a solid house, or money spent at the weekly market). In many other respects, the picture is less clear or there are no significant differences between the four groups at all; but I have not included such topics in the table. Alternative ways of measuring wealth will be discussed further on (ch. 3.2, p. 117).

	<b>Small ≤30</b>	<b>Medium 31 – 67</b>	<b>Large 68 – 150</b>	<b>Very large 151+</b>
	N=101	N=81	N=93	N=84
Herd size (sheep only, averages)	19	49	101	495
<i>Daghma</i> share	52%	45%	49%	43%
<i>Bayda</i> share	2%	1%	1%	1%
<i>Bargiyya</i> share	37%	40%	45%	53%
Sales volume (annually, % of current herd size)	187%	139%	97%	57%
Supplementary feeding:				
- always	50%	54%	65%	67%
- most of the time	35%	41%	32%	32%

5 Compared to the previously published chapter (Breuer and Kreuer 2011), I recalculated all figures based on the up-to-date, slightly smaller sample of 465 households.

	<b>Small ≤30</b>	<b>Medium 31 – 67</b>	<b>Large 68 – 150</b>	<b>Very large 151+</b>
	N=101	N=81	N=93	N=84
Practice of fattening	56%	58%	77%	89%
Co-op membership	23%	32%	39%	43%
Migration	16%	17%	23%	29%
Both tent and house	20%	25%	41%	49%
Truck ownership	1%	11%	32%	58%
Cell phone ownership	82%	86%	91%	94%
Money spent at weekly market (average per adult household member)	123 dh	135 dh	138 dh	186 dh

Table 7: Herd size categories and their characteristics

In the following paragraphs of my economic inventory of livestock trade in the high plateaus, I will first describe price formation in the sheep market in general, and then as it relates to the four groups. I also address speculation, cross-border trade, and several additional points that emerge from this categorization.

Trade volumes in the region's sheep market fluctuate seasonally. In the summer, when pastures are exhausted and pastoralists sell animals in larger numbers, prices are expected to go down. During the winter, when vegetation is abundant and producers retain the maximum number of sheep, prices increase (Khalil 2007; Allali, Dalil, and Mahdi 2002). The feast of sacrifice, *'id al-'adha*, has a special role regardless of season and is accompanied by a 'strong price increase for live animals' (Khalil 2007, 108). My fieldwork team generally observed that sheep prices vary widely; they are normally negotiated on the spot rather than arranged in advance.

The survey data do not offer detailed insights into the influence of drought on price formation. Historically, it is assumed that drought in Morocco 'increased the price of staple foods, and urban residents curtailed their consumption of meat, a consumable luxury' (Holden 2009, 76), thus reducing the demand for livestock. I assume this pattern to be less valid today. On the one hand, drought has become an omnipresent phenomenon that can affect a region's food production in any given year; on the other, today's information and transportation infrastructure, combined with integrated world markets, makes it possible to compensate for drought-linked food scarcity in a given location. Nevertheless, pastoralists in the high plateaus speak of socio-economic drought as *jafaf nta' al-suq*, 'drought of the market' (DPA Figuig 2006, 7, my translation).

Turning to my survey data once more, I start with seasonal trade patterns. The total of animals sold by all respondents amounted to 9,824 sheep during the 2008 *'id*; 10,318 in the winter of 2008–9; and 15,061 during the summer of 2009. In other words, the average number

of sheep sold per pastoral household amounted to 27 before the 'id; 29 in the winter; and 42 in the summer. These figures underline the greater number of sheep sold during the summer months. By contrast, the often assumed importance of the festival of sacrifice is not confirmed by this data. For the average pastoral household in the northern plateaus, the 'id is apparently not the single big event where most of a year's transaction volume is realized. Instead, sales are distributed across the whole year. This makes sense given the frequently heard statement by herd owners with no significant second source of income: 'I sell one or two animals whenever I need some money.' Herd size does not seem to be an influencing factor: small and large flock owners exhibit basically the same marketing patterns across the seasons.

Are these fluctuations in trade volume reflected in prices? Calculated from my sample, the mean prices obtained for *daghma* sheep and the *bargiyya* crossbreed at different times of the year are given in the table below. For the upcoming 2009 'id, the expected prices were higher than those of the previous year. Generally, the peaking demand at the 'id is clearly reflected in prices, and *bargiyya* are slightly more lucrative than *daghma* sheep in general. My low case numbers for *bayda* (Awlad Jalal) sheep prices do not allow a comparison. Interestingly, despite the larger sales volume in the summertime, prices in the summer are somewhat higher than in the winter, which runs counter to a simple supply-demand equation and received wisdom. Some other factors that determine animal prices must be at work. The annual influx of Moroccan emigrants who return home during the summer months and are comparatively wealthy certainly plays a role, as does the fact that marriages and the like are usually celebrated in the summer.

	Last 'id	Last winter	Last summer	Upcoming 'id
<i>Daghma</i>	1,397	954	1,004	1,453
<i>Bargiyya</i>	1,444	1,034	1,064	1,517

Table 8: Average sheep sales price (dh per animal)

Other elements that have an influence on sheep prices include a pastoralist's membership in a cooperative; and this, in turn, is related to their herd size, as Table 7 above demonstrates. While 43 percent of the large herd owning households have one or more co-op members, only 23 percent of the very small livestock keepers do. In terms of sheep sales, those who state being in a cooperative tend to obtain slightly higher prices in summer and winter, but not during the 'id. Mobile nomads achieve lower prices than sedentary people (former and non-nomads). Those who hold a public office are paid far better prices than those who do not, except for the 'id – although case numbers are low, so care needs to be taken in extrapolating.

The general impression is that people who command higher levels of social capital, expressed in access to networks and formal institutions, employ it to accumulate financial gains. They are less dependent on individual intermediary traders and thus have a stronger

position in bargaining. In the days before the *'id*, these systematic differences disappear and everybody seems to enjoy equal economic opportunities.

When addressing the issue of cross-border sheep trade, I should first note that reliable information is almost impossible to obtain, as these activities are illegal due to the long-standing closure of the Moroccan-Algerian border. Yet, two indicators give hints as to who may be involved in this business: the percentage of Awlad Jalal sheep someone possesses, since they were originally brought from Algeria; and the proportion of animals sold each year in relation to the current herd size. Starting with the latter, it turns out that 39 percent of those who own sheep have, throughout the past year, sold at least as many animals as they owned at the time of the interview. This phenomenon is most distinctly found among the very small owners (see Table 7 above) whose turnover is almost twice their entire stock, and decreases with growing herd size. Khalil, in his study, found essentially the same pattern and concluded that the smallest herd owners were the most active in sheep speculation and smuggling (Khalil 2007). There are other possible explanations, however. Natural growth of the flock can lead to a surplus; or the majority of herds could simply have shrunk during the past year (since 2008–9 was a year with abundant rainfall, this is unlikely). It is quite common among the region's pastoralists to purchase a number of sheep, fatten them for a few weeks, and then re-sell them for a profit. Others buy and sell livestock within a single market day, trying to take advantage of intra-day price variations, and thereby become part of the intermediary network described above. One large herder told me that he preferred selling a large number of sheep once a year (in spring) rather than a few every week. There seem to be different marketing strategies that complement one another.

If taken with a grain of salt, trade volume numbers can serve as an indicator of cross-border trade activities, and the same is true for the share of *bayda* sheep in a household's animal stock since they are brought directly from Algeria. The survey suggests, surprisingly, that almost none of the interviewed pastoralists claim to own animals of the Algerian breed; *bargiyya* sheep, on the other hand, are very popular. Across the interviewed livestock-owning households, the average herd size is 159 sheep, including 71 of the local *daghma* and 82 of the *bargiyya* crossbreed. A few other breeds can be found as well. Herd compositions are very heterogeneous, but the essential finding is that, in the northern high plateaus, the Algerian breed is not present in large numbers, whereas the mixed breed has become even more popular than the local one.

The larger the herd, the higher the proportion of *bargiyya* sheep tends to be (Table 7 above). This observation is somewhat at odds with the non-linear distribution of sheep types reported by Khalil (2007), and if taken as an indicator of involvement in smuggling activities, plainly contradicts what I just concluded about sales volumes, namely that the smallest herders are most active in cross-border trade. My interpretation is that, in the past 20 years and at least in the northern plateaus, the Algerian breed has become much less relevant than suggested by previous studies, while its cross-bred *bargiyya* offspring is now so common that

its breeding can no longer be seen as an indicator of specific economic strategies. The Awlad Jalal and subsequent *bargiyya* introduction can, if this is true, be understood as a typical innovation process where the early adopters were to be found among medium and large herd owners. Once the viability of the new crossbreed was proven, large owners entered into the business and massively increased their *bargiyya* stocks in order to maximize profits.

Innovation is a hallmark of pastoral economies (Catley, Lind, and Scoones 2013), whose protagonists often need to adapt their methods to subtle changes in environmental conditions. One example mentioned earlier is the growing reliance on supplementary fodder. As Table 7 above demonstrates, two thirds of the medium and large herds today completely depend on feed supplementation; the remaining ones do so most of the time. The minuscule number of pastoralists who rely only on the natural pastures without using any extra fodder tend to be small herd owners. In this respect, the situation appears more uniform than in the 1990s (Khalil 2007). This could be due to extended drought and pasture degradation, which are cited by most pastoralists of the region as the main reasons for recurring to supplementary fodder. Another reason for the use of external inputs is the fattening of sheep before they are sold. This value generation method is now practiced by nine out of ten large owners, but by only about half of the very small and small ones. Even the rate of mobile telephone ownership is highest among the sheep-rich (see Table 7 above). Adoption of new technologies and accumulation of wealth tend to go hand in hand.

Such rather recent innovations are indicated linguistically by loanwords. Fattening, for instance, is locally known as *girasa* or *tigras* (from French *engraissement*), and fodder troughs as *mijwar*, pl. *majawir* (from French *mangeoire*). These words have been twisted beyond easy recognition to conform to dialectal Arabic morphological patterns, which goes to show the extent to which things of foreign origin have been appropriated. This is a common process in Moroccan Arabic in general, with many examples of borrowings from French and other languages – but these two examples seem to be specific to the high plateaus. In actor-network terms, as new actants are being integrated into existing networks, alignments are forged (Li 2007, 286). There is usually suspicion toward the innovation at first, followed by experimentation, which may lead to firm establishment and routinization in the end. Bruno Latour has identified four phases of this process that should be followed whenever a new actor demands to become part of a collective: *perplexity—consultation—hierarchization—institution* (Latour 2004). Repeating the new names frequently enough eventually leads to them not sounding strange any more. *Majawir* and *tigras* have become elements of daily life. In this process, they have changed not just the collective's setup, but also their own identities by assuming hybrid linguistic forms.

To round off my account of the region's sheep economy, I will now address the ways in which globally observable tendencies of neoliberalization have expressed themselves in the Moroccan steppe over the past few decades.

## *2.7 Neoliberal Policies: Free Trade and Green Morocco*

One of the assumptions underlying my approach to drought in eastern Morocco is that the globally dominant neoliberal agenda has not been able to deliver on its promises of universal progress, growth, and liberation. In 2016, one of the institutions that has been perpetuating this ideology, the International Monetary Fund, even started questioning some of its basic assumptions in a paper (Ostry, Loungani, and Furceri 2016). Its authors characterize the neoliberal agenda as resting on two key premises: ‘increased competition—achieved through deregulation and the opening up of domestic markets,’ and ‘a smaller role for the state, achieved through privatization and limits on the ability of governments to run fiscal deficits and accumulate debt’ (Ostry, Loungani, and Furceri 2016, 38). The element of competition is expressed in Morocco’s numerous free trade agreements, while elements of the push for privatization become evident in the government’s current plan for agricultural development.

In this chapter, I will address the effects neoliberal practices have had on the nomadic community in the eastern Moroccan steppes, focusing particularly on the livestock economy. By discussing free trade and the Green Morocco development plan, I hope to contribute to a better understanding of current and future developments of the political-economic setting these livestock producers operate in. In view of my research question, such knowledge may be helpful for an analysis of what drought can do when it is added to this mix. It has repeatedly been observed that ‘economic globalization and neoliberal reforms combine with drought stresses to mount pressure on small farmers,’ first and foremost (Kallis 2008, 101). One aspect of this mechanism is that policies of so-called structural adjustment, which were implemented in many countries including Morocco starting in the 1980s (Pfeifer 1999), systematically scale back public safety nets and subsidies for health or educational services (Kallis 2008). This leaves citizens loaded with higher risk burdens that can easily overwhelm resource-poor families in case of crisis (such as drought).

For rural environments in particular, three broad manifestations of neoliberal policymaking have been identified: first, the removal of subsidies for agriculture, combined with trade reforms that affect marketing mechanisms; second, a growing commodification of rural ecosystems; and third, new ‘technologies of rule’ that promote certain forms of market discipline and auditing processes (Higgins et al. 2014, 386). In assemblage theory, this last point corresponds to the process of ‘rendering technical’ (Li 2007, 286) mentioned earlier. Reflecting these global concerns, the pastoral livestock breeders of eastern Morocco face several specific implications of free trade for their own livelihood security.

The Moroccan sheep meat sector is currently almost completely sealed off from the world market.<sup>6</sup> High tariffs protect domestic producers from foreign competition, so there are no official imports or exports of sheep meat or live sheep of any noteworthy volume. For about a decade, however, Morocco has witnessed a rush of bilateral and regional free trade

---

6 Parts of the following discussion have been published before (Breuer and Kreuer 2011).

agreements. Increasingly, these agreements encompass all economic realms, including agriculture, which had long been considered a 'sensitive' sector.

While negotiations with the European Union have progressed only slowly, the agreement signed with the United States in 2004 concerns all sectors; all trade barriers are to be removed by 2031. For agricultural products, a complete liberalization is to take place significantly before that date. The agreements include only two exceptions to this rule where quotas will be established: namely, for red meat and wheat imports into Morocco. The wheat quota is indexed and will vary according to domestic production, whereas red meat imports will only be liberalized for high-quality products (so-called Hilton meat) that do not bear on Moroccan producers. For standard meat, the existing protections will remain intact apart from a negligible quota. The EU is not likely to obtain more favorable conditions due to a clause in the US agreement that would automatically adjust its terms accordingly (Akesbi 2009 and pers. comm.).

Paralleling these free trade agreements, the Green Morocco Plan (*Mukhattat al-Maghrib al-akhdar* in Arabic, *Plan Maroc Vert* in French) was launched in 2008. The plan's authors, consultants with the McKinsey & Co. firm, do not elaborate on its theoretical underpinning, although market-oriented neoliberal assumptions have evidently informed it. It is seen as a political instrument that aims to make Moroccan agriculture competitive on the world market. Although the plan has not been made available in any detail, it officially consists of two pillars: the quick development of modern agriculture through 'poles of growth' to become competitive, with high value added production, adapted to market rules, on the one hand; and the 'upgrading of vulnerable actors' and the fight against rural poverty by improving farm incomes through trickle-down effects on the other (ADA 2010). Green Morocco is thus supposed to attract massive investments into the country's agriculture, to improve both productivity and rural incomes, to increase exports, and to create numerous additional jobs in the long run (Koné 2010). However, budgetary provisions reveal that the first pillar is given absolute priority by planners, while the livelihoods of small scale producers are largely neglected (Akesbi 2009).

In the livestock sector, the plan aims to improve domestic supply in terms of meat quality and price, namely by increasing production; and within the second pillar, it strives to upgrade the sheep meat commodity chain to 'make it a social driving force' (what precisely this means remains unclear), and to double or triple the livestock producers' income (Benlekhal 2009; ADA 2010). This is to be achieved through an 'integrated approach' following the model of the National Association of Sheep and Goat Breeders (ANOC) where small breeders' resources are pooled into larger productive units. Another axis of development is the opening up of export opportunities for niche products; moreover, a modernization of slaughtering facilities and distribution networks is aimed for, notably the installation of cooling systems. In terms of export facilitation, the plans stipulate the gradual removal of tariff barriers (Benlekhal 2009).

While it has been pointed out that the policies laid out in the Green Morocco Plan will likely have negative impacts for the rural poor in general (Akesbi 2012), the implications for pastoral production are mixed. Most producers already depend on supplemental feeding to some degree. When imported barley becomes available at low, but at times fluctuating prices, an even stronger conversion to feed-dependent production systems might be a first consequence, with increased profits for livestock breeders. On the downside, this dependence on the world market would expose them to price fluctuations and thus create new vulnerabilities, in addition to severe long-term effects from undermining domestic grain production and forgoing a promotion of food sovereignty.

The Green Morocco Plan is only one in a series of modernization projects targeted at Moroccan agriculture in the past few decades. Until now, these have not caused major disruption to pastoral systems. However, the new plan raises two main concerns: the prospect of increasing rangeland fragmentation and conversion to more intensive agricultural use, and the danger of growing economic inequality.

Through public-private partnerships, 80,000 ha of farmland throughout the country had been leased to investors by 2010, with more acreage poised to follow (Koné 2010). This has so far only lightly affected pastoral areas, but a large-scale plantation project, 243 hectares in size, has sprung up in the midst of the eastern Moroccan steppe near Murayja. This plantation of 38,000 olive trees was originally established in 2005-6 as a development experiment by an institution from the United Arab Emirates and subsequently handed over to the Moroccan state which started looking for a lessee. The bidding process was eventually won by a livestock functionary and businessman, Abderrahmane Mejdoubi, whom I quoted earlier as an adherent of the view that nomadism will change rather than disappear (ch. 1.1, p. 14). If he manages the plantation well for 18 years, he will have the right to acquire it for a 'derisory price,' in his own words. The installation of a drip irrigation system was heavily subsidized by the state at 80% of the costs, and the purchase of a tractor at 40% (with funds from the Green Morocco Plan). A tribal leader (*na'ib*) had granted the land concession to the Emirati project back in the day. The rent Mejdoubi pays is collected by a government agency and disbursed to the collective of local stakeholders in the nebulous form of 'social projects and the like,' according to the investor.

Should the example of the olive plantation be copied more widely in the context of the expansion of Green Morocco Plan policies, an increasing fragmentation and territorial disruption of the available rangelands can be expected. This would likely have adverse effects on soils and sheep, plants and people (see the discussion in ch. 2.4, p. 72). In addition, important questions have to be asked about the sustainability of agricultural intensification. I touched upon these issues in my earlier discussion of the aquifer (ch. 2.2, p. 63).

While modernist or neoliberal ideas may be an almost hegemonic form of thinking in political institutions around the world's metropolises, resonances of such notions can also be found in the Moroccan highlands. The *qa'id* of the Bani Mathar tribe, an educated outsider



posted to the region for a couple of years, presented this view of the aquifer-fed crop cultivation in the oasis: 'The region is underexploited. These people are herders, not farmers. Instead of alfalfa, which yields perhaps 100 bales (at 40-50 dh each) per hectare, they could grow vegetables.' The typical marketing price of one bale of alfalfa is indeed 40 dh, according to my survey data. In addition, the fodder plant demands a lot of water to grow: 'It requires 700 to 1000 kg of water to produce 1 kg of dry fodder, while other fodder crops may use only 25 to 30% of that for the same yield' (Le Houérou 1996, 167). More efficient water use by the area's farmers might lead to substantial production increases, not just in terms of crops grown, but also by utilizing water-saving techniques. The open half-tube irrigation canals that run across the fields of 'Ayn Bani Mathar had in fact surprised me on my very first visit to the town, as they seemed liable to produce massive amounts of evaporation in the daily heat.

The Green Morocco Plan's emphasis on upgrading, modernization, and quality improvement poses the question which kind of livestock producers will be able to keep up with the envisaged intensification efforts and who will benefit from them. Previous experience shows that, in the eastern Moroccan highlands at least, each wave of modernization and innovation has exacerbated social polarization among sheep breeders. The advent of motorized transportation, for instance, was accompanied by the emergence of a small group of large-scale, highly mobile producers, while the majority of small-scale immobile producers were gradually pushed out of pastoral livestock production (Bourbouze 2006).

The Plan suggests that the sheep meat sector develop export products with high added value, and concentrate on primary markets like the European union – mainly butcheries that cater to Muslim populations – as well as African and Arab countries (ADA 2010). In a related move, the breeders' association ANOC is trying to establish its own label for the Bani Gil breed and get into certification by creating Protected Geographical Indications according to EU regulations (Fagouri 2009). Such efforts tie in with emerging global discourses on the promotion and protection of agrobiodiversity, local knowledge, and heritage (Ben Hounet, Brisebarre, and Guinand 2016). Again, it is safe to assume that 'modernized,' well-equipped producers would obtain privileged access to such opportunities, while the majority of small-scale producers would be excluded, particularly in view of the required standards for export markets. At the same time, the Green Morocco Plan also includes the rubric of 'sanitary security of livestock and meat quality' under which it pledges to fight informal structures and smuggling – both important resources for the poorest herders' livelihoods. Pastoralism expert Alain Bourbouze predicts that we will soon see, in the region,

'a class of very large herd owners (600 to 3,000 sheep or more) occupy most of these steppe spaces: well-equipped, strongly motorized, highly adapted to the context, cultivating vast fields of cereals in aleatory production, living in town with their entire families, leaving their flocks under the supervision of hired herders who live in tents.' (Bourbouze 2006, 34–35, my translation)

There would be no business left for medium and small producers in this scenario.

In the age-old debate about whether the market or the state is best suited to provide equal development opportunities and livelihood security for an entire population, the Green Morocco Plan marks a further movement away from state agencies and toward private enterprises. Since these policies tend to be implemented as a continued silent transformation rather than an abrupt shift, it is difficult to fathom their concrete impacts on drought assemblages. Evidence from similar settings hints at the danger that the poorest members of local communities face increased drought vulnerability in the future.

The political drift toward favoring private enterprises over the efforts of public institutions is relatively recent in this part of Morocco. In the past, publicly funded initiatives have been dominant, often in the form of development projects. The next chapter portrays the most important one at the time of my research.

## ***2.8 The PDPEO: Case Study of a Development Project***

Precursors of contemporary development discourses date back at least to the French colonization of North Africa, which officially started with the invasion of Ottoman-controlled Algiers in 1830. The environmental narrative that emerged in the following years holds as a key tenet that the Maghreb used to be a fertile and productive agricultural region at the time of the Romans. By the 1870s, it had become general knowledge that this formerly prosperous landscape had in principle been degraded and deforested by ‘indigenous peoples, especially herders’ (Davis 2007, 2) since the influx of Hilalian tribes from the Arabian peninsula started in the eleventh century, through ‘a combination of overgrazing, itinerant slash-and-burn farming, and a general “native improvidence”’ (Guerin 2016, 361). While this declensionist narrative has in the meantime been discredited as an ‘[e]nvironmental myth’ (Guerin 2016, 361), it remains powerful today in modified forms (cf. my discussion of desiccation and desertification in ch. 1.4, p. 38).

The key figure in France’s occupation of Moroccan territory was general Louis Hubert Lyautey, based in Algeria (see ch. 3.5, p. 144). His tribal policies in the high plateaus during the build-up to the occupation, while driven by geostrategical interests, also included developmental aspects, if only as a cheap and cynical way to buy support. As Lyautey wrote in November 1904, his strategy was to select a tribal group strong enough not to be attacked by others. This group would then ‘simply serve as a fulcrum for an intensive political action, enhanced by material and tangible pieces of bait, subsidies, farming implements, medical assistance, schools’ (Lyautey 1937, 130, my translation). Beyond such superficial use, the steppes remained untouched by development efforts in this early phase.

The subsequent French colonization of Morocco in the early 20<sup>th</sup> century did not so much affect the steppe regions in the form of occupation either, but was rather a colonization of ‘supervision’ (Bourbouze 2006, 32, my translation). In the dominant view, non-sedentary

populations were an 'anti-modern element that worked actively against material and cultural development' (Guerin 2016, 334). Unlike sedentary farmers, nomads did therefore not become 'targets of the so-called civilizing mission' (Guerin 2016, 334) and were largely neglected in development schemes. Nevertheless, profound transformations of the eastern Moroccan economy started unfolding during the protectorate with an increased market integration, new income opportunities, and reduced mobility of humans and livestock (Bourbouze 2006).

One innovation concerned the rangeland vegetation directly: the extraction of esparto grass from the Moroccan high plateaus, which started in the late 1920s. The fibrous plants were sold by the French to Great Britain as raw material for the production of paper. In the process, the steppe vegetation was gradually degraded because annual grasses depended on the shade provided by esparto tufts (Steinmann 2001). For locals, working with the esparto companies provided a little side income that 'became essential during big droughts' (Paskoff 1957, 54, my translation). While I will not provide a detailed ANT-style account here, this episode indicates yet another complex assemblage that drought was somehow an integral part of, together with unlikely actors such as the shade needed by grass species or the increasing demand for paper in Great Britain.

Regarding the region's pastoralist production, French administrators saw 'the biggest obstacle to developing the livestock industry' in the widely fluctuating animal numbers in the aftermath of droughts (Steinmann 2001, 57). In an effort to stabilize these numbers, they introduced veterinary services, first in 'Ayn Bani Mathar – which was then called Berguent – in the late 1920s. The drilling of wells and installation of water pumps in the 1930s (see ch. 2.2, p. 63) was another attempt to achieve this goal. Yet overall, the negative colonial view of nomadic production remained intact. Writing at the time of Morocco's independence and the end of the protectorate, a French academic described the treeless high plateaus as 'desperately monotonous' (Paskoff 1957, 38, my translation) and lamented: 'The livestock husbandry methods are, according to specialists, very defective' (Paskoff 1957, 46, my translation). He piled further blame on the local population by concluding: 'Modernization efforts risk being futile if the traditional mentality does not evolve' (Paskoff 1957, 64, my translation). Besides such stereotypical expressions of an arrogant colonial mindset, more nuanced positions can be found as well. Some protectorate officials, at least, were perfectly aware of the disastrous effects expropriation policies were having, for instance on transhumance-based pastoral systems in western Morocco, but felt that they were not in a position to reverse these policies (Guerin 2016).

After the achievement of independence, not everything was turned upside down. The newly independent Kingdom perpetuated some of the French ideas and politics of agricultural development for a long time. But the myth of the lost 'granary of Rome' was gradually replaced with the so-called California model of irrigated fruit and vegetable cultivation for export. This approach, by and large, has equally 'failed to provide food security, raise rural

standards of living, or provide adequate foreign exchange earnings' (Burke, III 2009, 107). Other development ideas have come and gone, but especially in the nomadic lands, they have had very limited success:

'Many projects have tried hard, for about thirty years, to promote the development of these pastoral systems. All or most have failed, because they specialized too narrowly on strictly pastoral, ecological, and environmental aspects.' (Bourbouze 2006, 39, my translation)

Another reason for this failure may be in the general logic of projects characterized by limited funding and duration, which typically precludes long-term perspectives (Abaab et al. 1995). Partially in recognition of such difficulties, the plans for a new project, elaborated in the 1980s, had a slower and more multifaceted approach. This project was baptized *Projet de développement des parcours et de l'élevage dans l'Oriental* (Husbandry and Rangeland Development Project in the Eastern region), PDPEO in short.

The PDPEO covers the entire high plateaus – not just my study area, but also the much bigger Bani Gil territories to the south. Its first phase was launched in 1990 by the Moroccan government, the International Fund for Agricultural Development, and the African Development Bank; the second phase started in 2005 (Boutaleb and Firmian 2014). According to a quite recent publication, the main rationale behind the project was based on well-known degradation narratives, but now allocated part of the blame on climate change rather than exclusively holding local land users responsible:

'Human activity, specifically overgrazing and cropping, and climate change are driving Moroccan rangelands in the Eastern Highlands to degradation and inability to maintain livestock anymore. This dreadful condition is becoming permanent and irreversible.' (Boutaleb and Firmian 2014, 94)

This reflects not only an increased awareness and knowledge about the extent of climate change, but also an evolution of international development discourses which now include this term as an important keyword. Another characteristic of current thinking in this field is the insistence on improved 'rangeland management' in a late modern and capitalist spirit, which is also emphasized in various PDPEO documents.

In several publications that compare different pastoral development initiatives, the PDPEO has been presented as a positive model for other countries. One example sounds almost as if it were written for a glossy public relations brochure rather than a critical scholarly inquiry:

'The assessment of this initiative shows how common management and restoration of traditional social systems may be a successful path to enhance governance and sustainable management of natural resources.' (Boutaleb and Firmian 2014, 94)

The PDPEO began in the early 1990s with the creation of lineage-based livestock cooperatives where all pastoralists were inscribed.<sup>7</sup> Long touted as ‘a real success story’ (Tozy 2002, 24, my translation), the project’s results on the ground have been mixed, however. Today, only a small proportion of herders seem to benefit from these new institutions, and some of the cooperatives’ headquarters in the northern high plateaus look rather decrepit. Less than one third of the sheep breeders in my sample acknowledged being members in a co-op, and some had ostensibly never heard of them, although in theory and according to public authorities, all pastoralists are formally enrolled. The same tendency was already observed years earlier: ‘In practice, local participation is marginal’ (Steinmann 2001, 22). An analysis of village education committees established in India shows pertinent parallels, where the authors identify ideology, ignorance, and inertia as key factors behind the failure of many development efforts:

‘Inspired by an ideology – people’s power is good – and designed in ignorance of what people want and how the village works, it was, by the time we were studying it, entirely sustained by inertia. No one had paid any attention to it for many years, except for some bureaucrat somewhere who was making sure that all the boxes had been checked.’ (Banerjee and Duflo 2011, 259)

When the PDPEO cooperatives were first created, they corresponded to administrative structures (about 30 sheikdoms, *mashyakhat*, in the entire project area). Subsequent sociological studies found that solidarity between families was usually effective at smaller levels of aggregation (Lazarev 2008). Despite a few shortcomings, some of the cooperatives are actually thriving. They have created reserves (*mahmiyyat*, areas protected from grazing) that strive, again in the diction of current international development jargon, to rationalize rangeland management and impede degradation. Large areas of grassland are closed off to everyone for a period so the vegetation can recover; they are then opened to co-op members against a small fee based on the number of sheep that are let in. In successful cases, a powerful institutional actor has thus been established that plays an important role in land use negotiation. The cooperatives were superimposed on tribal structures (Mahdi 2009a) to reinvigorate them, unlike similar ones established earlier in Syria, which had sought to weaken and replace those structures – although with limited success (Chatty 2010). Political power struggles between leaders have, nevertheless, occurred within the PDPEO cooperatives and have led to several instances of fission and reorganization of these newly founded institutions (Tozy 2002).

Looping back to the main topic of my thesis, I looked into the connections the PDPEO has built with drought. Naturally, drought has been recognized as an important topic in the second project phase. A 78-page evaluation report on drought risk management testifies to this (DPA Figuié 2006). Much like the bulk of contemporary drought literature (see ch. 1.4, p. 38), the project puts an emphasis on measuring and taming ‘the drought hazard’ through the

---

<sup>7</sup> This and the following paragraph are adapted from an earlier publication (Kreuer 2011).

improvement of early warning systems and the establishment of 'mechanisms, programs, and procedures of drought risk management' (DPA Figuié 2006, 5, my translation). But the report also contains a thoughtful analysis of drought effects and reactions which resonate with my own findings.

After the PDPEO was launched in 1990, a series of rainy years – combined with the material benefits and support programs newly introduced by the project – allowed many herders, large and small, to increase their livestock holdings to unprecedented levels. The subsequent dry years of 1998-2000 threatened more animals than previous droughts had, and the authorities massively subsidized animal fodder to prevent livestock deaths. This policy caused pastoralists to keep their herd sizes high and rely completely on supplementary fodder to feed them, and it encouraged sedentarization and the expansion of agriculture. When the first project phase ended and several support programs were discontinued in the early 2000s, the rangelands were not able to regenerate as well as before, even under normal rain conditions, due to the changed system, and many impoverished pastoralists were gradually forced to give up their herds (DPA Figuié 2006). This analysis gives a new meaning to the expression of drought as a structural phenomenon: perhaps drought itself has not changed at all, but the transformed social and economic structures are no longer able to accommodate it in an adequate way. The old network is broken, as some actors were excluded and many others invited in, but the resulting new configuration has not yet found a stable form.

At an early stage of my fieldwork, I had a conversation with two employees of the Provincial Department of Agriculture (DPA) in Bouarfa (southern zone of the project) who had been involved in the implementation of the PDPEO. They gave a self-critical account by all means. A number of points stood out:

1. Vaccination of animals had increased since the launch of the project; supplementary feeding had skyrocketed. They also confirmed that a change in values was occurring: from collective toward individual decision-making.
2. After the first phase, the state had completely retreated. Two thirds of the cooperatives had collapsed. According to the two DPA men, there had been no genuine common interest in keeping them operative as they had merely been imposed from above. Government-decreed cooperatives, in this case under a socialist banner, had similarly failed to achieve the desired goals in neighboring Algeria in the 1980s (Trautmann 1985). In PDPEO phase II, post-project plans were to be included in the hope of creating a more sustainable set of institutions. The top-down politics of the first phase, which had proved difficult to implement, were to be replaced by bottom-up politics that came from the population. Five groups of actors were now to be specifically addressed: small, medium, and large herd owners, women, and young people.

3. Three government agencies were pursuing three very different goals in the high plateaus: nature conservation (High Commission for Waters, Forests and Desertification Control), keeping the population in place (Ministry of the Interior), or intensifying agricultural production (Ministry of Agriculture). This resulted in contradictions, conflicts, injustice and inefficiency on many levels. The long-awaited tripartite agreement between those three agencies was not yet effective. This formal agreement had been initiated in 2006 'in order to resolve juridical conflicts over the management and administration of collective lands' (Boutaleb and Firmian 2014, 105), but the negotiations were still 'under way' and no evaluation could be made as of 2013 (Boutaleb and Firmian 2014, 106). This constellation shows that the Moroccan government often cannot be analyzed as a unified actor, an unproblematic punctualization, since it is itself a highly complex and shifting assemblage of various entities, ministries, employees, policies, agencies, offices, press releases, and so on. Each actor tries to impose its own interests and goals, in competition and sometimes complete antagonism with others.
4. The cooperatives established in the PDPEO project had not yet become ideal instruments of collective resource management as a functional replacement for the older system. Of the 25 or 26 cooperatives in the southern part of the high plateaus, 40% at most were doing all right, were able to get things done (such as organizing their annual general meetings) without being pressed. In general, 80% of the project staff's working time was being used for conflict management: there were countless disputes within cooperatives, between them and their neighbors, and concerning interventions by other state institutions (Interview with Mr Harrach and Mr El Omari, Bouarfa, November 6, 2008).

Based on this first glimpse into the PDPEO and some of its challenges, I formulated some questions for my 2009 survey. The statement that only large herders benefit from cooperatives was met with various degrees of agreement across the herd size categories (Figure 15).

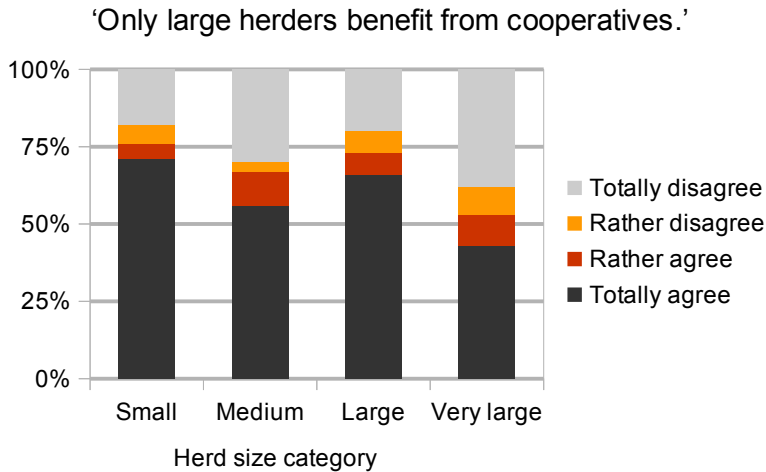


Figure 15: Evaluation of cooperatives by herd size

This issue had also anecdotally been recorded in a project evaluation report from 2002 in which one herder explained: ‘The pasture resting areas benefit large herders who have the means of transportation and are well-informed about their opening dates’ (FIDA 2002, 26, my translation). As might be expected, the largest herders tend to disagree most with this statement, but even among them, the majority agree or rather agree that the benefits of this institution do not accrue to everyone in an even way. The opinions on grazing reserves (*mah-miyyat*) also diverge, but along different lines – they are related to the extent of a household’s dependence on livestock for income generation. The statement in the questionnaire read: ‘For me, the pasture reserves are very beneficial.’ This topic is quite controversial, as one half of the somewhat livestock-dependent households disagree and the other half agree (Figure 16). Non-pastoralists are overwhelmingly in favor of grazing reserves, presumably because the aesthetic and recreational value of a greener landscape does not come with any economic trade-offs for them.

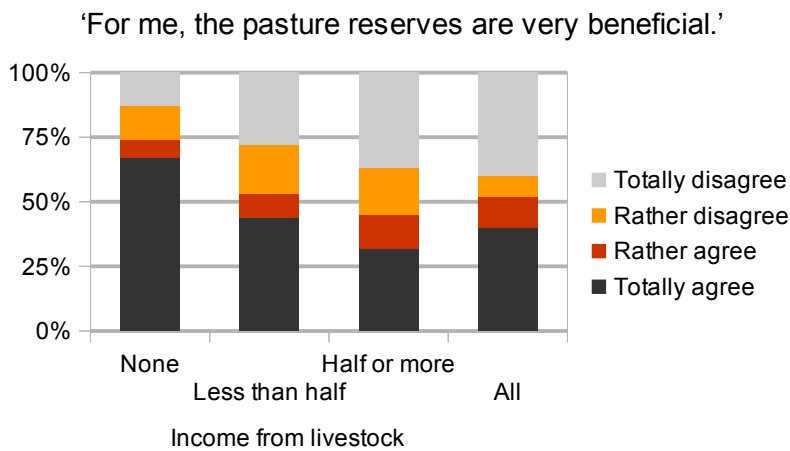


Figure 16: Evaluation of reserves by income group



I certainly do not want to give the impression that the entire PDPEO was a failure. Of course, the 'innovative' idea of community-based range management (Boutaleb and Firmian 2014, 107) is not all bad and the efforts to initiate and carry out such projects are laudable. Apparently, they are now 'being replicated in Syria and Tunisia' (Boutaleb and Firmian 2014, 107). Local cooperatives can surely be a more equitable alternative to unfettered corporate capitalism. Other things brought to the high plateaus by the project have also benefited many herders, such as improved veterinary services (FIDA 2002). But the many small failures and disappointments encountered throughout the PDPEO project seem to indicate a need for a more profound analysis of the actor-networks in question, and a more fine-tuned attention to their silently shifting connections.

### 3 Drought and the Tribal Community

There are other surprising implications of drought – more unexpected assemblages. These concern the tribal structure of human society in various ways, which will be the guiding line through this part of the thesis. One cannot really understand this society, I contend, without understanding drought. As in the previous part, identifying transformations is often the most useful starting point for my analysis. The statement by a physicist, ‘we understand the world by studying change, not by studying things’ (Rovelli 2018, 89), is equally valid for the social world. There will be a stronger emphasis on qualitative stories in this part, but I will also look at the survey data from new angles. My starting point is the perspective of the three tribes that make up the four municipalities in my study area of the northern high plateaus. Most of the municipalities are named after tribal groups: Awlad (the children of) Ghuzayyil, Awlad (the children of) Sidi ‘Abd al-Hakim, and Bani (the sons of) Mathar refer to tribal ancestral figures. Al-Murayja, in turn, means ‘the small pasture’ and clearly describes a landscape feature rather than a tribe. Importantly, Murayja and Awlad Ghuzayyil are considered territories of the same tribe, Awlad Sidi ‘Ali Bu Shanafa. All municipalities ‘were defined on the basis of tribal lands’ back in the 1980s (Boutaleb and Firmian 2014, 100). But do they still reflect these divisions today? And how much socio-economic variance can they explain? Depending on the particular research topic, it may be more meaningful to identify and analyze alternative societal factions that are distinguished by education levels, capital access, land ownership, or other criteria. I will explore several of these possibilities in the following chapters, never completely forgetting the underlying question of how all these elements are part of various drought assemblages.

As one of the first questions, my 2009 survey questionnaire asked respondents for their tribal affiliation. The degree of correspondence between self-identified tribal groups and administratively defined municipal territories varies, as Table 9 shows. It is highest in Awlad Sidi ‘Abd al-Hakim with very few cases of divergence, and lowest in Bani Mathar, where certain groups emphasize their lineage (Zuwayd) or village affiliation (Sahb al-Ghar) rather than the overarching tribal frame of reference. In Awlad Ghuzayyil, one in three interviewees prefers using the specific sub-group rather than the wider tribe (Awlad Sidi ‘Ali). Such divergence possibly indicates ongoing processes of distinction, fission, and shifting collective identities. Households affiliated with the southern federation of Bani Gil are present in three of the municipalities and form the largest allochthonous group overall.

It is worth noting that tribe-based units were not the only form of social organization even in the more distant past. The daily labor of livestock management was carried out within voluntarily formed groups of six to ten families, the *dawawir* (plural form of *duwwar*), which usually brought together nomads of different lineages. These groups, however, had no names and did not contribute to the formation of collective identities (Rachik 2002).

	Awlad Ghuzayyil	Murayja	Bani Mathar	Awlad Sidi 'Abd al-Hakim
Dominant tribe	Awlad Sidi 'Ali (46%)/ Awlad Ghuzayyil (34%)	Awlad Sidi 'Ali (79%)/ Murayja (4%)	Bani Mathar (50%)	Awlad Sidi 'Abd al-Hakim (91%)
Other tribes	Bani Gil (4%) Awlad Bin Ya'qub (4%)	Awlad Bu Ras (7%)	Bani Gil (11%) Zuwayd/Mahaya (10%) Sahb al-Ghar (9%) Awlad Sidi 'Ali (4%)	Bani Gil (3%)

Table 9: Tribes and municipalities in the survey

Taking the three categories of mobility analyzed earlier (nomads, former nomads, non-nomads) as a starting point, the following chart shows their distribution across the municipalities. It turns out that this distribution is all but uniform, even though all three categories can be found in each municipality.

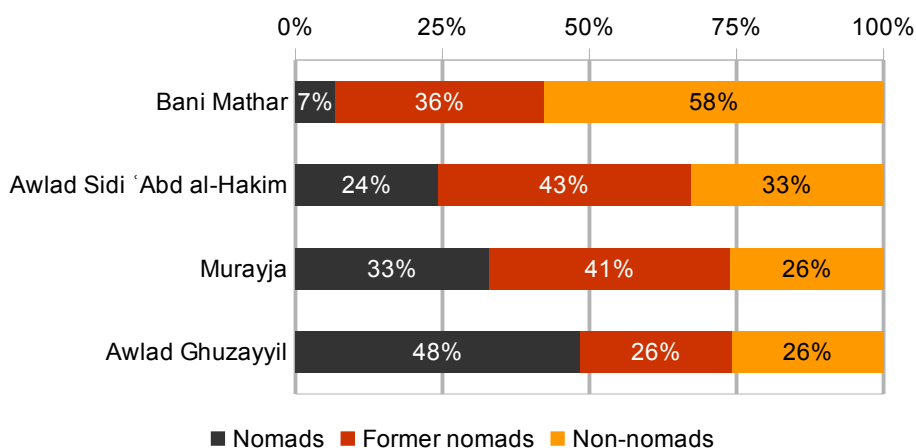


Figure 17: Nomads per municipality

The most characteristically nomadic region of all is, clearly, that of Awlad Ghuzayyil, with almost half of the sample population made up of active nomads; but even here, one in four household heads has only ever known a sedentary lifestyle. In Bani Mathar, on the other end of the spectrum, more than half of today's families have always been settled and only a small fraction of households are still mobile. The overall number of formerly nomadic households is high at 36% across the study region – one in three families has thus abandoned mobile pastoralism within the current generation. On the national level, this tendency continues unabated: between 2004 and 2014 alone, Morocco's nomadic population decreased by a staggering 63% according to official census figures (HCP 2016, 1).

Processes of general sedentarization have been 'all but completed' in the pastoral communities of neighboring Algeria and Tunisia (Bourbouze 2006, 36, my translation) and are observable in many other drylands of the world. In the case of Algeria, they were driven by French colonial politics after the occupation of 1830 and accelerated by drought-induced

crises (Trautmann 1989, 128). While sedentarization is sometimes actively promoted or even enforced by government agencies and has yielded highly problematic outcomes (Blench and Marriage 1999), the impetus for settling down in Morocco, as in most pastoralist communities (Fratkin 1997), comes from within the population. It could thus be termed ‘voluntary sedentarisation’ (Emadi 1995, 25).

A conversation I witnessed between a clerk of the Awlad Sidi ‘Abd al-Hakim municipality and a local citizen summarized a major bone of contention in this context. The herd-owner, who lived in the steppe, asked for an extension of public services: ‘We need a road, we need electricity, we need a school and a hospital.’ The official replied: ‘Well, but we cannot build a road and a school for every tent. If you get a bunch of families together in one place, we may be able to do something there.’ Whether new villages will one day be formed in this manner remains to be seen; it would require a profound change in lifestyles. One reason that neighboring tents are usually set up at a considerable distance from one another (2-5 km according to Lazarev 2008), apart from notions of privacy and respect, is the practical concern of keeping the herds clearly separated.

What follows is a further exploration of the four municipalities in order to tease out some key differences between them. At this point, one might be inclined to think that they all follow similar paths of development, partially driven by drought, from old-fashioned nomadism toward modernity and urbanization, and are merely at different stages in this process. I would like to caution against such over-generalizing and teleological views, as innovation tends to take place in different areas of a society and to follow slightly unpredictable paths. And yet, linear narratives of progress influence people’s behavior and can turn into self-fulfilling prophecies. Crises like drought sometimes increase the pace of innovation: for one, they reveal existing tensions; moreover, they may serve as a justification for previously unacceptable behavior, legitimizing and accelerating processes of change (Solway 1994). This role of drought as a catalyst may be less important in a setting of ubiquitous, ‘structural’ drought such as the high plateaus today (cf. ch. 1.1, p. 14), but innovation remains a key indicator of change even here. One visible aspect of innovation is linked to new technologies penetrating into the households. A number of these are displayed in the following table:

	Awlad Ghuzayyil	Murayja	Awlad Sidi ‘Abd al-Hakim	Bani Mathar
HH size, mean	9.2	8.0	7.6	7.0
HH with TV	28%	61%	14%	79%
HH with refrigerator	21%	36%	6%	62%
HH with cell phone	89%	96%	84%	85%
HH that own a truck	41%	13%	29%	2%

*Table 10: Characteristics of the four municipalities*

Arranged by descending degrees of nomadism, Table 10 confirms an earlier observation: nomads tend to have larger families than sedentary residents, and this is clearly reflected on the level of municipalities. But a look at various items available to each household reveals very different lines of distinction. The prevalence of television sets and refrigerators, for example, is highest in peri-urban Bani Mathar, as could be expected; but it is followed by Murayja, despite the fact that one in three families is still nomadic there. Virtually every family in Murayja has a cell phone, too, while all remaining municipalities are at lower levels ranging from 84 to 89 percent. A different order emerges when one looks at the ownership of trucks: Awlad Ghuzayyil is in the lead here, followed by Awlad Sidi ‘Abd al-Hakim residents. Each municipality seems to have its own, unique mix of lifestyle characteristics and economic strategies.

A basic indicator in my questionnaire is a question about the respondent’s satisfaction with their own economic situation (with four options: very good, rather good, rather bad, or very bad). The distribution of responses turns out to be very similar across the municipalities, with most of the respondents evaluating their situation as rather good (54%) or rather bad (30%). However, changes in this domain over the past five years are judged differentially: residents of Awlad Ghuzayyil and Murayja view their recent economic past in a much more positive light than the two tribes in the east (Figure 18). No less than one in two families here perceives an improvement, and only small groups believe they have experienced an economic deterioration. For people in Bani Mathar and Awlad Sidi ‘Abd al-Hakim, on the other hand, the main impression is one of stagnation. Economic winners and losers, hence, are not spread evenly across the pastoral communities. This variegated self-evaluation is also reflected in other insights from my household survey.

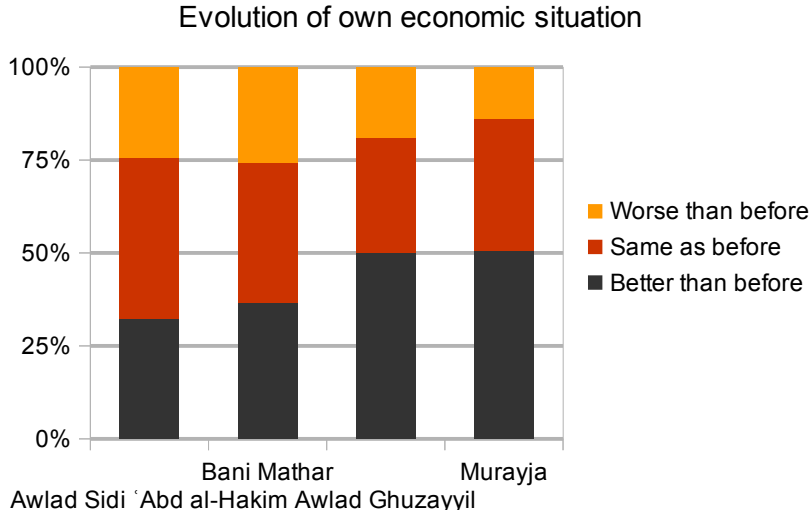


Figure 18: Assessment of economic evolution by municipality

The next statistic offers an explanation as to why so many families in Murayja possess TV sets and fridges. Figure 19 displays the forms of habitat in each municipality: How many families live in tents, how many in houses? Once more, clear differences between the four

zones become visible. On the extreme ends, there are hardly any residents of Bani Mathar and especially Murayja without a solid house and hardly any citizens of Awlad Sidi ‘Abd al-Hakim without a tent. Members of the Awlad Sidi ‘Ali tribe display the highest preference for combining the best of both worlds, increasing their economic options through the possession of both a permanent home and a mobile one. Of course, this is not just a matter of wish/desire as a driver of assemblage building, but of commanding over the right connections to other actants that facilitate the construction of a house: labor power, building materials, acquaintances who can help out, financial means, skills, etc. Things that make a difference from one municipality to another certainly include the ease of access by road and the administrative stance toward new construction – while it is tolerated or even promoted in urbanizing zones like Murayja and Bani Mathar, the construction of homes in the middle of the steppe is discouraged or straight-out forbidden.

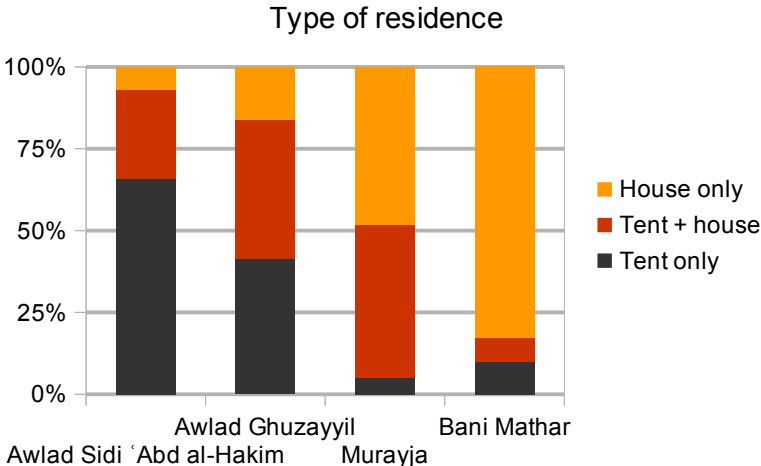


Figure 19: Type of residence by municipality

This topic is related to a survey question about each family’s immediate surroundings: how many tents and how many houses are visible from their current place of residence? The averaged answers are strongly differentiated by municipality and provide an important insight into settlement densities (Table 11). The urban character of the villages surrounding ‘Ayn Bani Mathar, i.e., the Bani Mathar municipality, is reflected in the high number of neighboring houses and the almost negligible number of tents nearby. Murayja exhibits similar characteristics, but on a smaller scale. Residents of Awlad Ghuzayyil see about the same number of tents and solid houses around their homes on average, an observation that is at odds with the nomadic reputation of this municipality. Then again, the frequency of tents is highest here. Furthermore, the fact that the overall numbers for houses are much higher than for tents has everything to do with agglomeration, as tents are usually set up with a considerable distance between one another. The lowest density of visible neighbors is found in Awlad Sidi ‘Abd al-Hakim, where tents are clearly dominant. Part of this comparatively low concentration also has to do with topography, however: this is a more hilly terrain than the wide open plain to the west, which limits lines of sight.

	Awlad Ghuzayyil	Murayja	Bani Mathar	Awlad Sidi 'Abd al-Hakim
Tents visible	11	4	2	8
Houses visible	12	22	41	2

Table 11: Tents and houses visible from current home

The built environment and the interaction with neighbors arguably contribute to an individual's self-perception, and changes in their composition may indicate social transformations. But as mentioned earlier, nomadic mobility is often not at the heart of people's identities in the high plateaus. Therefore, we also asked the survey respondents how many of their relatives were living in the steppe (*'urubiyya*). Apparently, most respondents have relatives both in the steppe and outside (i.e., in town). Only very few families have lost all (or never had any) ties to the *'urubiyya* lifestyle, and they are mostly found in the vicinity of the urbanizing center of 'Ayn Bani Mathar (Figure 20). Some persons in my sample might also be the last members of their extended families who still hold out in the steppe despite the pushing force of drought and the pulling force of new opportunities in town.

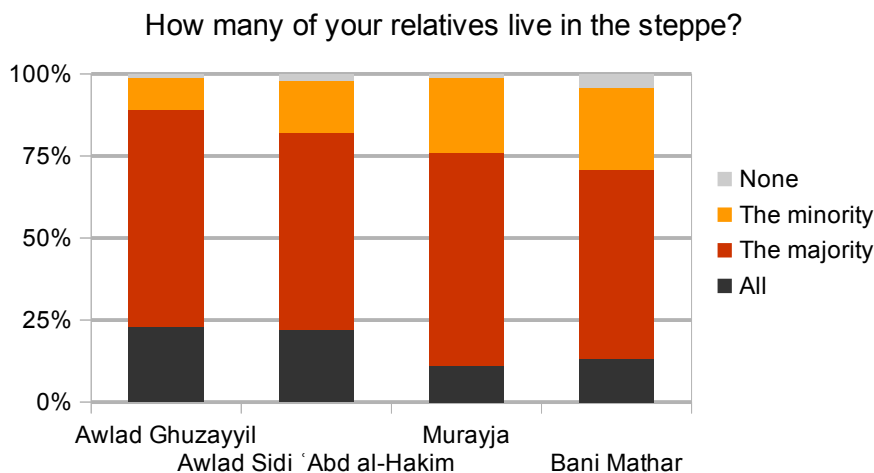


Figure 20: Relatives living in the steppe by municipality

In this regard, the four municipalities show a rather uniform makeup. The dryland environment dominates lifestyles to a considerable extent. I will summarize my findings on the most salient differences between the municipalities in the final part of this thesis. What follows now in my quest to multiply the perspectives and potential actants involved in drought assemblages in eastern Morocco is a closer look at the tribes themselves. They still seem to constitute an important form of collective organization.

### 3.1 What is in a Tribe: Identities, Elites, Gender Issues

How can the three tribes that make up the study area be characterized?<sup>8</sup> The usefulness of the concept of tribe (Arabic: *qabila* or *'ashira*) is the subject of much argument (Bouderbala

8 Some of the material presented here has been published previously (Kreuer 2011).

2007), and the wide range of definitions and perceptions of what a tribe is, or should be, add to its problematic nature. Moreover, the manifold, sometimes overlapping subdivisions and superordinate structures of actual tribes – which are always prone to processes of fission and fusion – preclude overly simplifying statements. In a sense, ‘tribe is an enigma’ (Isidoros 2018, 223) to outside observers. An eastern Moroccan informant told me: ‘In our tribe... there are about thirty or forty tribes, or more,’ using the word *qabila* both times. Given such complexities, I do not consider it important here to establish a theoretical terminology that accurately separates between all units; rather, the aim is to describe groups as they materialize in everyday situations. For the purpose of this study, therefore, I adhere to the observed congruence between tribes and the denomination of rural municipalities.

In daily life, an individual’s tribal affiliation serves as an important expression of identity. I witnessed how two adolescents met and greeted an adult tribesman who did not know them personally. He asked them: ‘So who are you?’ One of them, who was from the same tribe (Awlad Sidi ‘Abd al-Hakim in this case), answered: ‘I am the son of So-and-So.’ ‘Ah yes, I know him.’ The other boy said: ‘I am a *Gili* [i.e., belonging to the Bani Gil], Awlad Mubarak,’ giving just his tribe. ‘Welcome.’ This small conversation indicates that, in theory, any male adult member of the tribe knows every other family head as well as their relation in the tribe’s genealogy. They see themselves as linked to a common ancestor (Mahdi 2009a).

There is, in fact, an occasion where all tribe members convene in one place. This annual festival, held in the summer, is called *wa’da* and usually happens at a religious shrine connected to the tribal lore. Large marquees are set up for several days; there is food and dancing, and equestrian performances take place. From an actor-network perspective, one can observe that various ‘prestige objects and goods’ (Ben Hounet and Guinand 2016, 257) are brought together during the festival; this assemblage, in turn, makes the tribe itself hold together. The *wa’da* is also an occasion when political issues are discussed and decisions made, and serve as a ‘conflict resolution space’ (Ben Hounet and Guinand 2016, 253). Hence, the eastern Moroccan tribe is not only an imagined community akin to large confederations elsewhere (Büssow 2011), but also has a basis in face-to-face contacts between all its male adult members. I am not sure whether most women share a similar sense of knowing every family in their tribe. Recent anthropological research among Sahrawi nomads shows that women there constantly create, maintain, and expand tightly knit networks of affectionate kin relations across the landscape. Female daily interactions, from this perspective, are much more important in holding the community together than the somewhat erratic male ‘circulation’ over longer distances and time scales (Isidoros 2018, 147). Whether similar patterns exist in my study area is an open question.

The most influential tribal confederation in eastern Morocco are the Bani Gil, whose homeland lies to the south of my study area. Ideally, the functioning of such large confederations is characterized by two complimentary principles: aggregation and segmentation (Lazarev 2008). Segmentation allows an optimal use of scarce and complementary resources



and prevails 'during times of peace and abundance' (Steinmann 2001, 43). Aggregation, on the other hand, serves to defend tribal territories against external adversaries and is intensely practiced 'during times of drought and war' (Steinmann 2001, 43). Once again, drought is a key component of social dynamics.

Smaller subdivisions of the tribe more routinely function as political actors. This is even more the case since the PDPEO development project (ch. 2.8, p. 98) gave the newly created cooperatives (cf. Table 4, p. 47), which were designed to coincide with existing lineages, a certain degree of authority over the collective rangeland. A lineage, as a smaller descent group within a tribe, may include anything from a dozen to several hundreds of families, and the pitfalls related to precisely defining a tribe apply to lineages in a similar way.

On November 7, 2009, I witnessed a tribal gathering among 50 to 60 members of the Awlad al-Hajj Ibrahim lineage in their tribe's *zawiya* (literally: corner), a place of worship and spirituality situated at the shrine of a pious ancestor. Much like a *wa'da*, this assembly served multiple purposes. The lineage bade farewell to a group of Mecca pilgrims, discussed political issues and mobilized to oppose certain positions in the municipal administration, and worked on the resolution of some internal conflicts. As described earlier for land conflicts (ch. 2.4, p. 72), the symbolic act of reconciliation often happens under the guise of *sadaqa* (charity) and is celebrated with a shared festive meal. This method of conflict resolution is the one preferred by the authorities.

According to observations by my fieldwork team, formal political functions on the tribal level are exclusively held by notables (*a'yan*). Most notables in the region adhere to the center-right Independence (*Istiqlal*) Party. Among my survey respondents, this is the most significant political party, even though enrollment levels are generally low. Individuals from eleven households in my sample are *Istiqlal* members (2%, distributed across all municipalities and mobility categories). Party posts are less prestigious than tribal structures; and both political office and tribal status are in a long-term process of being eclipsed by monetary wealth as a decisive factor for power and influence.

Given that tribes serve as identity anchors, there must be differences between them. These are subtle in my study region, with lifestyles being based on similar activities and folklore drawing on similar sources. Nevertheless, differences can be recognized on many levels – including language. This is explained by the pharmacist who grew up in the province's capital, Jarada, just outside the high plateaus, but has lived and worked in 'Ayn Bani Mathar for many years:

'In Jarada, we have a way of talking that is different from over here. They say something in one way and we say it in another. When you go to someone who lives here you will notice a certain melody, a difference in pronunciation. It is not the same melody.' (Interview with pharmacist, 'Ayn Bani Mathar, June 1, 2010)

He cites changed suffixes, differences in vocabulary, and a diverging pronunciation of certain letters as examples. Linguistic studies have indeed found countless nuances and variations between one tribal group and another, but no clear overriding pattern (Behnstedt and Benabou 2005). In day-to-day practice, however, internal differentiation within each group is key to understanding tribal politics. Especially in the context of a society that is undergoing continual changes, it is crucial to understand processes of socioeconomic distinction and polarization that may create new elites, but may at the same time adversely affect parts of the population, exposing them to higher risks and practically narrowing down their livelihood choices. This runs counter to basic ideas of development being gauged by the expansion of people's freedoms (Sen 2000).

Not everybody sees the notion of tribes as a helpful analytical tool at all. One scholar presents a quite harsh view on eastern Morocco's pastoral communities:

'Why does this society, marked by individualism, inequality, and competition, try so hard to emit this image of a pastoral society based on tribes and lineages, despite its obvious disconnection from reality?' (Lazarev 2008, 3, my translation)

Lazarev provides his own answer to this question: the tribal image is a 'useful fiction' (Lazarev 2008, 3, my translation) for everyone involved. I consider this view overly simplistic, but agree with the premise that the most profound socio-economic transformations today have little or nothing to do with tribes. The next few paragraphs will outline the most salient intra-tribal differences as evidenced by my fieldwork in the steppe.

In former times, the most important factor to determine someone's socioeconomic status in the nomadic societies of eastern Morocco, as in many other pastoral communities around the world, was the number of livestock they owned. More specifically, a large herd holds prestige because it represents a high degree of economic resilience to drought and other crises in the absence of other social security mechanisms (DPA Figui 2006). Categories such as large (*kabir*), medium (*mutawassit*) and small (*saghir*) herd owners are not only dominant in most studies of the region, but are present in people's minds even today and are readily used in everyday conversation. When one asks for a definition of what makes a large herder, however, one receives a variety of answers. 'Four to five thousand sheep,' one elderly informant told me. 'The largest one I know has 1,200 sheep,' said another. And according to a third tribesman, a herd of two to four hundred sheep can already be considered big these days. In fact, my own survey data suggest that anyone with three hundred sheep or more ranks among the top 10 percent of herd owners.

Traditionally, a herd of either two hundred or three hundred sheep is considered an '*asah* (staff), a herd that can be managed by a single shepherd. Hence, this number is related to herd control, a task that includes 'ensuring the herd's cohesion and manageability, its protection from predators and dangerous terrain, and prevention from mixing with other herds' (Dwyer and Istomin 2008, 529). Ideal herding units have generally shrunk in size over the decades due to technological innovation. One example is the widespread use of fodder

troughs for supplemental feeding, which has made smaller units a requirement so that herders can ‘maneuver animals efficiently’ (Steinmann 2001, 122). As pointed out earlier (ch. 2.6, p. 89), a new actant, the trough or *mijwar* in this case, has partially imposed its own program while being integrated into the collective.

The size of a family’s herd is correlated to many other things, although this does not necessarily imply a causal link. For instance, the more sheep you own, the more likely you are to own a car or truck. While just 1 percent of the smallest herd owners interviewed possessed a truck, 58 percent of the large ones did. Trucks, as noted earlier, serve to transport livestock, fodder and water quickly over long distances – sometimes across half the country. Those who own many sheep are also twice as likely to be members of one of the pastoral cooperatives created under the auspices of the PDPEO project. The likelihood of holding public office is three times higher among the livestock-rich as among small herders, so their access to formal institutions is much better. Finally, they are more likely to own one or several horses. These are not generally used as workhorses, but are trained for equestrian performances like those that take place on the occasion of a *wa’da*. Accordingly, horses have long been seen as a status symbol (USAID 1986).

Out of the 111 families in my survey who keep horses, three quarters specifically train them for these performances, called *tburida* (from *barud*, gunpowder). Also known as *fantasia*, the basic idea of this joint human-nonhuman endeavor is this: a race track is set up on a large open space. Different teams of about a dozen men each, dressed in tribal garb and armed with rifles, take turns in forming a line, speeding up their horses until they race toward the spectators’ ranks in full gallop; the horsemen then simultaneously fire their rifles into the air or at the ground, bringing the animals to an abrupt halt just meters in front of the stunned audience. The game can go on for hours or over several days. It draws part of its aesthetic from the combination of a display of unrestrained energy, horses thundering along the steppe, the lethal danger imminent in human-weapon hybrids (even if blank cartridges are routinely used these days), and the men’s mastery over this power by exercising the sequence with utmost precision and synchrony. According to my survey, the more livestock a family owns, the more likely it is to have *tburida* horses among them.

Taken together, these findings suggest that tribal elites are very much produced and reproduced by the traditional livestock economy. They have at their disposal material wealth, measured in animals, equipment, and symbolic items that exhibit their status, but also high social influence as expressed by their access to formal and informal institutions. These assets tend to reinforce one another as the various forms of resources – or, in Bourdieusian terms, capital – are mutually convertible under ‘certain conditions’ (Bourdieu [1984] 1993, 73). According to a scholar, the large (*kabir*, pl. *kibar*) herders or notable elites in the wider region have acquired an excessive importance:

‘Multiplying their sources of revenue (emigration of relatives, commercial acquisitions, official tasks), at times residing in town where their children study, they expand their

power over their homeland by transgressing customary rules, inflate the totals of their herd by recruiting hired herders, cultivate cereals in forbidden zones with the benevolent complicity of the authorities, reach agreements among themselves between one community and another by violating rules of hospitality, and surround themselves with an opaque network of multiple “clients”.’ (Bourbouze 2006, 34, my translation)

Even development projects tend to benefit the elites first and foremost, as they are able to invest in and adopt technological innovations. This can ‘expand the gap between different social groups’ (Emadi 1995, XX). Elite capture was evident in the first phase of the PDPEO as well: ‘In most cases, the cooperative leaders also turned out to be the largest herd owners and the wealthiest Beni Guil’ (Steinmann 2001, 65). An elder *kabir* from my study region, however, insisted that he would not be able to grow his operations indefinitely, and identifies drought as one of the culprits:

‘Yes, I am a large herder, but there is a limit that I cannot surpass. – Why? – Because of time, because of expenses, because of drought, do you know what I mean?’ (Interview with Daoudi, ‘Ayn Bani Mathar, June 2, 2010)

While traditional notables still represent the dominant model of leadership in the area, a sociological study reports two new types of leaders that have emerged: entrepreneurial or functionary notables who have worked their way up, as it were, and are said to be less authoritarian than the old ones; and a younger generation of civil society leaders who have a high level of education and know how to run a project, but are largely disconnected from traditional political spheres (Tozy 2009). Old structures are thus being challenged and transformed by emerging social strata.

The older generation does not necessarily put their trust in younger people. Household heads are often heavily supported in their daily workload by their sons, but a father’s typical assessment of his offspring is: ‘*Ma ka-ydir walo*’ (He does not do anything). The contributions of women to their families’ livelihoods are often evaluated in a similar way. Women actually work very hard, while ‘continually renegotiating land-use decisions and labor allocation within the household unit’ with men (Steinmann 2001, 196). However, female-headed households are rarely found (1% in my sample). This low figure may partly be due to men not regarding such families as full-fledged households and discounting them (Steinmann 2001), which would mean that my interviewees were never made aware of their existence. My interactions in the field were predominantly with males; men hold most positions in the local administrative structures and are supposed to represent a family vis-à-vis the outside world. The observation that a ‘norm of female seclusion and gender segregation prevent[s] male researchers from gathering information among women’ (Steinmann 2001, 5) is generally valid for my study area, although I have interacted with communities elsewhere that are much stricter in applying such norms. Being easily distinguishable as a *gawri* (non-Muslim Westerner, from Turkish *gâvur*) and the occasional company of female research assistants

were two facts that probably alleviated this restriction in my case. Even so, the bulk of my knowledge comes from men and concerns topics that tend to be seen as male domains.

Gender asymmetries are reflected in family structures. Six percent of all married men in my sample have a second wife, and a few even a third one. In mainstream interpretations of Islamic law as well as the Moroccan family code, this is permitted under certain conditions, whereas a woman may never have more than one husband at a time. One of the rationales quoted for polygyny in the high plateaus is the large amount of work women have to do – in this context, men suddenly have no problem acknowledging the magnitude of female chores. This argument is echoed by the participants of a study among the southern neighbors, the Bani Gil, where geographer Susanne Steinmann found even higher polygamy rates of 15% (Steinmann 2001, 45). In bilocal households, the older spouse typically follows the herd out in the steppe while the second wife stays in town and supervises the schooling of the family's younger children (Bourbouze 2003; Lazarev 2008).

According to a public scrivener in 'Ayn Bani Mathar, women are increasingly aware of their marital and civil rights, even those out in the steppe, and are ready to claim them in court (Interview with scrivener Idris, 'Ayn Bani Mathar, June 5, 2010). This is in part due to the spread of television sets and satellite antennas, and to government campaigns after the 2004 reforms to the national *mudawwana* (family code). Still, there seem to be very few divorces, which struck my fieldwork assistants as peculiar compared to other Moroccan regions. Less than one percent of the adults in my sample claim to be divorced, namely one man and twelve women.

In summary, tribes provide building blocks for personal identities and constitute reservoirs for political action. The role of notable elites cannot be underestimated despite recent signs of new leadership modes, and women are far from an equal status but changes can be registered nonetheless. Drought is tied into tribal configurations in various ways: it unites tribal confederacies; wealthy herders feel that their drive for expansion is stifled by drought; and large herds are generally seen as prestigious because they represent a protective buffer for times of drought and scarcity. I will examine herd size as a wealth indicator in the next chapter, probing to what extent it can capture contemporary processes of economic polarization.

### ***3.2 Indicators of Wealth: The Question of Polarization***

The number of sheep is a conventional, but still useful measure of a family's wealth, and was a key topic in my survey. It should be noted that herd sizes were likely downplayed by the respondents, which tends to happen in most surveys. One motivation for this is a fear of taxation, another one the hope for aid if one's herd appears small enough. Moreover, only reproductive female sheep are counted. While the absolute sheep numbers may not be true

to reality, the relative proportions should nevertheless be accurate and make a comparison between herd owners meaningful.

Apart from small ruminants, the most common domestic animals in the high plateaus are cows. A herd of cows indicates a wealthy household and provides economic diversification. Changing a herd's species composition may serve as a 'long-term recovery strategy and insurance against the impact of future droughts' (Blench and Marriage 1999, 21). Cows also provide milk for the family, a relatively new source of nutrition. Sheep and goats are milked only intermittently by pastoralists in the Maghreb, and even then, their milk is often transformed into clarified butter (*samm*) for better preservability (Abaab et al. 1995). The iconic camels, for their part, are hardly present any more. Among my 465-household sample, one sole family still keeps five of them. The replacement of camels with trucks is complete in this region. Other domestic animals become enrolled in changing assemblages too, adding their own characteristics and propensities into the mix, obliging families to alter their mobility strategies (cows, for instance, move more slowly and prefer walking shorter daily distances than small ruminants), location preferences, household spending, and direction of labor and effort. Animals and nomads mutually influence their movements and learn about each other's preferences, as a study of reindeer herders in Siberia shows (Dwyer and Istomin 2008). One could thus hypothesize that highly mobile households do not own cows, or at least significantly less than sedentary families. As a trend, this pattern is indeed reflected in my sample, albeit less clearly than assumed: about half of the nomadic households own one or several cows, compared to almost two thirds of former and non-nomads. Overall, the likelihood of cow ownership increases with sheep herd size and with age of household head. Looked at through the lens of municipalities, the proportion of cow owners is lowest in Awlad Ghuzayyil (52%) and highest in Murayja (71%). This is remarkable insofar as these two populations belong to the same tribe, Awlad Sidi 'Ali. In this case as in many others, tribal affiliation fails to explain diverging economic profiles.

Some elements in my questionnaire allow an observation of changes and divergences over time, despite the fact that I was only able to conduct a one-time baseline study. Based on the four herd size categories introduced above (ch. 2.6, p. 89), the following table presents the evolution of livestock numbers over the last 10 years as recalled by the respondents in 2009.

	2009 Herd size			
	Small <= 30	Medium 31 – 67	Large 68 – 150	Very large 151+
Sheep in 2009	19	49	101	495
Sheep 5 years earlier	37	77	122	419
Sheep 10 years earlier	71	106	195	473

Table 12: Evolution of mean herd size by category

Most pastoralists have seen their herds decline. Today's large and medium herders used to hold twice as many sheep ten years earlier, and the smallest category has suffered aggregate

losses of more than 70%. By contrast, those who presently own more than 150 sheep have been able, on average, to increase their herd sizes over the past decade, despite an intermittent drop in numbers five years earlier. Ruling out dramatic ruptures and massive social category shifts, of which there is no evidence, this is an indicator of polarization – a process by which the gap between poor and rich households becomes wider. Increasing polarization in pastoral societies has been identified and studied at least since the 1980s (Fratkin and Roth 1990). There is even a sixty-year-old observation from my study region: ‘Social inequalities tend to become sharper’ (Paskoff 1957, 47, my translation). Crucially for my inquiry in this thesis, drought is routinely made responsible for such processes. As an example, ‘the 1984 drought of northeastern Africa resulted in increased wealth differences between rich and poor in one community of Ariaal pastoralists of Kenya’ (Fratkin and Roth 1990, 386). And a recent paper on climate change in Morocco acknowledges that growing ‘social inequality can be another effect of more frequent and intense droughts’ (Schilling et al. 2012, 21).

A commonly used mathematical measure for variability is the Gini index, established over a century ago and named after its developer (Ceriani and Verme 2012). In this case, the question is: how is wealth distributed across the community? The value of the Gini index can range from zero (representing complete equality, where all households own the same amount of wealth) to one (total inequality, one household owns everything). I extracted, from my survey data, the number of sheep owned by each family at the time of the interview (2009), five years earlier (2004), and ten years earlier (1999). Calculating the Gini index, specifically over the 375 households in my sample that owned sheep in the 1999-2009 period and quoted their figures for each of the three points in time, yields the following result:

1999	0.604	2004	0.641	2009	0.696 <sup>9</sup>
------	-------	------	-------	------	--------------------

Table 13: Gini index by year

The coefficient, and thus the inequality of sheep distribution across the households, has markedly increased over the past ten years. And this trend has been ongoing for a long time: a project report from 1986 had found an income-based Gini coefficient of only 0.48 for ‘Ayn Bani Mathar (USAID 1986, 175)! The perceived general decline of the nomadic way of life, which is often narratively linked to drought (as exemplified by Mr. Hamzaoui, the nostalgic artist), thus has a basis in material reality for many households. However, the total number of sheep in those same 375 households has developed unevenly: it dropped from 75,513 animals in 1999 to 55,610 in 2009. There was a massive decline by one quarter around the early 2000s; since then, the overall sheep stock has not changed, while its distribution has continued becoming more unequal. Both trends are depicted in Figure 21.

---

9 I thank Birgit Müller for calculating these figures.

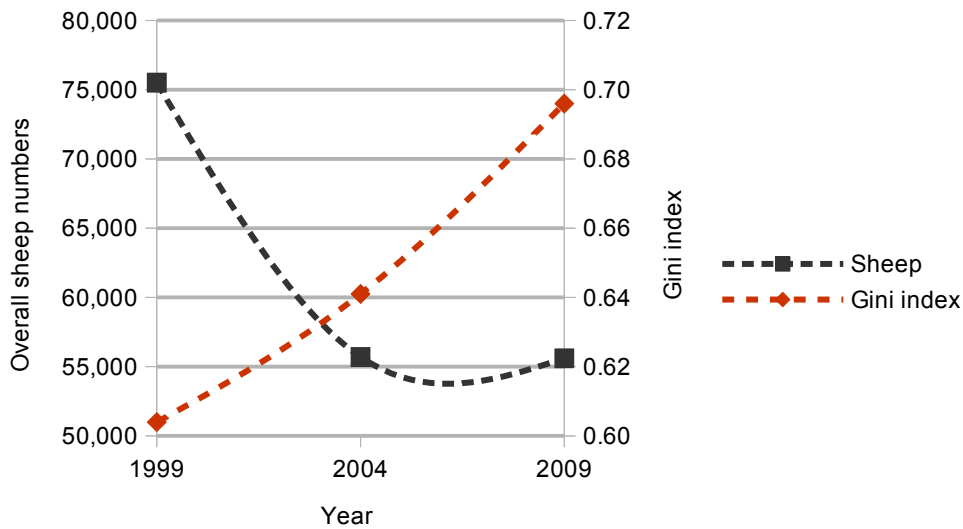


Figure 21: Sheep numbers and Gini index

In the light of these numbers, the story of sheep breeding in the high plateaus is not one of universal decline. Some economic players have managed to maintain or increase their wealth in livestock. The group of very large herders, accordingly, profess the highest average satisfaction with their own economic situation.

Looking at the development of sheep numbers by municipality reveals how the 1999-2004 decline and the subsequent stagnation are distributed. These figures include all those households that have owned sheep throughout the past ten years, except for a few outliers who held more than 1,000 sheep at least once, as they would severely distort the averages. Evidently, the strong decline from 1999 to 2004 equally affected residents of all four municipalities. Only the herds of Awlad Ghuzayyil have recovered since then, while the decline has continued at a slower pace in the other territories (Table 14). Five households have owned more than 1,000 sheep; these livestock entrepreneurs, all located in Murayja or Awlad Ghuzayyil, have managed to multiply their herds against the general trend, thereby deepening economic inequality within their communities. These outliers contribute to the rise of the Gini index.

	Sheep 1999	Sheep 2004	Sheep 2009
Awlad Ghuzayyil	212	140	161
Murayja	191	136	128
Awlad Sidi 'Abd al-Hakim	171	119	99
Bani Mathar	118	75	63

Table 14: Evolution of mean herd size by municipality

My findings contradict a more recent study which reported that overall livestock numbers in the Bani Mathar municipality grew considerably between 1999 and 2004 and have since remained largely stable (Bechchari et al. 2014b). That study is based on information available



from public agencies in the livestock sector. I cannot identify the origin of their contrastive assessment of the 1999-2004 period due to a lack of detail in said study, but this point is a useful reminder and warning that even subtle differences in research methodology may produce quite disparate results. Assuming that the official figures are more trustworthy than mine, a possible explanation is that some of my survey respondents retrospectively glorified their more distant economic past and overestimated their previous livestock wealth. But I rather suspect that a number of successful large producers, in addition to the handful featured in my survey, were behind this overall increase and simply did not make it into my sample.

Another remarkable difference between municipalities concerns the extent to which the households depend on livestock-generated income. The survey respondents were asked to estimate a rough percentage, often with the support of the interviewers. As shown in Figure 22, the livestock-rich municipalities in the west occupy a middle position, whereas Bani Mathar and Awlad Sidi ‘Abd al-Hakim fall into opposing extremes.

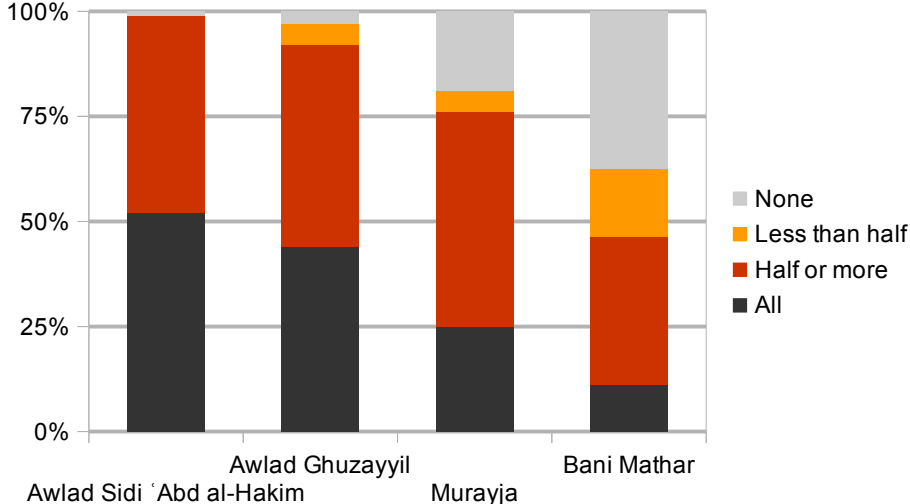


Figure 22: Proportion of livestock-generated income by municipality

Inhabitants of Bani Mathar, who have the smallest flocks of sheep on average, overwhelmingly have alternative income sources available. Incidentally, they are also the least likely livestock producers to practice fattening (49% compared to 74-78% in the other three communities). Sheep have lost much of their commercial importance here. Families in Awlad Sidi ‘Abd al-Hakim, on the other hand, combine low livestock numbers with a thorough dependence on pastoral income, which leaves many of them in a dire economic situation. The respondents’ satisfaction with their own economic situation here is lowest, and this measure strongly correlates with satisfaction in other areas.

Economists often look at consumption as another indicator of wealth and poverty. In my 2009 survey, the participants were asked for the weekly sum they spend on the market. I divided this amount by the number of adults in each household. There is a visible difference between municipality averages, ranging from 104 dh in Bani Mathar to 170 dh in Awlad

Ghuzayyil. In other words, those who are nearest to the main market in 'Ayn Bani Mathar spend the least amount of money there. This is likely due to the fact that there is a plethora of grocery stores available where everything can be obtained on a daily basis. For families in remote Awlad Ghuzayyil, the weekly market is often the only opportunity to spend money and provide themselves with staple foods and goods. They have their own weekly market in Hisyan al-Diyab, but this settlement only comes alive on market days (Fridays in this case, which coincides with the day of communal *jum'a* prayers). I would conclude that this aggregate spending criterion is not very useful for comparing groups that live in very different spatial setups. Moreover, it is clearly related to the importance of livestock. The more you depend on livestock income, the more you tend to spend on the market per adult household member. Spending increases from 89 dh in the group without livestock-generated income over 122 dh in the 'less than half' category and 134 dh in the 'half and more' segment to 156 dh in the group with no other income sources. This phenomenon is probably related to fodder purchase at the weekly markets, given the almost universal reliance on supplemental feed.

With increasing monetarization, 'the goal of market transaction becomes the accumulation of money rather than the accumulation of animals' among pastoralists (Blench and Marriage 1999, 14). The limitations of using herd sizes as the sole wealth indicator have become apparent. But what alternative measures of wealth are available? How can the emerging new elites in the region be described through my survey statistics? Inspired by an extensive study of Arab youth that I was involved in (Gertel and Hexel 2018), I calculated a 'wealth index' from my 2009 data. It is based on four criteria: the number of sheep mentioned above; the level of formal education of the household head (as a proxy for incorporated capital); the respondents' satisfaction with their current economic situation; and the availability of certain items in the household. Each respondent household gets an individual score based on this information. Table 15 details how I calculated this index and how each category and wealth marker is distributed across the sample.

Cars or trucks alone are not necessarily a sign of prosperity. They come without insurance or legal documents and are thus relatively cheap, and contraband petrol is available at low cost. Moreover, cars are often shared among several families. Yet, truck ownership varies drastically between categories. This is visible, firstly, when related to municipalities. While only 2% of the interviewed households in Bani Mathar and 13% in Murayja own a truck, 30% in Awlad Sidi 'Abd al-Hakim and 41% in Awlad Ghuzayyil do. Secondly, this indicator is significantly related to nomadism: one in three nomadic families, one in five former nomadic ones and only one in nine non-nomadic families have a truck. Thirdly, the proportion of livestock-derived income is decisive. None of the households without any animal-generated income own a truck, but one fourth of those who mostly or entirely depend on livestock do. The picture is much less clear for car ownership, which might be seen as an indicator of cross-border trade activities with Algeria, as some of my field assistants suggested. This con-

clusion remains in the realm of speculation, however, and the bulk of smuggled goods enter or leave the country further to the densely populated north at any rate, in the immediate surroundings of Oujda (Daoudi 2015).

Criterion		Score
Sheep	0-30 (45% of households)	1
	31-150 (37%)	2
	More than 150 (18%)	3
Formal education	None (74%)	0
	Up until primary (21%)	2
	Above primary (5%)	4
Economic self-assessment	Very bad (11%)	1
	Rather bad (30%)	2
	Rather good (53%)	3
	Very good (6%)	4
Items available	Cell phone (87%)	+1
	TV (48%)	+1
	Motorcycle or moped (48%)	+1
	Refrigerator (34%)	+1
	Car (22%) or truck (20%)	+1
	Satellite receiver (22%)	+1

Table 15: Wealth index calculation

In my wealth index, the possible total scores range from 2 to 17 for each household. Applied to the data set, it turns out that the distribution of scores resembles a normal distribution. There are few very resource-rich and few very resource-poor households; most families are somewhere in the middle. Moreover, there are no clearly distinguished classes with vast wealth differences between one another, but rather a continuum. This conforms to our observations in the field, even though it must be noted that the most destitute as well as the wealthiest families are often missed by surveys with non-random sampling methods (Elwert, Evers, and Wilkens 1983). To break down the continuum into discrete categories, the following four groups can be distinguished based on their scores:

Highest (score 11-17)	68 households
Upper middle (score 8-10)	160 households
Lower middle (score 5-7)	193 households
Lowest (score 2-4)	44 households

Table 16: Four wealth groups

In the following paragraphs, I will characterize each group according to typical features. Crucially, these groups or strata are not distinguishable through observations on the ground. Instead, they result from the artificial reduction of a multi-dimensional space into one single numerical criterion and from dividing a continuum into convenient slices for analytical purposes. There are very different ways of carrying out this operation. The procedure is justifiable, however, when it yields new insights into the sample population that hold up against some qualitative scrutiny – and this is the case here, as I will demonstrate.

Not surprisingly, the highest stratum is most present in the comparatively urbanized municipalities of Murayja and Bani Mathar, while the lowest and lower middle wealth groups are predominantly located in Awlad Sidi ‘Abd al-Hakim, followed by Awlad Ghuzayil. Non-nomads are overrepresented in the highest-ranking group, which may be due to the fact that the scores are based on rather ‘sedentary’ criteria. A nomadic family may have little use for a satellite dish or for formal education; yet, this means that they enjoy less opportunities and less freedom than their sedentary compatriots in many ways (on development as freedom, see Sen 2000).

A household that is classified as very livestock-rich may only be in the lower middle wealth category according to this alternative assessment – and vice versa. The according matrix (Table 17) shows that the two measures are far from identical, as only one in three households lies on the middle diagonal. This is despite the fact that the two classifications are only partially independent from each other: herd size itself factors into the wealth index, after all.

		Wealth group			
		Lowest 2-4	Lower middle 5-7	Upper middle 8-10	Highest 11+
Herd size	Small <= 30	17	47	29	8
	Medium 31-67	5	41	27	8
	Large 68-150	1	45	34	13
	Very large 151+	–	18	39	27

Table 17: Herd size versus wealth index (number of households)

The remaining two thirds are either wealthier than their livestock numbers alone would suggest (37%) or have large herds but not much else (30%). For comparability reasons, 106 households without livestock are missing from this table. They are distributed across the four categories with very similar proportions, except for a bigger chunk of households in the ‘lowest’ bracket.

Many questionnaire items that characterize the respondent households are clearly correlated to wealth index scores. The higher its score, the more likely a family is to include emi-

grants, have access to electricity, employ a herder to take care of their animals, have an animal stable at their disposal, own land, engage in agriculture, and be a member of a pastoral or agricultural cooperative. As Table 18 shows, other indicators follow the same trend. The poorest households rarely possess solid houses, but most of the wealthy ones do. This also distinguishes the lower middle and upper middle categories more clearly than other criteria. The consumption measure – how much money a family spends on the market every week – varies with geographical location, as we have seen above. However, it is also related to wealth categories as defined by my index, except that the lower and upper middle group have the same average expenses. Looking only at nomadic families, the average distance traveled per relocation of the tent steadily increases with wealth index; members of the highest category travel twice as far as those of the lowest one.

	Lowest	Lower middle	Upper middle	Highest
Residence:				
Tent only	61%	42%	21%	6%
Tent + house	16%	26%	27%	34%
House only	23%	32%	52%	60%
Mean money spent at weekly market per adult (dh)	113	130	129	159
Mean distance traveled (last two nomadic journeys, km)	110	136	184	207
Experience of herd loss due to drought (among sheep owners)	31%	36%	38%	23%

*Table 18: Wealth group characteristics*

How is the wealth index related to drought? Fundamentally, wealth should protect a household from negative drought consequences. I have shown early on in this thesis that drought does not affect all households in the same years or with the same severity. The favored possible reactions to drought, such as buying extra fodder or relocating to distant pastures, require various resources; the more money, education, and equipment you can mobilize, the better your chances of forging a successful and resilient anti-drought assemblage around your livestock business are. My survey data corroborate this assumption for the wealthiest group, where only 23% of herd owners report major livestock losses caused by drought. The other three groups challenge this pattern, however: the second lowest proportion (31%) is found among the least wealthy group. Hence, the middle strata are most affected by this sort of disruptive drought shock. It would be too much of a stretch to speak of drought as a middle-class phenomenon, for sure – there is no really distinguishable middle class in the pastoral community of the high plateaus, and the differences between the four groups are not that drastic. But this indicator conforms to the well-known observation that the poorest households are not necessarily the most vulnerable (Swift 1989).

Another section in my questionnaire validates the wealth index as a meaningful way to uncover tendencies of divergence in this community – namely, the part where respondents

were asked to evaluate a number of political statements. Three of the most revealing ones are illustrated in Figure 23. The evaluation of today’s life conditions compared to the past rises consistently with increasing wealth index scores. Poorer household heads are less concerned about the environment than richer ones, but still on a high level. On the other hand, they often agree that land is being taken away from pastoralists, whereas more affluent respondents do not usually share this view. This attitude is also expressed in the evaluation of the general state of pastures, which is seen as overwhelmingly negative by the poorest group and as intermediate by the others (Figure 24). Even though the wording of my questions was unspecific and could possibly be understood in various ways, the large number of interviews should even out such inconsistencies and allow a comparison. The material conditions of existence are mirrored in an individual’s consciousness, to a certain extent.

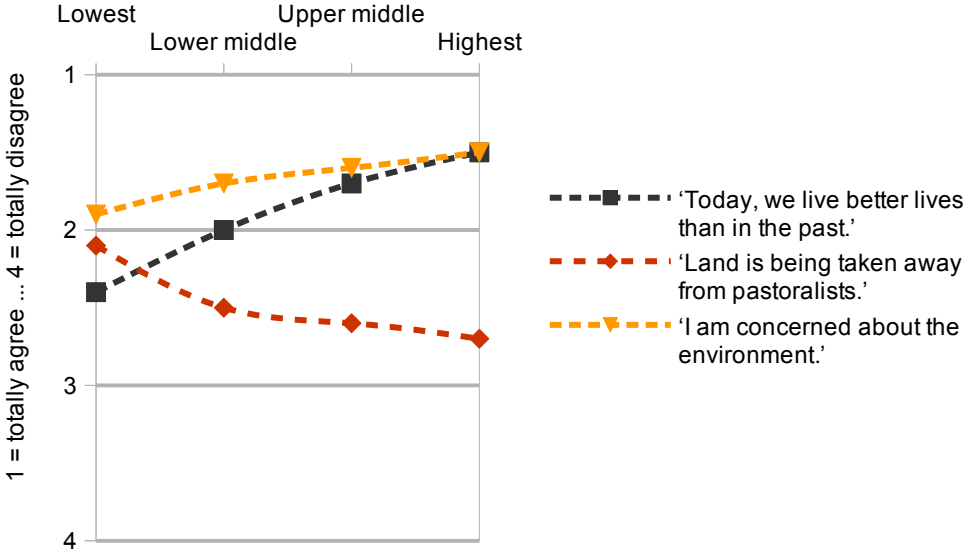


Figure 23: Opinions by wealth group (mean values)

One of the most pronounced differences between the four groups concerns their satisfaction with their current housing situation, which the lowest group rates slightly worse than ‘rather bad’ on average; the highest stratum, on the other hand, regards it as even slightly better than ‘rather good.’

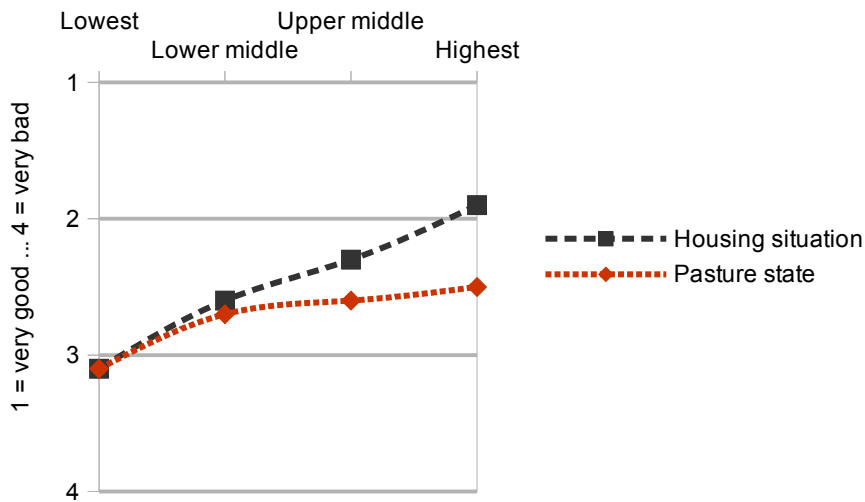


Figure 24: Satisfaction by wealth group

As an individual's satisfaction with their own household's economic situation was included in the calculation of this wealth index, it obviously correlates with the overall score. Specifically, none of the lowest stratum consider their situation as very good and none of the highest theirs as very bad. The proportion of 'rather good' and 'good' replies combined ranges from 14% in the lowest group to 88% in the highest group. But how about perceived changes in this situation? When the frame of reference is 'the past five years,' do households perceive a decline or rather an improvement of their economic status, and how is this related to current wealth? It turns out that all combinations exist, but there is a strong tendency: the better off you are today, the more positive you evaluate the past five years. This pattern seems to indicate polarization, but may also be influenced by psychological mechanisms that project current perceptions onto the past. Overall, the assessment is rather positive: the notion of decline is reflected by 22% of the respondents, whereas 38% perceive stagnation and 40% progress in the economic realm.

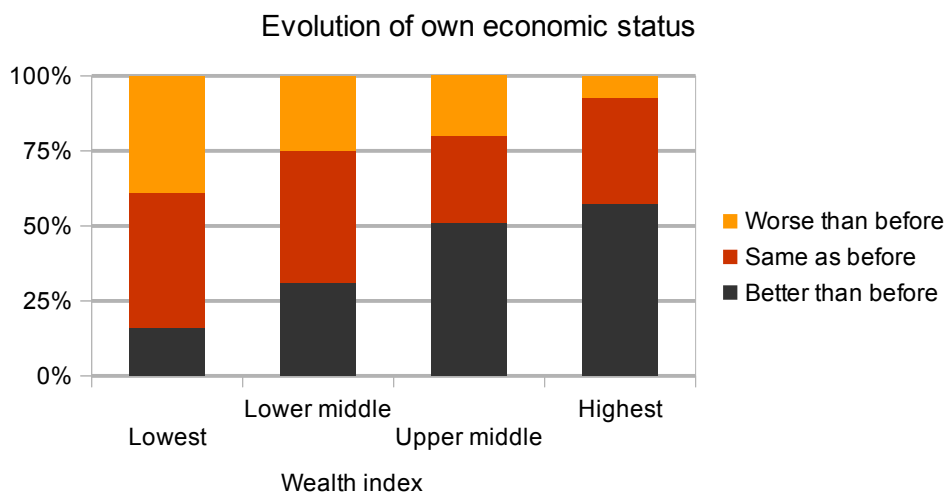


Figure 25: Assessment of own economic development by wealth group

With a further survey question, I tried to capture the ways in which social capital is related to material wealth. Each interviewee was asked to estimate how often he or she talks to a relative, a fellow tribesperson, an official, or a foreigner. While foreigner contacts did not play a particular role, the figures related to relatives are telling and show a distinct differentiation even between the lower and upper middle strata (Figure 26). For officials, the same pattern applies, albeit on much lower levels. How often you see someone may be related to physical distance, once again; but there are no significant differences between municipalities in this regard. Physical distance can be overcome thanks to transportation technologies, the use of which needs an effort, however – an investment of time and/or money. These technologies then help stabilize someone’s social ties to other human actors.

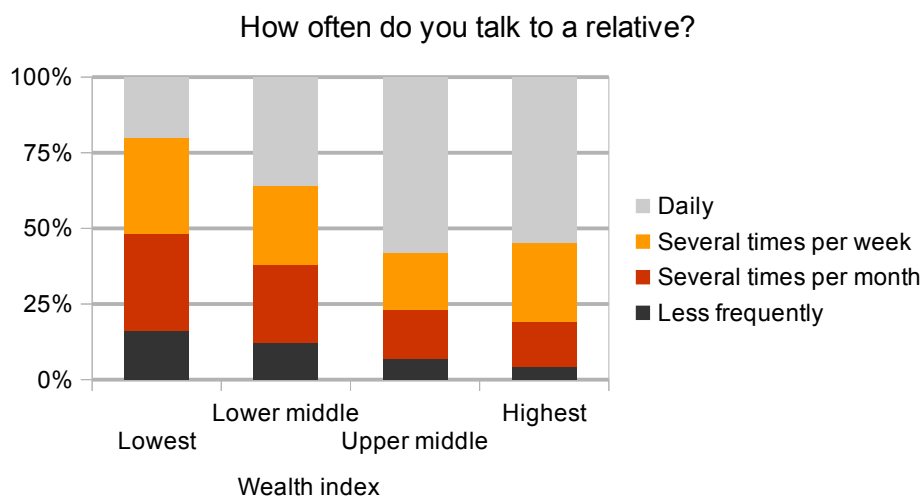


Figure 26: Frequency of seeing relatives by wealth group

To wrap up this chapter, I would like to take another look at drought and its involvement in producing economic difference. The households that were severely affected by drought shocks in the past constitute about one third of the sample. Across the four municipalities, their proportions range from 30% in Bani Mathar to 38% in Awlad Sidi ‘Abd al-Hakim – a very uniform distribution over the tribes. Drought affects the entire region in similar ways and does not distinguish between single villages and landscape units. Nomads (38%) and former nomads (37%) are somewhat more often affected than non-nomads (30%). While my wealth index suggested that the middle layers of society were most prone to drought damage, the four classes of herd size yield a very different result. Here, the ‘medium’ category with 31-67 sheep is actually least affected (27%)! Small (37%), large (40%), and very large herd owners (42%) reach higher levels. These findings seem to corroborate existing observations that large owners suffer higher proportional (and not just absolute) losses than small herders in a drought. At the same time, they are able to recover better thanks to the sheer size of their assets; poor families risk falling below a critical sustainability threshold (Fratkin and Roth 1990). At this point, my inquiry has not found a simple causal mechanism that turns households of a certain economic status into drought victims in the Moroccan high plateaus.



However, the older a household head, the more likely he is to have been stricken by a drought; this is no surprise, but confirms the general plausibility of my data.

A related question in the survey questionnaire is the open-ended Question 33 which asks, in general terms, about the most important negative change during the past 15 years. I counted all the replies that mention 'drought,' 'climate change' or similar terms – they add up to 123 out of the 465 interviews. Such replies are comparatively more frequent among large and very large herd owners. One element of an explanation is that wealthy, influential herders have appropriated the drought discourse more than small herders, by using neologisms like *tasahhur* (desertification), even when they personally are not heavily affected. A similar observation was made in Japan, where rural collectors of wild plants 'often borrowed from the language of science' to frame discussions of their current difficulties (Faier 2011, 1089), and in a farming community in Ghana where educated and influential individuals often added scientific explanations of drought to the existing ones – immoral behavior, witchcraft, or the 'natural order' of things – that are passed on from generation to generation (Jarawura 2014). To claim that drought in eastern Morocco is nothing but a discursive figure employed for personal benefits, however, would be a glaring mistake which cannot be sustained without negating all the aspects of drought that I have already presented. At this stage of my study, the only hope is to add even more nuance and continue multiplying agencies for a fuller understanding of drought. This is why I will use the next chapter to invite some supernatural beings into my drought assemblage.

### ***3.3 Sources of Power: The Solar and the Spiritual***

The province of Jarada, the overarching administrative unit for the four municipalities under study, has been trying to inscribe itself into an assemblage of so-called energy landscapes. There are various initiatives to harness solar energy from the desert to supply renewable electricity to consumers around the Mediterranean. Morocco is considered 'a pioneer among the Middle East and North Africa (MENA) countries in establishing a policy and regulatory framework' for this endeavor (Kousksou et al. 2015, 55). The high plateaus are part of this effort: in 2010, what was at the time the world's largest hybrid solar-gas power plant was inaugurated on the outskirts of 'Ayn Bani Mathar, adjacent to a gas pipeline running from Algeria to Spain. Abengoa, a private Spanish company, operated the plant based on a 5-year contract that expired in 2015.

The plant was co-funded by the International Bank for Reconstruction and Development (IBRD), Global Environment Facility (GEF), African Development Bank (AfDB), and Morocco's National Electricity and Water Utility (ONEE). Construction started in January 2008 and was completed in 34 months. But many locals are unhappy with their new neighbor. When I asked them about the power plant, it transpired that the project site was widely considered to be cursed. Several workers had died during construction.



Figure 27: Province billboards, 'Ayn Bani Mathar, June 2010

Other things had gone wrong, too, as an official project report summarizes prosaically:

'The construction of the plant suffered from a 6-month delay due to force majeure events such as severe flooding of project site, damage to collectors due to strong winds, total loss of one transformer and fire in one turbine filter.' (World Bank 2013, 6)

Unexpected events continued after the construction phase, especially from the operator's perspective. In the first few years, the plant could not run at full capacity because the economic crisis in Spain and Portugal had reduced the demand for gas in those countries. While the solar fields were ready to heat up large amounts of gas, the quantities passing through the pipeline were insufficient to keep the electricity-generating turbines running around the clock in a cost-efficient way. The situation only improved in late 2011 'after ONEE's signature of a dedicated gas-supply contract with Algeria' (World Bank 2013, 11).

The introduction of a new technology into a collective is more often than not accompanied by errors and hiccups, as numerous studies from the field of actor-network theory have demonstrated. Stable connections need to be forged between old and new actants before updated routines can be established and a smooth operation comes to be taken for granted. This applies to human actors in a social environment just as well as to nonhuman ones. According to the World Bank report on the 'Ayn Bani Mathar power plant, the project's scheduled 'environmental mitigation and monitoring measures' (World Bank 2013, 12) were largely ignored in the first few years. Important steps 'such as noise and air quality monitoring, proper waste management, preparation of an occupational, health, and safety plan by the plant operator' (World Bank 2013, 12) were only implemented by ONEE personnel after they had been reminded by auditors. By contrast, the death of construction workers is not mentioned in the report; and the overall impact on the pastoral communities whose land was expropriated for the power plant is dealt with in a single sentence:

‘Regarding social issues, all measures put forward by ONEE to be in compliance with Bank’s policies, e.g. compensation to landowners for loss of agricultural productivity, were considered satisfactory and no particular issues arose.’ (World Bank 2013, 12)

My impression during fieldwork was decidedly more nuanced, as I sensed a lot of hostility toward the whole project. The power plant operators had not managed, in my analysis, to establish a firm connection or even to enter into any relationship with most local tribespeople. Locals have stronger links to a different source of power: the *junun* (sg. *jinn*), invisible beings that can be benevolent, but also malevolent and dangerous to humans. According to a survey conducted in 2006, 85% of Moroccans believe in their existence (El Ayadi, Rachik, and Tozy 2007). *Junun* prefer certain habitats – places associated with water, darkness, or blood, for example – and are best left alone. The links between humans and *junun* are maintained through stories, rituals, amulets, superstitions and the like. To give an example, a young man from ‘Ayn Bani Mathar who showed me and a fellow researcher around and was by all standards a cool, tough chap, advised against a visit to the old cemetery (which lies outside the town on a hillside) just before sunset: there would be *junun* around. So we went there the next day, at an earlier time; even now, he felt visibly uneasy around the cemetery and returned to his joking, confident self only after we had put a certain distance between ourselves and the abode of supernatural beings.

In the solar power plant case, the *junun* evidently interfered in the attempt to build a connection between the new power station and the local tribal society by causing the death of several workers. I have tried to sketch this particular network situation in Figure 28. There are strong links between tribe and *junun* on the one hand, and between the various companies involved in the project on the other, but the fragile connection between plant and people is broken by a string of fatal accidents. Had ONEE invested more in elaborating and enforcing labor safety regulations, this would have helped strengthen the weak ties to the locals from the other side, but this did not happen either.

Drought plays an ambiguous role in this particular network. For one thing, it may be related to the world of *junun*, saints, and related popular beliefs, as can be seen in sacrifices that are offered to ask for rain. I will discuss those *istisqa*’ prayers further below. Then again, drought is one of the forces that actually pushes local people into construction work because the livestock business is no longer profitable. On an indirect but related level, the high solar irradiation was one of the factors that made the ONEE planners think about setting up a solar power plant in this particular region in the first place (World Bank 2013, 23).

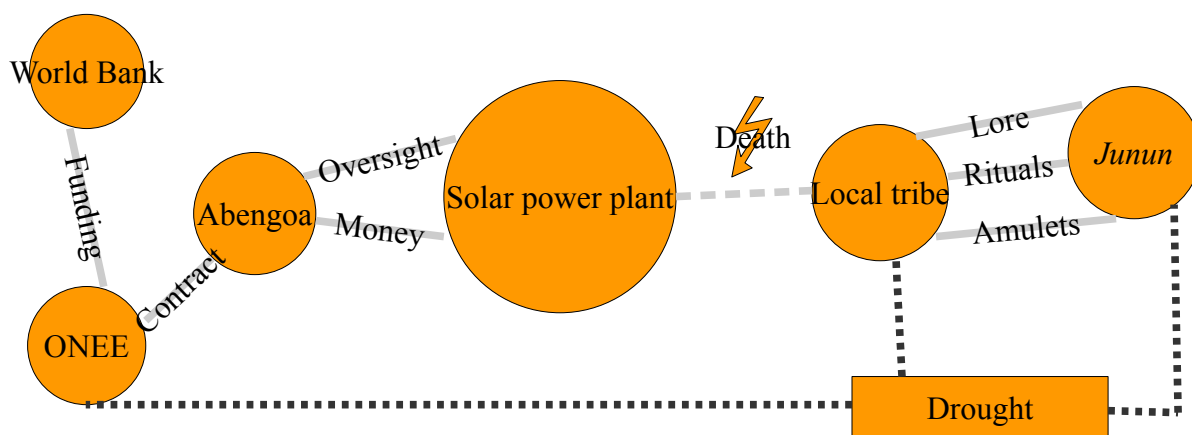


Figure 28: Power plant – junun – drought network

What could a more successful integration of the project in the local tribal landscape have looked like? More generally, what is the right process to tap a new resource, solar energy in this case, and what would be the local population's fair share in the profits it generates? The project staff's answer was to establish

'Community projects for one hundred neighboring families, e.g. construction of latrines in three schools and reinforcement of irrigation system. These projects were financed with the funds corresponding to the expropriation of collective land for the project.' (World Bank 2013, 16)

In other words, the dispossessed tribespeople were not even paid out their compensation money, but were basically fobbed off with some technical implements, just as General Lyautey had intended to do more than a century earlier (see ch. 2.8, p. 98). This critique of a colonial mindset can be formulated in less polemical ways, of course, but will not lose its validity.

Maybe Abengoa should have entered into a relationship with the *junun* instead, by making a few sacrifices or otherwise acknowledging them. In this way, the company could have found a position within a newly defined assemblage (*junun*-tribes-Abengoa) and then enrolled the power plant into it as well. In a different surrounding a few thousand miles away, a similar thing happens on a regular basis. When a new road or house is planned in Iceland, experts may be called upon to enter into communication with the 'hidden people,' elves who are known to inhabit certain places such as large rocks. These experts either manage to negotiate a relocation with these nonhuman beings, or they fail and the road is rerouted around the elf's abode. There are many anecdotes of accidents, machines breaking, or workers becoming ill whenever elvish wishes were ignored (Wainwright 2015).

This does not mean, to be sure, that there will ever be universally accepted, irrefutable proof for the existence of *junun*; nor does everybody have to be converted into someone who

believes in them. The point is to acknowledge potential actors that are not supposed to exist in a modernist universe. It is a chance 'to fathom the diversity of agencies acting at once in the world' (Latour 2005, 48), but not necessarily an acknowledgment that *junun* are real. No statement on their ontological status is required in order to recognize that the *connections* between them and the locals are very real: they are maintained by an investment of efforts and stabilized through the involvement of other actors (amulets, sacrificial animals, and the like). This unconventional perspective, one of my key lessons from assemblage thinking and actor-network theory, can point to innovative solutions for social and technological problems.

Likewise, I am not claiming that the death of workers could have been avoided if the company had taken the invisible beings more seriously by admitting them into the power plant assemblage. An affable young engineer from Casablanca who was staying at the *Gara* hotel in 'Ayn Bani Mathar for a few weeks while he worked on the plant told me, from experience, that a few fatal accidents were commonplace and hard to avoid on construction sites of this scale. Locals were exaggerating, he said. Such a display of contempt and disconnect from human concerns may well reflect the emotionless cost-benefit analyses run by corporate economists. In fact, why should Abengoa care? They will make their profit and move on to the next project. This is one of the moments where the uneasy feeling that something is fundamentally wrong with this neoliberal world of ours becomes palpable. Had the company acknowledged the *junun*, by contrast, thus 'managing failures [...] and reassembling as the ground shifts' (Li 2007, 286), improved relations with locals would at least have enabled more nuanced and more constructive responses to the lethal accidents. Everyone involved might have benefited from a more reliable assemblage of actors in the future.

To most pastoralists of the high plateaus, *junun* are just one among many visible and invisible powers in the world. Among the visible religious institutions, one stands out because it has adherents well beyond the region: the *zawiya* at the shrine of Sidi al-Shaykh Bu 'Amama, just two and a half miles away from the new solar power plant. It is run by a Sufi order (*tariqa*), the Shaykhi order, which occupies a central spot in the tribal history. This school of Islamic mysticism was founded by Sidi Shaykh (d. 1615) on what is now Algerian territory, and resembled more of an aristocracy at the turn of the 20<sup>th</sup> century (Montet 1902). Today, the *tariqa* focuses on spiritual instruction. People come to the *zawiya* to be cured from ailments or simply to ease their daily stress. Courses in Qur'an education are offered, and a long process of initiation awaits those who want to become followers of the order. A mystical poem is part of the process, as are secret *dhikr* (invocation) formulas. Among the 465 household heads in my survey, no more than eleven affirmed being members of a *zawiya*, most frequently at another local shrine, that of Sidi Hmida. All others may still regularly or irregularly visit a shrine, but without the same level of personal and spiritual commitment.

During my fieldwork in 'Ayn Bani Mathar, I visited the shrine of Sidi al-Shaykh Bu 'Amama – not to be confused with the rebellious warlord Bu 'Amama whose presence had

served as a pretext for Lyautey's first invasion of Morocco in this exact region in 1904 (Porch 1986) – and was welcomed, with my team, by several members of the *tariqa*, all dressed in white. They talked in detail about their spiritual approach and the order's history in the region. The *zawiya* owns irrigated farmlands around the shrine which provide its revenue basis, apart from members' contributions and donations. With their educational programs, the Sufis today view themselves as a counterbalance to Salafist and Wahhabi fundamentalism, which has some proponents in the region but 'causes many problems in society' (Interview at the shrine, June 5, 2010).

The shrine is an important focal point for tribal meetings, too. In 2005, the *zawiya* organized its first festival (*mawsim*) which lasted for three days, was attended by more than 5,000 guests from the surrounding tribes (notably Awlad Sidi 'Abd al-Hakim) and beyond, and focused on religious education. Moreover, it included festive meals and *tburida* horse competitions (Bilhama and Hakimi 2007). The border closure, according to our interlocutors, has negatively affected attendance by Algerian adherents in recent years, but the community remains intact across borders and includes a diaspora in Europe, too.

Outside the Sufi domain, certain elements of popular Islam are cherished by many locals. One instance intimately connected to drought is the prayer for rain, *salat al-istisqa'*. As mentioned in the introduction (ch. 1.4, p. 38), many communities around the world resort to prayer in situations of severe drought. In the Moroccan steppes, however, this practice is now controversial. Rabi'a, forty years old, who grew up in the village of Sahb al-Ghar (Bani Mathar municipality) but now lives with her husband and two children in the center of 'Ayn Bani Mathar and is no longer engaged in livestock breeding, gives her account:

'Yes, people perform *istisqa'* prayers. They pray two *raka'at* [sequences of movements during prayer]. Or they come together and carry out *sadaqa* [charity]. This means, they meet at a saint[s shrine], slaughter [sacrifice an animal], and perform *sadaqa* in order to make it rain. But really, this is all up to God. I do not believe in these saints. Those are all superstitions. Do you hear me? My family, my husband, my children, we have only God. God is one. We do not go and visit these saints. Look, we do not visit them. But other people do, they visit them, they go and slaughter and do horse [performances] there, they put up marquees... Just recently, they did it at Sidi Ibrahim, not far from here. They did it there, set up tents, slaughtered, they all met... and they say it is for rain. And this, no, it is not right.' (Interview with Rabi'a, 'Ayn Bani Mathar, November 2, 2011)

It is people of the steppe rather than townspeople who are involved in such practices, according to her. Rabi'a distances herself from rain prayers and views them as reprehensible superstitions, embracing a somewhat orthodox, mainstream interpretation of Islamic rules and values. Everything that calls the oneness of God into question is frowned upon. If this is a predominantly urban perspective, the remarks on religion by Deleuze and Guattari seem to hold some explanatory value for my case study, however general and idealizing they may

be. Specifically, the two thinkers observed that nomadism and orthodox, institutionalized religion do not easily go together:

‘The nomads have a vague, literally vagabond “monotheism,” and content themselves with that, and with their ambulant fires. The nomads have a sense of the absolute, but a singularly atheistic one.’ (Deleuze and Guattari [1980] 1987, 383)

While no nomad I met in the highlands would consider him- or herself an atheist, religious beliefs or practices were never turned into a topic of debate either. Islam is an unproblematic and hence unobtrusive part of daily lives. Based on similar impressions, a French author of the 1950s speculated that climatic factors – specifically, cyclical droughts – were more important than religion in shaping the purported character of the locals:

‘One can also wonder whether the climate, even more than religion, would not explain to a large extent the fatalism and improvidence of the nomads of the High Plains. They know – or at least, they think – that nothing can be done to avoid the tragic consequences of years of scarcity. Is not survival the essential thing in order to fully enjoy the years of abundance that will inevitably come after periods of famine?’ (Paskoff 1957, 36–37, my translation)

Leaving aside the writer’s prejudiced and patronizing stance that is not genuinely interested in people’s motives, I would argue against him that a certain degree of fatalism is actually a sign of wisdom. Villagers in Ghana refer to this attitude as simply accepting the ‘natural order’ (Jarawura 2014), and private gardeners, while assembling their own small-scale ecologies, typically ‘accept contingency’ and unpredictability (Livesey 2010, 121). This approach resonates with the Taoist teaching that going with the flow is preferable to stubborn insistence on having your own way regardless of changing circumstances; seeing and seizing the opportunities brought about by accumulated silent transformations is the smoothest road to success (cf. Jullien 2009). This is often likened to the flow of water which always finds and follows the ideal path. Apparently, life with an omnipresent drought risk can teach you similar lessons.

Water is a key element in the energy landscapes of the province of Jarada, to be sure. For livestock producers and their sheep, water access is an utterly critical issue, as discussed above (ch. 2.2, p. 63) – and it is equally vital for the wider tribal community. I will use the next paragraphs to review the information on water access that is available through my survey data once more, this time focusing on differences and similarities between the four municipalities.

The first major difference concerns the distance between each residence and the nearest source of potable water. In households that are connected to a water supply network, this distance is considered zero and they were not taken into account in calculating the average distances shown in Table 19, hence the diverging overall case counts. The average distance across the study region is 8.4 kilometers (5.2 miles), by no means an easy walking distance. Bani Mathar is an exception here: in line with the village character of its communities and the

availability of natural springs, most residents live within close proximity of a drinking water source. The other extreme is represented by Awlad Ghuzayyil, dominated by fully mobile pastoralist families, with a mean distance of 15 km (9.3 miles) between tent and water source.

Municipality	Mean distance (km)	N
Bani Mathar	2.2	105
Murayja	7.7	63
Awlad Sidi ‘Abd al-Hakim	9.0	129
Awlad Ghuzayyil	15.0	94
<b>Total</b>	<b>8.4</b>	<b>391</b>

Table 19: Distance to currently used water source

When asked how the water access situation had evolved for them over the past five years, more than half of the respondents in Bani Mathar and Murayja stated that it had improved. In Awlad Sidi ‘Abd al-Hakim and Awlad Ghuzayyil, the largest group said that it was unchanged. Only a tiny fraction of respondents reported a deterioration across all municipalities, with 9% among Hakimis being the highest share. Awlad Sidi ‘Abd al-Hakim is more generally the municipality where the highest percentage of respondents feel neglected by the state, whereas improvements are most clearly felt in the two central municipalities that are readily accessible by road.

The specific sources of drinking water are highly differentiated by municipality, as my survey reveals. Table 20 lists them, with the municipalities ordered geographically from west to east; multiple answers were possible.

	Awlad Ghuzayyil	Murayja	Bani Mathar	Awlad Sidi ‘Abd al-Hakim
Private well	25%	35%	14%	10%
Public well	57%	41%	31%	71%
Natural spring	2%	3%	16%	2%
River	3%	1%	6%	7%
Tap	2%	16%	37%	1%
Others	20%	11%	13%	21%

Table 20: Water sources by municipality

What stands out most from this table is the concentration of water taps in two municipalities (the urbanizing, central ones) and the high reliance on public wells in the other two (nomadic, peripheral ones). Natural springs as a source are only important in the surroundings of ‘Ayn Bani Mathar, and the sparse rivers do not support large numbers of families anywhere in the region. Overall, water provision involves quite heterogeneous socio-technical assemblages in this dryland area, and this diversity of sources provides a certain level of



protection – failures in one type of source can be compensated with others. Water storage techniques provide an additional layer of security, and the use of cisterns for this purpose is highly differentiated as well. Prevalence rates range from 16% of households in Bani Mathar to 91% in Awlad Sidi ‘Abd al-Hakim, and from 42% of the small herd owners to 89% of very large ones. As stated further above, the problem with drought is usually not one of a deficit in drinking water, however. Precipitation remains decisive.

While every family needs water to survive, another form of energy can almost be considered a luxury item in the high plateaus: electricity. In the words of the provincial administration,

‘the Jarada province experiences a paradoxical situation: it contributes, thanks to the [coal-fired] power plant in Jarada, a non-negligible share to domestic electricity generation, but rural electrification rates do not exceed 51% (they were at 10% in 2002).’ (Province de Jérada 2007)

This paradox was exacerbated with the opening of the solar power plant, but electrification rates are slowly picking up in the steppe. Exactly matching the provincial statistic, one half of my sample households have access to electricity. Most of them (72%) have only achieved it within the previous six years (i.e., since 2003). The most common source is the public grid of national utility provider ONEE, which two thirds of electrified households are connected to. A quarter of the families rely on solar panels. A herder who has built a house in the steppe, in Awlad Sidi ‘Abd al-Hakim, has had a solar panel for four or five years. He made a down payment of 900 dh and will be paying monthly installments of 65 dh for ten years. His assessment is completely positive: ‘It has saved us from the smoke of the gas bottles and candles. The light we now have is clean, we have gotten rid of the dirt’ (Interview with Abdelkader, Awlad Sidi ‘Abd al-Hakim, June 3, 2010). In their old tent, this had not been a problem, but in the new concrete house, the smoke had not been able to escape and had bothered children as well as adults.

The differences by municipality are drastic in this domain: electrification reaches 72% and 73% in Bani Mathar and Murayja, compared to 32% in Awlad Ghuzayyil and 21% in Awlad Sidi ‘Abd al-Hakim. Looking at the sources of power also provides a spatially differentiated picture (Figure 29). Bani Mathar households almost exclusively depend on the public network. The share goes down to about half among the western communities and one third in Awlad Sidi ‘Abd al-Hakim. Inversely, the proportion of solar panels steadily increases and reaches 57% of electrified households in the easternmost municipality. Generators do not play a large role in this region, and tents are hardly ever equipped with electricity: barely a dozen tents in the entire sample boast some form of electrical outlets.

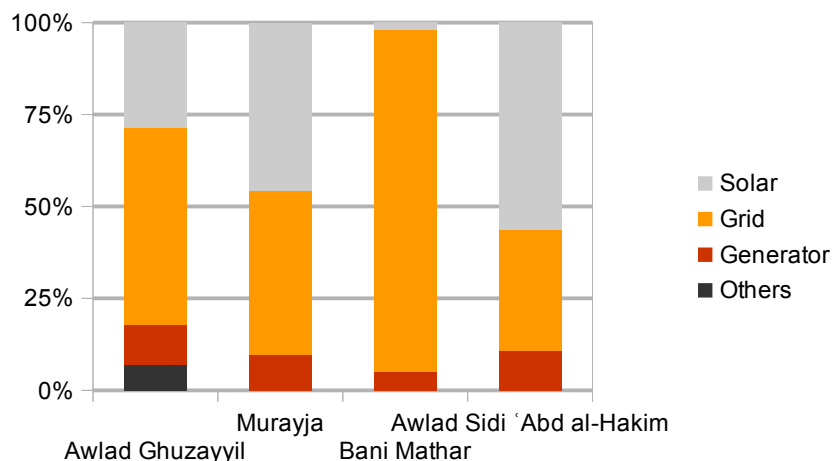


Figure 29: Electricity sources by municipality

As could be expected, nearly all households with a high wealth ranking (ch. 3.2, p. 117) have electricity access (94%). The upper and lower middle categories reach 62 and 33%, respectively, whereas only 9% of the lowest stratum are connected. To some extent, this outcome reflects the input, as four different electrical appliances each added one point to a family's wealth score. A family's herd size, on the other hand, has no correlation whatsoever with electricity access. This is another proof that no simple categorization can explain every socio-economic phenomenon, not even within this comparatively small and homogeneous community.

Although they require electric power to run, cell phones are much more prevalent than electricity access in the respondents' homes. Even people who live in areas without network coverage own phones (Vidal-González and Nahhass 2018). Users without electricity at home usually recharge their mobiles in town or during visits to friends and relatives. The role of phones in the livestock business cannot be overstated: they are used to access and disseminate information on markets, pasture conditions, veterinary issues, and the coordination of multiple herders, for instance (Vidal-González and Nahhass 2018). But they also facilitate the maintenance of family and romantic relationships, serve entertainment purposes, and keep non-pastoralists informed about job opportunities. Just as about everywhere in the world, smart phones have become hugely popular in recent years. In how far they will permanently change pastoral practices and drought responses remains to be seen.

A final aspect should be mentioned when discussing sources of power in dryland regions and their connections to drought. The collection of firewood as fuel is considered a main driver of land degradation and desertification, which is why the promotion of energy-efficient appliances and alternative energy sources could 'increase resilience against droughts and agricultural productivity of semi-arid rangelands' worldwide (Le Houérou 1996). While it was a matter of concern four decades ago (Müller-Hohenstein 1978a), this topic seems no longer relevant in my study area today: virtually all households use butane gas for heating and cooking. This innovation has also removed a considerable burden from

women and girls who used to be responsible for firewood collection in the past (Mahdi, Har-rami, and Ablal 2007).

Viewing the high plateaus as an energy landscape, while remaining faithful to the ANT perspective, provides new insights into the various agencies, human and nonhuman, that are active here. The religious realm includes rain prayers and a Sufi order; both are eschewed by adherents of a more fundamentalist Islam. Drought is interlinked, in various ways, with water pipes, power cables, and invisible beings – often resulting in subtle socio-economic distinctions between the tribes and municipalities that my 2009 survey reveals. But how about more visible phenomena of social stratification? Does the increasing influence of non-pastoral labor and income lead to the emergence of clearly identifiable new groups? In the next chapter, I will analyze changes in education, professional occupations, and labor migration trends to tackle these questions.

### ***3.4 From Tribes to Professions: Education, Diversification, Migration***

Given the economic difficulties faced by many households in the livestock business, the search for alternative revenue sources is understandable. Non-pastoral activities are on the rise, wage labor is an increasingly important basis of rural livelihoods (Breuer and Gertel 2012), and considerable numbers of people migrate to earn their money outside the high plateaus. All these processes are routinely linked to drought by inhabitants of the region. Everyone seems to agree that drought is the obvious driver of this silent, but unstoppable overturn of an entire economic system – and of the society whose survival is based on this system. Relying on my survey data, I will now investigate the resulting changes in labor biographies and livelihoods in the high plateaus of Morocco.

There may be different reasons for families to engage in non-pastoral activities. At the wealthier end of the social spectrum, these activities can add an element of portfolio diversification, spreading risk and increasing the chances of profit. The poorest households, on the other hand, are often forced to seek their income elsewhere as it has become impossible for them to get by on livestock husbandry. This bifurcation of motives has been observed in other regions (cf. Toth 2015 investigating ‘poverty traps’ in Ethiopia) and is, as a tendency at least, reflected in my survey data. Figure 30 shows the role played by livestock-related cash income for each of the four wealth groups (as defined by my index).

The lowest wealth group contains the highest percentage of households that have no livestock-generated income at all. Many of them were forced out of the business by the combined forces of drought and other constraints. The proportion of those who combine livestock with other income sources, on the other hand, increases from lower to upper middle and reaches the highest level with the highest stratum. In other words, economic success often allows adding other income sources to the flourishing livestock business; this diversification tends to reinforce economic success in the long run.

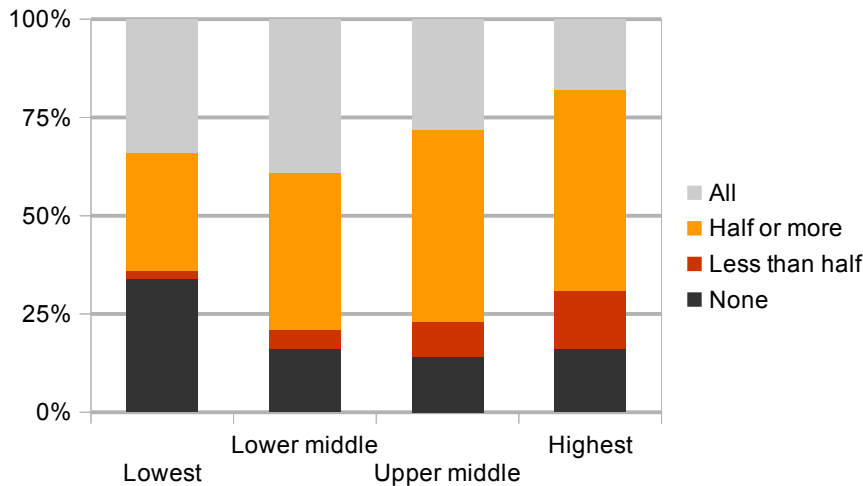


Figure 30: Livestock-generated income by wealth group

Looking at the same numbers from a slightly different angle, the average contribution of livestock to a household's income is around 60% for the lowest and highest categories, and around 70% for the middle ones. The lower middle stratum also features the highest share of families – two out of five – who live off nothing but livestock. All these indicators confirm that non-pastoral labor concerns both the neediest and the wealthiest families more than it does those at intermediate levels.

To analyze how people's professional careers have changed over the generations, I extracted personal information on all household members from my survey data. These 3,612 individuals of all ages are represented in the following graph (Figure 31). It displays ten-year age cohorts and their respective main occupations in percent, separated by gender. Several things stand out, especially about the differences between men and women in this society. For one, only a handful (3%) of women have activities other than being a student, a housewife, or 'none' deemed worth mentioning by the (mostly male) respondents. Earning a livelihood is almost exclusively a male endeavor in this community.

Enrollment rates in above-primary education (10-19 years of age) are higher among boys compared to girls, but they are identical among younger children. Girls often have to quit school after a few years of basic education. A teacher at the local women's association, which has been active in 'Ayn Bani Mathar since 1998, told us about her experiences in this field. Her account contains important insights into the difficulties faced by girls in education and the underappreciated hard work they have to carry out in the steppe:

'The proportion of girls is low, because when a girl reaches the age of 15 or 16, they start preparing her for marriage and they push her toward household chores. She has to learn domestic tasks and all those things about milking and tending to the animals, about feeding them... So there are pressures from the family. I cried tears for this one girl. I can testify that she was diligent. She studied with me for a year, and was in tears when she left. She did not want to leave school. She was successful, I enrolled her and she reached the sixth grade and attended [regular] school. When she had come to me,

just a year earlier, she had been almost illiterate. She went to fourth grade, I put her in fourth grade because she was diligent. When she started, she studied for two years until she grew a little older – and that was it, the family intervened. Her parents did not want anymore. I went to talk to them, but they said: that's it, her uncle is against it. This uncle has authority over his brother's family. He had told him: act responsibly, the girl has grown up. If you want to let her stay among the people, let her, but you bear the responsibility if you let her continue her studies. She was taken from our hands. What can you do?' (Focus group discussion at women's association, 'Ayn Bani Mathar, June 5, 2010)

Such stories showcase attitudes that are still dominant in rural Morocco. In addition, literacy levels are exceptionally low in the high plateaus, even among males. However, voices calling for change can be heard and examples of local girls succeeding in higher education or with their own businesses exist. Attitudes are being transformed, albeit in slow and silent ways. The teacher continues:

'There still is this culture. Females have certain obligations. Even males, too: when a boy grows up a little, his father needs him out there in the steppe. He needs someone to assist his father. I had two cases where they grew older and their fathers took them back. I thought: if there was an opportunity for vocational training here, in the area of agriculture, we could maybe keep those children here for longer and they would not go back to illiteracy. They return to the position they wanted to get away from. So they go back to the steppe, back to the drudgery, their education stops.' (Focus group discussion at women's association, 'Ayn Bani Mathar, June 5, 2010)

In my survey data, an individual's occupation is not clearly related to their educational achievements, however. The bulk of existing jobs do not require a specific degree of formal education.

Drought is commonly made responsible for unemployment. What does my data set have to say about this issue? The large group of individuals whose occupation was given as 'none,' it turns out, is distributed along a U-shaped curve; this is true for men as well as women. Understandably, children and the elderly are most likely to have no particular occupation. The curve drops to almost zero for middle-aged men: they all do something rather than nothing. This pattern corresponds exactly to statistics compiled by the provincial administration (Province de Jérada 2007).

Livestock tends to be most important for older men, a sign that this sector is gradually losing importance as a main occupation. Children and young adults who appear in this category may simply support their father's livestock business, as observed by the teacher. The combination of livestock and agriculture, in turn, is most prominent in the fifty-to-eighty years age bracket. Finally, 'other' activities are most pronounced among young and middle-aged men (twenty-to-sixty-year-olds). They seem to be steadily on the rise. Of course, certain jobs are physically demanding and thus unsuited for elderly men. Those who are in their

prime now may fall back to herding when they become older – assuming that they possess the required skills.

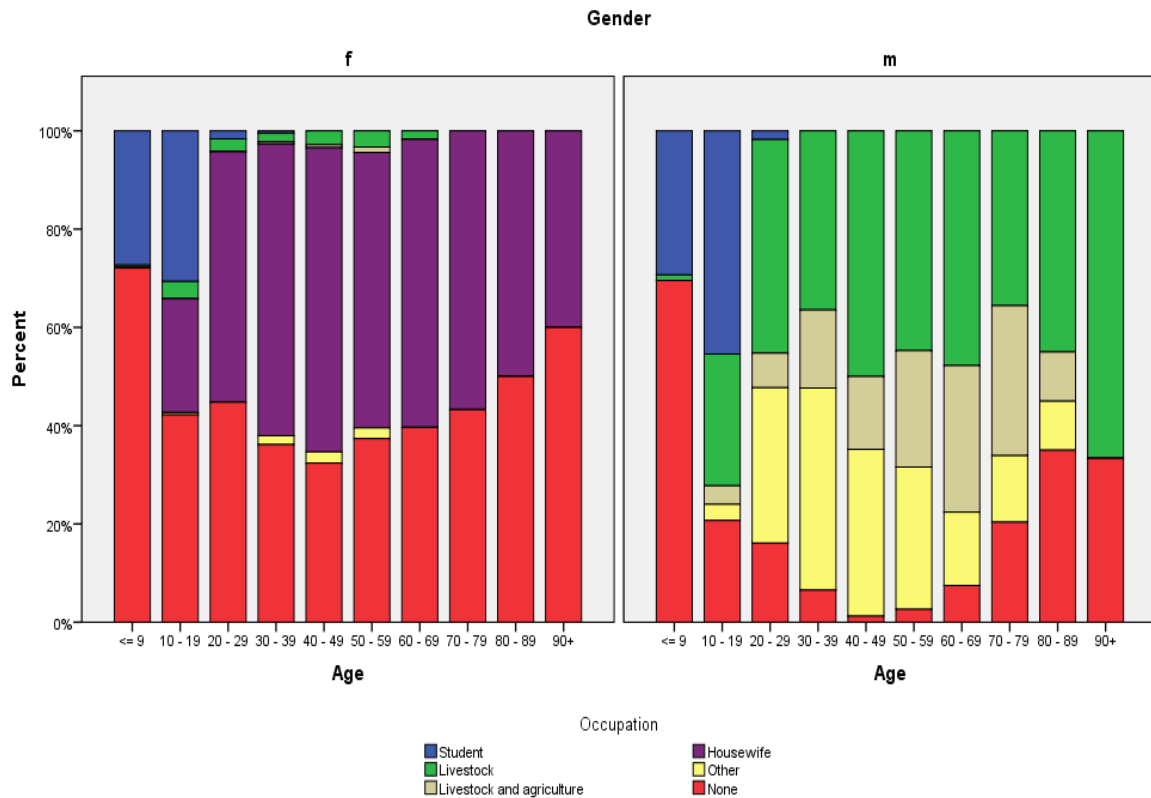


Figure 31: Main occupation per ten-year cohort

It is worth noting that the approach to livestock raising has changed with the rise of business-minded large herders. The phrase *l-ksiba wllat mashru'* (livestock has turned into a business enterprise) has become a cliché that is often repeated when summarizing the main transformations of the past decades, just as the obligatory reference to drought and its effects. An elder notable puts it this way:

‘Livestock is a business. It is like setting up a factory, but according to this region and this climate, our factory is the herd of sheep’ (Interview with Daoudi, ‘Ayn Bani Mathar, June 2, 2010).

Taken together, my findings nevertheless indicate a gradual, generational shift away from livestock and toward new professions. This happens in socially and spatially differentiated ways: individuals with ‘other’ activities, presumably representing novel occupational pathways, are not distributed equally across the four municipalities. Their proportion among working-age men – those aged from 16 to 64, in my categorization – is highest in Bani Mathar (47%), much lower in Murayja (28%) and Awlad Ghuzayyil (22%), and lowest in Awlad Sidi ‘Abd al-Hakim (14%). A similar distribution is found in the number of different professions or unique combinations of activities per location: there are over sixty different job descriptions in Bani Mathar, including day laborers, grocers, electricians, drivers,

masons, soldiers, a hairdresser, a plumber, a photographer, and a tailor. This testifies to a wide and diversified, tentatively urban spectrum. Interviewees from Murayja named about thirty different professions, and those in the more peripheral municipalities of Awlad Ghuzayyil and Awlad Sidi ‘Abd al-Hakim listed twenty each (including drivers, functionaries, and a niche for females in the services sector: three women work as housemaids).

Income diversification has become widespread, and pastoral production is intertwined with wage labor.<sup>10</sup> Just one in three households derives all of its income from livestock, either as independent breeders or as paid herders – with the highest percentage among families who own 31–67 sheep (my ‘medium’ herd size category). Among the overall sample of 465 households, 17 percent have no animal-generated income at all, and no less than half of today’s families combine livestock breeding with other jobs, most frequently as agricultural laborers in Spain or as day laborers or construction workers in the region. This is mirrored by lifestyles, as the forms of residence indicate (Figure 32): the less you depend on sheep production, the more likely you are to live in a house rather than a tent. Wage labor is most widespread among small livestock owners and lowest, in this sample, among large ones. This latter category seems to rely on freelance non-pastoral activities more frequently. Moreover, the significance of salaried labor varies strongly across municipalities, ranging from 41% of adult men in Bani Mathar and 24% in Murayja and Awlad Ghuzayyil down to 19% in Awlad Sidi ‘Abd al-Hakim.

Pastoralism thus continues to be the mainstay of the regional economy, but it is clearly losing importance: even among those who are not engaged in any livestock breeding, nine in ten respondents report that it was their parents’ main activity a generation ago.

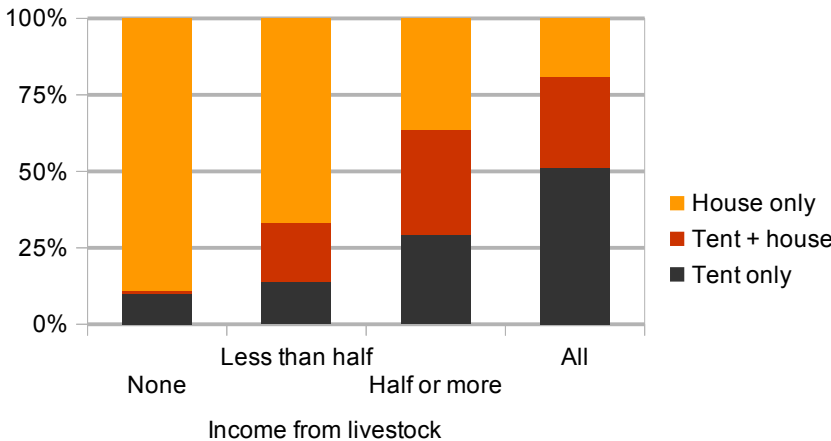


Figure 32: Housing type by livestock-based income category

Labor migration is another remarkable aspect of the shift away from pastoralism in this region (Mahdi 2014). When you walk through the streets of ‘Ayn Bani Mathar, you may be surprised to see numerous cars with Spanish license plates, especially in the summer

10 The remainder of this chapter is, in part, based on previously published work (Breuer and Kreuer 2011, 167).

months. They do not belong to tourists, but to labor migrants from the high plateaus who are on a family visit. According to my 2009 survey, one fifth of the interviewed households have (or have had) at least one family member who has emigrated to another Moroccan region or abroad. When asked about migrants in their larger family, 55 percent of household heads mention at least one. This migration happens predominantly on a seasonal rather than permanent basis. The most popular destination by far is Spain, in particular the region of Murcia where emigrants from the northern high plateaus usually work in agriculture. Three quarters of the emigrants in my sample first left Morocco sometime between 1990 and 2004, while the earliest cases date back to 1960. Permissions to work abroad were ‘almost impossible’ to obtain in those early days (Müller-Hohenstein 1978a, 64, my translation).

Among the survey respondents, people in Murayja have the highest proportion of emigrants in their larger families (67%) and those in Bani Mathar the lowest (47%). Being related to a migrant strongly correlates with wealth as measured by my wealth index. The likelihood of having a migrant in your extended family rises from 36% in the lowest stratum to 45% in the lower middle group, 64% in the upper middle category, and 74% among the wealthiest households. Those with migration experience in their family are also more likely to own a house (76%) than those without (60%). Migration seems to be directly related to herd size, too, which can be read in two ways: either those who possess large numbers of animals can more easily afford to send one or two of their sons to Spain – or the migrants’ remittances are invested in animals and lead to considerably larger numbers of livestock. Both explanations are partly true according to locals: there is a certain investment threshold to be overcome before obtaining a Spanish contract, but once you are in the game, you can easily earn eight times the monthly wage that is commonly paid in the high plateaus. In contrast to other regions or periods of history, and in slight contradiction to local depictions of drought as a force driving people out of the steppe, migration has for several decades been an opportunity rather than a necessity for the herders of eastern Morocco.

The inherent risks of integration into a distant labor market have been felt since 2008, however, when the global economic crisis hit Spain and the demand for seasonal agricultural labor went down. Many migrants have since stayed at home and concentrated on livestock breeding or other activities like house construction, slowly but surely fostering change in the steppes. The urbanizing tendencies that express this change most visibly are the topic of my next chapter, which focuses on the town of ‘Ayn Bani Mathar.

### ***3.5 ‘Ayn Bani Mathar: Urbanization in the Making***

This chapter is about urbanization and consumerism, two emerging forces in eastern Moroccan assemblages that are intimately linked to notions of drought. During my 2011 visit to ‘Ayn Bani Mathar, I noticed a new billboard on the main street. It featured designs of shiny new town houses, a middle-class dream, marketed for 25 million frank (i.e., 250,000 dirhams) apiece. What is the target audience of these advertisements? What other silent transition pro-



cesses have prepared the ground for such a business endeavor in this peripheral region? Do post-nomadic (and possibly post-drought) families strive to emulate lifestyles they know from large cities or from TV series? Have such trends diffused out from the center into the four rural municipalities around it, and which traces do they leave in my survey data? As a reminder: the town itself was not included in the survey as it constitutes a municipality on its own.



Figure 33: Real estate advertisement, 'Ayn Bani Mathar, October 2011

'Ayn Bani Mathar, while small in comparison to other Moroccan cities, is the undisputed commercial and administrative hub of my study region, and has been so for a long time thanks to its natural springs, the weekly Monday market, and its location near the border which conferred to this settlement a remarkable role in the regional history of the early 20<sup>th</sup> century (see below). The town had a population of 13,526 in 2004 and had grown to 16,289 inhabitants by 2014, continuing a decades-old trend of expansion (HCP 2015).

To be sure, processes that involve urbanizing lifestyles and changing consumption habits are unfolding in various parts of rural Morocco, but in the east, drought has been an additional driving force. The sprawling neighborhood south of the center of 'Ayn Bani Mathar, behind the marketplace and the Afriquia gas station, is called Hayy al-Ziyani. It 'only exists because of drought,' as a young policeman who lives there explained to me: the first families from the Awlad Sidi 'Abd al-Hakim tribe who had to give up nomadism in the 'urubiyya due to drought settled here. More and more followed over the years. Today, Ziyani has several thousand inhabitants, a primary school, a number of shops and cafés, and an elegant new mosque. Most of the people who live here are Hakimis, unlike the town center where differ-

ent ethnic groups have been mixing for decades, including Bani Mathar, Bani Gil, but also people from the Souss plain and the edge of the Sahara in Morocco's south.

A common narrative, as I pointed out earlier, is that 'rural exodus is one of the big consequences of this extreme natural phenomenon' named drought (Tarik 2012, 15, my translation). Massive population movements into towns and cities are expected to increase further due to demographic pressures and worsening climate patterns which seem to destroy any economic hopes for pastoralists. Then of course, there are also the benefits of living in a town, such as the existing infrastructure, doctors, schools, communications, and administrative functions. Hence, some families who can afford it entertain both a house in town where the children can attend school and a tent in the steppe so they can continue, at the same time, the practice of mobile livestock breeding.

During the colonial era, 'Ayn Bani Mathar – called Berguent back then – was known in the region as a 'little Paris' thanks to its cosmopolitan touch and green spaces. A substantial Jewish population (247 individuals in the 1950s), who sometimes invested their money in livestock via sharing agreements with pastoralists, largely took care of exporting live sheep to France (Paskoff 1957). Most of Morocco's Jews (a 240,000-strong minority at independence in 1956) gradually emigrated to Israel and other countries over several decades; their numbers dwindled from 105,000 in 1963 to 35,000 in 1971 and 8,000 in 1987 (Laskier 1990), and there is no Jewish community left in 'Ayn Bani Mathar today, occasional visitors notwithstanding.

The town's first coffeehouse, *Le café du commerce*, was founded around 1910 or 1920 and still exists today. In the 1960s, people would come here and play pool billiard or watch television on the first TV set. The café has also served as headquarters to the local soccer club. Even back in the 1920s, when French troops and administrative personnel resided in the town, 'Ayn Bani Mathar's commercial function for the region's nomads was central. An observer noted at the time that 'the chief sheep market of the Moroccan high plateaus is Berguent, a small center that has rapidly developed' (Célérier 1927, 464, my translation).

The name of this little town provides an instructive story about words (which can of course be analyzed as actor-networks) and the assemblages they become involved in as they shift or persist over time. Historically, this fertile piece of land in the middle of the steppes was known as Ra's al-'Ayn or simply Al-'Ayn, which means '(head)spring' and is a common toponym throughout the Arabic-speaking world. The attribution to the local tribe of Bani Mathar was later added to it (Birhab 2004).

French General Hubert Lyautey, who forayed into Morocco coming from Algeria in the first decade of the 20<sup>th</sup> century, decided to rename the strategically located outpost, as he had done with other localities before. Officially, he asked for reinforcements to contain the rebellious warlord Bu 'Amama and protect several tribes allied to the French, among them the Bani Mathar. In reality, Lyautey was planning a 'stealthy penetration of Morocco' (Lyautey

1937, 81, my translation). In this context, he proposed the creation of the first permanent French post to secure the border. Despite some severe policy disagreements (Munholland 1968), he went ahead and established the outpost at the end of June 1904, specifically 'at a point of the Sharif valley that should diplomatically be called Berguent, but that in reality belongs to Ra's al-'Ayn' (Lyautey 1937, 77–78, my translation). The idea behind using a different place name was to pass the site off as Algerian territory toward the government in Paris (Porch 1986). Thus, 'Ayn Bani Mathar became one of the first points where French troops established a permanent presence in the sharifian sultanate, followed by a chain of events that would eventually lead to the establishment of a protectorate eight years later. In a letter to his sister, Lyautey wrote on July 6, 1904:

'Ra's al-'Ayn is, besides, a marvelous spot, — I just came from there — superb waters — I bathed and swam — some trees, and cold nights.' (Lyautey 1937, 77, my translation)

He further explained his strategy:

'We are not conquering Morocco at all and I am conducting this business with the prudence of a snake, but it is a leap forward of 100 kilometers, and a perfect base of operations for the day that we will decide to do something' (Lyautey 1937, 77, my translation).

The name Lyautey chose, Berguent, was supposedly inspired by a Berber word meaning 'black' that had referred to a nearby part of the Wadi Sharif valley. While this origin is questionable, the new name established itself in the local parlance alongside the older ones. It was, however, adapted over time to better suit Arabic pronunciation patterns and thus became *Bargam*. One author has suggested, contrariwise, that 'Berguenn' (sic!) is a corrupted version of the real place name 'Berguem' (Paskoff 1957), but this seems to be based on a misunderstanding.

After Morocco's independence in 1956, the name was officially reverted to 'Ayn Bani Mathar, like other colonial denominations around the region. Examples from Morocco are much less numerous than those from Algeria, but include: Port Lyautey = Kénitra; Cap Blanc = Lagouira; Petitjean = Sidi-Kacem; and Louis-Gentil = Youssoufia (Malherbe 2008, 70). Since then, the names Berguent and Bargam have disappeared from official written documents. Yet, the people in and around town have kept using the name. Al-'Ayn is also frequently heard today, whereas Ra's al-'Ayn seems to have become quite rare (I only encountered it with elderly speakers) and the official name, 'Ayn Bani Mathar, is only used by educated individuals when dealing with outsiders. This parallel existence of official and vernacular place names is common across the Arab world and beyond.



Figure 34: Road sign, November 2011

Recently, the widespread use of the name Bargam (French spelling: Berguem) has led to it being included on direction signs in places a few hundred kilometers away, written in both Arabic and Latin characters. I took a picture of one such sign in Awtat al-Hajj at the western end of the high plateaus. As one gets closer to the town, this colloquial form disappears from signs and milestones and the official name is the only one visible. Yet it is conceivable that the vernacularized colonial name will eventually replace the official one on more street signs, maps, and written documents. The road sign, at any rate, contributes to 'authorizing knowledge' (Li 2007, 286), one characteristic step in assemblage making. It has modified the assemblage that is the name of the town and has shown it to be less stable than expected.

Looking at the population that makes up this place, the town center has long been a melting pot for people of different origins, and Bani Mathar tribesmembers are a minority – while representing the dominant group in most of the villages nearby. In addition, the weekly market of 'Ayn Bani Mathar has a catchment area well beyond its immediate surroundings. Throughout history, this town has often been the gateway for innovations whose effects then started spreading out into the steppe. For instance, the first pharmacy in 'Ayn Bani Mathar opened in 1982 or 83; there had been a simple dispensary before. Today, there are six pharmacies in the center and another two in Hayy al-Ziyani. The tenant of the oldest drugstore, *Saydaliyyat al-Shih* (Wormwood Pharmacy), recalls the old days:

'In the beginning, people trusted the pharmacist a lot. When they came to the pharmacy it was like going to the doctor. When the pharmacist gave them some medicine, they would go home confident and relieved. Later, as things developed and the town became more crowded, medical specialists came.' (Interview with pharmacist, 'Ayn Bani Mathar, June 1, 2010)

Medicine plays an important economic role for many families, nomads and non-nomads alike. In my survey, two fifths of all households are burdened by regular health-related expenses, usually for various forms of medication. The average expenses amount to 313 dh per month for these families, about five daily wages for an unskilled laborer or one third of a sheep.

Unlike the more distant past, money is now an integral part of most economic activities in the region, even for nomads in the steppe (Rachik 2009). In urban Morocco, consumerism has reached unprecedented levels, as private banks increasingly offer credit lines to their customers. They try to reach more and more families, targeting specifically middle and working classes, with consumer loans and credit cards. Such activities have multiplied since the 1990s, when the banking sector was widely deregulated (Benjamaa 2015). One urban advertising campaign I noticed relates to the rural world of sheep producers: in the weeks leading up to *'id al-'adha*, the festival of sacrifice, a bank advertised on billboards in Moroccan towns. The slogan read in colloquial Arabic: *'Ila bghiti hazwi smin / khud lik kridi zwin'* (if you want a fat ram, take out a nice loan), encouraging family heads to purchase a prestigious, high-priced sacrificial animal even if this means getting into debt. This general approach to sacrifice is not new; in one incident described in 1927 by writer Jules Borély, a destitute servant 'pawned his mother's silver bracelets in order to sacrifice on 'Id al-Kabir' (Holden 2009, 165). In precolonial times, poorer urban families had more typically pooled their resources to buy a common sacrificial ram (Holden 2009). While most residents of 'Ayn Bani Mathar either keep sheep themselves or can easily obtain one from a relative, banks have started touting loans to them for other purposes.

In the rural municipalities that composed my sample, most large-scale, exceptional private investments in the previous five years went into operations and medical expenses (55 households out of 465), house construction (28), or the purchase of tractors (15), cars (11), or trucks (8). Livestock, land, the drilling of wells, and the purchase of a work contract for Spain are also mentioned more than once. The amounts invested range from less than 3,000 dh for medical operations to over 300,000 dh for real estate. Naturally, the average volume of investments significantly increases with wealth (as per my calculated index). Herd size, nomadism status, age of household head, and municipality do not display similarly evident correlations with this indicator. As for the funding sources, most of these investments are self-financed (84%) and/or enabled by private loans (23%). Bank loans are still very uncommon (4%), and no more than seven households in my sample (2%) are members in a credit association: the state-owned *Crédit Agricole*, the country's largest microcredit provider *Al Amana*, or the regionally based *Al Karama* association. This rate seems low given the fact that Morocco has become a regional leader in the propagation of formal microfinance institutions since they were first introduced in the Middle Atlas in 1993 (Allaire et al. 2009), but may be seen as an indicator of the political and economic marginality of the high plateaus.

In summary, the town of 'Ayn Bani Mathar fulfills many functions for the northern part of the Moroccan high plateaus and for the nomadic, former nomadic, and sedentary people who live there. Not least, 'Ayn Bani Mathar is an integral part of drought assemblages – it provides resources to mitigate the harmful effects of drought, and it accommodates those who have had to give up pastoralism due to drought conditions. As a social melting pot, the town has for a long time brought together different actants, human and nonhuman, and

served as a gateway for innovation. Newly emerging forms of consumerism have become hallmarks of an accelerating urbanization process. In the next chapter, I will take a closer look at the development of taste as a form of social distinction in this context, focusing in particular on young people and the generational social transformations they are a part of. As the last element in my drought assemblage, this analysis also serves as an outlook, as an attempt to fathom what kind of community drought may be confronted with in the future – and how this may transform drought itself.

### 3.6 Social Distinction and Generational Shifts

At an advanced phase of our fieldwork, my team and I were keen to find out what it was like growing up in the high plateaus today; a group of adolescents we met in ‘Ayn Bani Mathar provided answers.<sup>11</sup> Rachid, an energetic eighteen-year-old who wears a Real Madrid jersey and stonewashed jeans, has grown up here. In his spare time, he plays music in a band that he started with his friends, Abdelkrim and Youssef. Seated in the garden of a café, the three young men talk about their experience (the following quotes are all from our interview that took place in ‘Ayn Bani Mathar on June 4, 2010).

Through their story, I would like to address phenomena of urbanization that are currently visible in this rural region close to the Algerian border, and that are partly driven by drought. Urbanization expresses itself, among other things, through a change in consumption habits: the clothes you wear, the music you listen to, and the way you celebrate your wedding have all turned into opportunities to develop and display your taste.

Rachid, Abdelkrim, and Youssef’s band, which is made up of about ten high school and college students, was formed in 2008. Rachid had the idea to start his own musical group while he played in another orchestra. But the young musicians hardly care about vernacular music, the *‘irfa*, or interpretations by the *shuyukh*, the local singers. Instead, they practice and promote the *daqqa murrakushiyya*, a popular music style that originates in Marrakesh in southern Morocco. Rachid explains: ‘We had seen it elsewhere, in Oujda, in Meknès, in the west of the country. I said to myself: why not introduce it here at home?’ Their inspiration, thus, comes from other parts of Morocco that are easily accessible to these young people. In addition, there are practical considerations behind their choice: to make *raï* music, for instance, is expensive because it requires a lot of material, according to Abdelkrim. *Raï* is a style that evolved in Algerian cities, notably in Oran, and probably has precursors in pastoralist musical practices (Asensio Llamas 2002). It is very popular in northeastern Morocco, and CDs are readily available on the market of ‘Ayn Bani Mathar.

In the northern high plateaus, the three young men were the first to introduce the *daqqa*. There are several groups in town, however, who perform the traditional *‘irfa* music, and one that specializes in Islamic anthems (*nashid*). This latter group is close to Islamist movements

---

11 The material presented in the first part of this chapter has been published in French (Kreuer 2015).

which the young men refer to as *ikhwan* ('brothers,' a reference to Egypt's Muslim Brotherhood); explaining this, Rachid signals a long beard with his hand and laughs. That group recruits young people in town, but 'they rather stick to themselves.' A certain diversification, maybe even competition in the local scene of leisure activities becomes evident here.

The existence as musicians is narrowly linked to weddings, which represent the ideal occasion to appear in public and earn some money. According to my interviewees, the opening of a first wedding hall in 2007 has spawned an entire business sector in 'Ayn Bani Mathar. The hall's owner is a former livestock producer from the region who lives in France and only comes home during his summer vacations; and weddings are usually celebrated in the summer. Female wedding planners (*naggafat*) can now be found in town, an unknown profession just a few years ago. The idea was imported, according to Rachid and his colleagues, from Oujda, the capital of the region, which is separated from the High Plateaus by a mountain range. Moreover, there are now four or five women's hairdressers and even a vocational school for female hairdressers, a caterer, women who work as cooks, and our young musicians who no longer play the traditional melodies. The youngsters have even printed their own business cards which they hand out during their engagements besides distributing them to retail stores in town so they do not miss a potential client.

To the question whether people like their kind of music, Youssef responds: 'There are some. We have to pass on this message. The *shuyukh* are very popular here; we try to change the mentality a little bit.' With this attitude, the youngsters inscribe themselves in a global dynamic of multiple transformations that touch the whole community; I have described them throughout this thesis. For some of the region's households, international migration offers an opportunity to gain a substantial non-pastoral income (ch. 3.4, p. 139), and many adolescents dream of a future in Europe. Currently, Spain is the first destination for the young men of the steppe, given its demand in seasonal labor force in the agricultural sector. Rachid notes, nevertheless, a certain disenchantment with emigration, which has spread notably since the financial crisis of 2008. A number of former emigrants nowadays prefer staying in Morocco and launching local projects. Expecting economic cycles to keep changing as they always have, an exiled poet who was born in 'Ayn Bani Mathar summarizes the prevalent feeling: 'Each season brings its share of hope and disillusion' (Bessedet 2005, 1, my translation).

Migration is also a concern for the young musicians, because the permanent emigrants who come home every summer for the wedding season do not just bring along money. They also seem to be open to new ideas – such as the *daqqa murrakushiyya*. 'We work with those from abroad,' Abdelkrim narrates:

'People here ask for 'irfa, *shuyukh*, and that's it. They are used to this thing. When we work, it's in July or August, when people return home from France, from Belgium. We work with them, that is to say two or three months a year, that's all.'

The innovation that Rachid and his friends have introduced was first accepted by migrants and young people, who possibly see it as a means to distinguish themselves from the older generation.

The young musicians are integrated, from many perspectives, into globalized networks of consumption and identity construction. Like almost everywhere in Morocco, there is an internet café in every neighborhood of the small town. Even in the rural municipalities where I conducted my survey, outside the town itself, 87% of all households owned one or several cell phones in late 2009. High school students in 'Ayn Bani Mathar rely on Wikipedia for doing their homework, follow the latest national debates on Facebook, and find it very natural to enjoy the *daqqa* which has, historically, nothing to do with the region.

This does not necessarily imply a social rupture, however. Our three young men know the traditions of their respective tribes well, exemplified by wedding rituals which they are able to describe in detail. They respect these traditions and do not behave like rebels. Nevertheless, they try persistently to establish new elements in their surroundings, to enroll new actors in their personal assemblages. The tribal context, for example, becomes insignificant in their group. Life in town brings tribes and lineages closer to one another and mixes them, and music unites them.

However, music can also create divisions when tastes diverge. 'Young people are into *raï*,' Abdelkrim states, whereas Rachid prefers rap and *sha'bi* music. Youssef, in turn, rather listens to Western music in addition to *raï*. But there is some ambivalence: *raï* is associated with the consumption of alcohol, admits Abdelkrim, and is hence 'not appropriate here.' Moral questions like this are inescapable when you live in a small community. This also concerns the relation between genders. None of the three young men indicates having a girlfriend. The high school is the only place where boys and girls are able to meet, according to Abdelkrim. He gives evidence of a gender dimension in musical habits: girls listen mostly to Egyptian, *Khaliji* (from the Gulf states) and Lebanese singers, which boys hardly take seriously. In this way, the young steppe dwellers develop their individual tastes which create distinctions between them. It does not seem reasonable, given the newness of such trends and the limited size of the community in question, to identify distinct social classes. Nor was I able to spot subcultures as they can be found in larger cities across the Kingdom. But they may well become visible in the future.

Another field of distinction that offers itself to the young people is fashion. Rachid's stonewashed jeans are not a coincidence; he has selected them with care in order to be properly dressed. In this context, it is instructive to compare townspeople with those who live in the steppe. They are connected by family ties, but live in very different worlds. Rachid explains: 'My grandfather's tent is out in the steppe and I go there on a regular basis.' There are also some cousins, of the same age, over there. Their attitude with regards to fashion styles is quite different:



'And in terms of clothes... For example, you bought some neat pants and you take them to the steppe. He'll ask you: how much were they? And you tell him: 20,000 frank [=200 dirhams]. He cannot endure it, he will tell you: I buy used pants for 2,000 frank and they serve me for an entire year. He doesn't know the brand, nothing at all.'

Another time, a pair of sports shoes turned into a social actor that made a difference, thanks both to its inherent distinction-marking propensity of a capitalist consumer good and to Rachid's efforts of saving money, finding, and buying them:

'I took some sneakers I had bought to the steppe. I had bought them for 65,000. [My cousin] got up and wouldn't sit with me anymore. For 50 or 60,000, he'll clothe himself for five years.'

Thus, a clear separation between town dwellers and steppe people is being drawn, at least in the mind of Rachid and his peers. When they muse about the reasons for change, the young musicians cite the motif of imitation. No matter how dramatic social change might appear from a distance, the transformations usually operate without producing any spectacle; they accumulate from day to day through mundane practices. The emigrant who opened the wedding hall, according to Rachid, quite simply

'thought: there is no hall here, and he built one. He had livestock, sheep, he was well off, and he loved the steppe. When he went to France, he started imitating others. People do nothing but imitate. Like ourselves with the band: [...] there is something new, the *daqqa*, and we wanted to do that, too.'

Imitation and slight variation are rather effortless, yet powerful ways of promoting change, quite in the sense of Jullien's silent transformations (Jullien 2009). Another recent change follows a similar logic: some high school students, 'those who are developed' according to Youssef, have started celebrating their birthdays with a party. The concept of development is frequently invoked in conversations, even though some older people resent the changes. A public scrivener concedes that 'the young people manage to pass their time' thanks to new information technologies, but 'they do not learn anything useful anymore' (Interview with scrivener Idris, 'Ayn Bani Mathar, June 5, 2010).

In spite of this nostalgia by some, new social categories are establishing themselves in the community. In former times, you basically had to count someone's sheep in order to deduct their social status; in the twenty-first century, you rather have to distinguish between migrants and non-migrants, townspeople and inhabitants of the steppe, and even between the adherents of different styles of music, if you really want to understand this society in transformation. The desire to distinguish oneself from others may be ancient and universal, but the various forms this can take and the opportunities that are available to young people in 'Ayn Bani Mathar today are quite recent and keep proliferating.

The names given to newborn babies are another potential indicator of shifting trends and fashions over time. In the tribal community of eastern Morocco, local preferences for male

and female first names may have changed across generations; I produced naming charts to have a look at this. Since my interviewers wrote down the names of all household members, a list of over 3,000 persons with hundreds of different given names (which may include multiple spelling variants of the same name) is available, even though a number of men preferred not to disclose the names of their wives. The most popular female names are, overall: Fatima (or Fatna), ‘A’isha, and Khadija – names of daughters and wives of the prophet Muhammad. For males, the three most common names are Muhammad (as in many Muslim countries), Ahmad, and ‘Abd al-Qadir. But when compared across age groups, more fine-grained naming trends can be discerned (Table 21). While Fatima and Muhammad remain unchallenged at the top, other popular names come and go with the decades. However, naming fashions seem to change more quickly now than they did a generation ago, and this can be interpreted as another sign of increasing individualism and distinction.

Born in the 1940s	1950s	1960s	1970s	1980s	1990s	2000s
Fatima Zahra’ ‘A’isha	Fatima Zahra’ ‘A’isha	Fatima ‘A’isha Zahra’ Rashida	Fatima ‘A’isha Karima Miluda	Fatima Karima Fatiha Samira	Fatima Khadija Fatiha Bushra	Fatima Khadija Fatiha Hajar
Muhammad Milud Ahmad Bu’alam ‘Ali	Muhammad ‘Abd al-Rahman Ahmad	Muhammad ‘Abdallah Ahmad ‘Abd al-Rahman Jum’a	Muhammad Ahmad ‘Abd al-Rahman	Muhammad Ahmad ‘Abd al-Karim Rashid ‘Abd al-Qadir	Muhammad Ahmad ‘Abd al-Karim	Muhammad Hamza Yusuf

Table 21: Most popular names per decade for girls and boys

To test whether there are other differences between older and younger generations, I looked at my survey data through another lens: namely, by grouping together those families whose household heads have similar ages. These cohorts obviously occupy different positions in the reproductive cycle, so certain differences in wealth and demographics can be expected. Some characteristics, however, may indicate larger social transformations. I chose fifteen-year intervals in order to obtain a manageable number of categories and a reasonable number of cases per category. The four groups I distinguished, along with some of their characteristics, are displayed in Table 22.

The expected differences include the average number of household members which increases with age. A large number of wealth indicators also strictly follow the age gradient: the existence of migrants in the larger family; possession of an animal stable and a truck; land holdings, both in terms of prevalence and of surface area; and the ownership of a solid house. All those things tend to accumulate the older you get. In addition, they may have been more easily accessible in the past, when pieces of land, for instance, were more abundantly available for private appropriation (see the discussion in ch. 2.4, p. 72). Membership in PDPEO-created rangeland cooperatives, which I earlier interpreted as a sign of influence and social capital, is much more widespread among the older generations of household heads, too.

On the other hand, the proportion of livestock producers is similar across all four age cohorts, concerning four out of five families in my sample. Their average herd size fluctuates widely, but is actually highest among the second youngest group: household heads between 35 and 49 years of age. At the same time, this group has the highest share of families who have never been nomadic (over 50% in this category). Apparently, most stories of a successful transition from the old ways toward a modernized, sedentary, entrepreneurial livestock production model can be found among these men under 50.

The youngest age cohort, those who have just recently founded their own families, generally start out in the worst economic situation, judging from these indicators. As their parents are typically still alive, inherited wealth plays no role at this stage. Strikingly, the proportion of nomadic households is highest among this group (36%). Does this mean that the much-lamented decline of nomadism is about to stop, as more and more young people get ready to move again? Or will they switch to an urban lifestyle once they have saved some money to build a house and their children have grown old enough to go to school? The bulk of my observations points at the latter option as the most likely pattern – but nomadism is not predominantly an old people’s affair, at least for now.

	Age <35 N=63	Age 35-49 N=167	Age 50-64 N=145	Age 65+ N=88
Members in HH (mean)	5.7	7.1	8.6	9.1
Migrants in family	46%	49%	59%	66%
Co-op members in family	13%	23%	38%	38%
Have sheep	78%	80%	83%	83%
Herd size (mean)	110	180	153	165
Have a stable	37%	42%	46%	60%
Practice fattening	77%	70%	69%	60%
Own a truck	10%	14%	25%	28%
Own land	64%	74%	86%	93%
Land owned (mean hectares)	8.1	20.8	21.9	32.1
Own a house	59%	65%	70%	82%
Nomads	36%	22%	22%	24%
Former nomads	21%	26%	43%	58%
Non-nomads	43%	52%	35%	18%
Children should take up same profession = yes	12%	15%	27%	43%

Table 22: Generations and their characteristics

There is one domain where the younger family heads are consistently more engaged than the older ones: the fattening of livestock. This practice, which did not play a large role before the advent of trucks, troughs, and supplementary fodder, has been adopted most willingly by

younger generations. In all likelihood, this can be taken as a gradual change in livestock management mentalities in the high plateaus of eastern Morocco.

The final part of my survey questionnaire dealt with the respondents' outlook to the future – the future of their family in particular and pastoralism in general. Asked whether they would like their children to take up their parents' profession, 43% of the oldest cohort answered in the affirmative. While this may already appear like a low percentage, it drops even more among the younger generations, down to a dismaying 12% among the youngest group of adults. Granted, the older you are, the more likely it is that your children have already chosen a profession, so the question may not be applicable any more for the oldest cohort. All the more so, this complete lack of perspective and esteem for their own profession paints a rather bleak picture for the future of pastoralism in this part of North Africa – at least in its current forms.

Those who preferred different occupations for their children were asked what they would like them to become. A quite typical answer across all categories is the very modest statement: 'I want them to be at ease' (Interview with Abdelkader, Awlad Sidi 'Abd al-Hakim, June 3, 2010). The pastoralist reality is often described as hard work that does not pay off. Overall, the largest fraction of parents in my survey would love their offspring to become state employees, mirroring a preference for a stable income displayed by most 'poor people around the world' (Banerjee and Duflo 2011, 226); the second favorite is a commercial activity. This sector does not play any role yet, as Table 23 shows: across the generations, just one percent of all incomes is generated by trade activities.

	Animals	Crops	Wage herding	Wage labor	Trade	Independent	Rents	Pensions	Supports	Nat'l remittances	Int'l remittances	Others
Age <35	61	6	7	18	1	4	-	1	-	-	2	-
Age 35-49	58	4	8	23	1	3	-	-	1	-	2	-
Age 50-64	64	4	4	17	1	4	-	1	1	-	5	-
Age 65+	70	4	-	11	1	-	-	3	3	1	7	-

Table 23: Income sources (mean percentage) by age group

The 35-49 age group, the one preponderantly consisting of non-nomads, stands out as the generation with the lowest reliance on livestock and the highest share of wage labor as a source of income. Employment as a shepherd for someone else, generally considered a sign of poverty, is also most important among the younger household heads. The oldest generation of families, on the other hand, overwhelmingly relies on animal production, but also on transfer income from pensions, social assistance programs, and remittances. Newer generations increasingly unlock other income sources as salaried employees or as self-employed,

independent professionals outside the sphere of livestock. Rents from real estate and the like play no role at all in these rural municipalities, however, although the picture probably looks different inside the town of 'Ayn Bani Mathar, which was not covered by this survey.

Some items in my questionnaire are not correlated to age groups at all, notably the respondents' satisfaction in different fields and their opinions on a number of controversial issues. Moreover, the four wealth categories calculated earlier (ch. 3.2, p. 117) are spread across the generations in a fairly even manner. Thus, the accumulation of wealth over a lifetime, suggested by the indicators mentioned above, cannot be taken for granted for all families.

A direct relation between drought and generations emerges from my survey data, adding another link into the assemblage. Responding to an open-ended question, many interviewees identified drought as the biggest negative change that had affected them in the past 15 years. Their proportion climbs from 13% in the youngest age bracket over 22% and 31% in the middle-aged groups to 36% among the most senior family heads. Those who have the longest experience looking back, in other words, find drought to be the most important agent of change. Several studies in the US found that 'more experienced producers were more accurate in their expectations' regarding drought hazards (Woudenberg, Wilhite, and Hayes 2008, 99), which is probably true in Morocco as well. The finding that younger generations do not consider drought as an outstanding problem confirms that drought has become less of a remarkable event and more of an omnipresent reality. Their shorter horizons of comparison may not include a prolonged absence of drought. On the other hand, drought never affects every community member equally in their experience; so the young adults may feel better adapted and less vulnerable to the hazard individually.

Even if drought has not substantially changed over the centuries, it now meets a different society that has developed a variety of responses and protection mechanisms, relying on new technologies and livestock production strategies. These changes have accumulated over time. They are not radical ruptures with past conditions and practices – rather, they operate as silent transformations and gradual shifts. To understand the contemporary meaning of drought, it is therefore essential to analyze the tribal community and everything that goes on in it. With the open-mindedness of an actor-network theorist, surprising actants, connections, and assemblages come to light: even the appearance of a vocational school for female hairdressers in 'Ayn Bani Mathar and the emergence of a market for feminine beauty can be linked to drought! Not only is the shift away from nomadic pastoralism and toward urban lifestyles heavily driven by economic necessities imposed by drought. Wedding ceremonies also tend to be celebrated with much less extravagance in dry years, or they are postponed altogether. As Bilal, the meteorologist, puts it:

'When it rains a lot, there are many weddings.' (Interview with Bilal, 'Ayn Bani Mathar, November 2, 2011)

Drought phenomena, the interests of sheep and goats, invisible beings, and shifting consumption patterns within the tribal community of the Moroccan high plateaus continue to be inextricably intertwined and should therefore not be studied in isolation. The tribal community interacts with drought in countless ways, and they keep slightly – but unremittingly – modifying each other.

## 4 Interpretation and Reflection: The Meaning of Drought

To complete this journey through the complex and delicate drought networks of the eastern Moroccan steppe, I will discuss my findings and conclusions in this final part. As signaled in the introduction, this study's empirical insights into the pastoral community of the Moroccan high plateaus constitute my most fundamental contribution to scholarly knowledge. Secondly, I have endeavored to forge a new connection between actor-network theory and assemblage thinking on the one hand and Middle East studies on the other. I will discuss, thirdly, several political implications of this approach. Finally, beyond the confines of a single discipline or geographic region, I will outline a fresh epistemological perspective on highly relevant, but too easily taken-for-granted and punctualized phenomena such as drought. In this final part of my thesis, I will address these four aspects in turn, and evaluate the lessons learned during my pursuit.

In a time of accelerating climate change, a full understanding of drought is perhaps more urgently needed than ever before. But drought has accompanied humankind from the very beginning and may even be considered 'an integral component in the evolution of humanity' itself (Heathcote 2013, 62). My fieldwork region is a case in point, and drought 'has been the leading natural hazard in Morocco since the earliest historical times' (Swearingen 1992, 403). In this light, my thesis is also an attempt to answer the call made by an Australian drought expert:

'The scientific study of drought cannot be left to the natural scientists alone; social scientists have a similar and vitally necessary contribution to make.' (Heathcote 2013, 264)

A specific contribution of the social sciences to global knowledge about drought makes sense in another regard, too. I would argue that my research helps discredit the dualistic division between *nature* and *society*, which is no longer justified in the Anthropocene, the current period in which humanity has become a geological force. Instead, we should focus on understanding the one *world* we all are in (Latour 2017). My study can thus provide a modest contribution to 'the development of knowledge systems that better expose the range of human and nonhuman materialities involved in the worlds of pastoralism' and beyond (Gertel and Le Heron 2011, 330).

The answer to my research question – What is drought? – cannot be summed up in two words or sentences. Fundamentally, this entire text is the answer. It is my own fragile assemblage that will need a combination of efforts by myself and others if it is to survive and become more stable. What I hope to have shown is that a surprising array of human and nonhuman actors appears once the 'black box' of drought is opened. These actors are all linked to drought in one way or another. The assemblages they try to build, stabilize, and hold together to further their various particular interests often involve drought as a central ingredient; in turn, they perpetually redefine drought itself, ever so exiguously.

## *4.1 Empirical Insights: Rural Morocco and the State of Nomadism*

The transformations that are currently reconfiguring collectives in the northern high plateaus have parallels in other parts of rural Morocco. As part of a research team, I was able to study them in the High Atlas in 2009 and again in 2012 (cf. Breuer et al. 2012). Once considered an important livestock-producing region, the economy of the Asni municipality there has principally switched from a combination of subsistence agriculture and transhumance to market-based fruit production. The nearly complete disappearance of pastoralism sets that region apart from the high plateaus, as does the mountain tourism that benefits considerable portions of the village communities in the High Atlas. While initiatives to promote either tourism or irrigated farming do exist in the steppes of the east, they remain embryonic and will not achieve a comparable presence in the near future. Other developments are identical in both regions: wage labor is becoming the dominant form of income-generating activity, infrastructure networks (roads, electricity, communications) are being upgraded at a rapid pace, and local lifestyles have started gravitating toward urban modes of consumption and distinction. The somewhat stronger diversification within the local economy in Asni goes hand in hand with an increasing wealth differentiation among families and a growing exposure to global market fluctuations (Breuer et al. 2012) – consequences that may be expected for the high plateaus if social and economic policies fail to keep such trends in check (ch. 2.7, p. 94). A key difference between the Atlas and the steppe concerns the role of labor migration, which is much more pronounced in the high plateaus, especially in its seasonal form. As shown above, the income thus generated has in part been reinvested in the livestock business, making this sector more resilient to change in the short term.

My fieldwork in the plateaus showed, in general, that any social reality is extremely complex and dynamic, even within a small and quite homogeneous rural population. The individual chapters provide examples of how specific variables are able to capture aspects of this variation, but also make clear that there is no single criterion that explains a large number of them. In my analysis, this is due to the diversity of assemblages put together by each household – the multifarious connections between each family and a spate of human and nonhuman actants. The two main categorizations I relied on are based on nomadic mobility on the one hand and tribal affiliation on the other. While certainly valuable for an appreciation of this community, both have clear limitations.

Nomads, former nomads, and non-nomads often have similar lifestyles, regardless of the question of household mobility. Wealth statuses, moreover, cut across these categories, and social identities are more closely linked to tribal affiliations. Even the meaning of tribes has started eroding where urban consumption patterns offer new opportunities for distinction; but the four municipalities still exhibit some obvious differences regarding their inhabitants. This is a central outcome of my 2009 household survey. In the following paragraphs, I will briefly reiterate what stands out, statistically, about each municipality, going from west to east (cf. Figure 5, p. 46). On an aggregate level, these findings illustrate the different options



people may have when they encounter drought. Such tendencies and patterns would have been harder or impossible to detect if I had just collected and compared a few dozen individual histories; they also go beyond the information that has been available in the scholarly and administrative literature so far.

Awlad Ghuzayyil has the highest percentage of nomadic families in my sample. Cases of newly settled or only-ever-sedentary households are relatively infrequent, making up about one-fourth each. The intuitive impression that this is the most archetypal of the four communities is corroborated by the fact that its members have the highest percentage of relatives who still practice the steppe lifestyle. Awlad Ghuzayyil residents can view the highest number of tents from their current home. The average family size is the largest of all four municipalities, conforming to the image of many family members living under the same roof. Regarding other indicators such as wealth, education, or general satisfaction with their livelihood circumstances, these pastoralists fall on an intermediate position. While electric household appliances are less prevalent, the rate of truck ownership is highest in Awlad Ghuzayyil. Trucks are essential not least because of the peculiar spatial setup of this community: many families live far away from sources of drinking water, the average distance being higher than anywhere else. While pastoral production is also dominant in the three remaining municipalities, the feeling that ample empty spaces are available for grazing decreases as one moves eastward.

Murayja, whose residents belong to the same overarching tribe as Awlad Ghuzayyil, is home to the region's largest nucleus of urbanization outside 'Ayn Bani Mathar. The settlement of Murayja has been growing consistently, as has the overall population (Table 25, p. 163). In this municipality, the proportion of emigrants is highest; they clearly constitute a source of wealth. This wealth is reflected both in conventional measures (such as the livestock head count, where Murayja comes second after Awlad Ghuzayyil) and in more up-to-date ones (my wealth index: ch. 3.2, p. 117). Overall, residents of Murayja profess the highest satisfaction with their economic situation, and they include the wealthiest households in my sample. They also own the highest number of cell phones per household. Individual cases of impoverishment notwithstanding, the pastoral economy has been successfully complemented by wage labor, and living standards have consistently improved in the view of many survey respondents in Murayja.

Bani Mathar: In the 1950s, this tribe was described as semi-nomadic, i.e., mobile during part of the year only, and thus as distinct from the surrounding communities (Paskoff 1957). This trend has further increased in the villages and hamlets since, facilitated by the proximity to the urban center of 'Ayn Bani Mathar. Thanks to this innovation hub, Matharis also benefit from expanding infrastructures earlier than the other rural residents. Their reliance on the public electricity grid is highest, and they have the highest share of tap water availability. Access to schools, hospitals, and markets is considerably easier. Among my sample municipalities, Bani Mathar has the highest diversity of professional activities. They are locally

based, however: the proportion of emigrants is lowest here. Yet, cosmopolitan attitudes are developing, as illustrated by the story of the young musicians in the town center (ch. 3.6, p. 150). The tribe as a point of reference is least important in the Bani Mathar municipality today (Table 9, p. 107), as other facets of individual or collective identities are emphasized more strongly.

The Awlad Sidi 'Abd al-Hakim territories are situated next to the Algerian border. A feeling of constriction and enclosure runs strong here. This is in stark contrast to a description from the mid-1990s, when this community seems to have been 'characterized by strong nomadism, active speculation, encouraged by the proximity of the border, and the practice of fattening' (Lazarev 2008, 14, my translation). A later analysis by the PDPEO project staff agrees with the last point, the high reliance on feed supplement, but explains this observation with the small amount of available rangeland per animal. While the livestock production systems of the other three municipalities are categorized as 'semi-extensive' in that report, that of Awlad Sidi 'Abd al-Hakim is therefore labeled 'semi-intensive' (DPA Figuig 2006, 8). My survey found no evidence of notable cross-border speculation or nomadic mobility here. In fact, indicators of mobility and wealth are comparatively low in this community, including herd sizes. At the same time, the prevalence of wage labor and non-agricultural activities is lowest, which means that the interviewed families almost exclusively depend on livestock for income generation (91% of household incomes – compared to 82% in Awlad Ghuzayyil, 65% in Murayja, and only 41% in Bani Mathar). While the proportion of solar panels is highest in Awlad Sidi 'Abd al-Hakim, the overall electrification rate is lowest (ch. 3.3, p. 129). Given this combination of spatial restrictions, the lack of economic alternatives, and a disadvantageous infrastructural setting, this community's feeling of neglect and marginalization is completely understandable.

Focusing only on the differences in nomadic mobility, income diversification, and the resulting self-perceived well-being of households, the following table gives a crude summary of the four rural municipalities I studied. The ° sign denotes unexceptional values, while + and - indicate comparatively high or low levels. This is no absolute, global assessment, but merely an attempt to tease out internal differences. Importantly, mobility and diversification constitute two fundamental strategies to cope with drought. Their uneven distribution across the communities underline that a detailed analysis is key to a full appreciation of drought, even within a seemingly homogeneous landscape. A combination of high pastoral mobility and high diversification will, under the current circumstances, lead to the most stable assemblage of resources for a pastoral household and thus to the highest prosperity level. This corresponds to findings by my colleague Ingo Breuer: diversified households were less likely to be poor and vulnerable in his study area in the High Atlas (Breuer 2007a). Although the notion of well-being I introduced here is not synonymous with drought resilience, I would argue that they are related.

	Nomadic mobility	Economic diversification	Well-being
Awlad Ghuzayyil	+	◦	◦
Murayja	◦	+	+
Bani Mathar	-	+	◦
Awlad Sidi 'Abd al-Hakim	◦	-	-

Table 24: *Mobility, diversification, and well-being in the four municipalities*

With this rough characterization in mind, it is worthwhile having another look at demographic trends in the four municipalities. My 2009 survey took place exactly in the middle of the ten-year interval in which censuses are currently carried out in Morocco (2004 and 2014). In this time span, the municipality that offers the lowest level of well-being, Awlad Sidi 'Abd al-Hakim, witnessed a rather drastic population decline (Table 25). By contrast, the other three have grown substantially. The number of households has remained unchanged in Awlad Sidi 'Abd al-Hakim, while it has grown much faster than the overall population numbers in both municipalities of the Awlad Sidi 'Ali Bu Shanafa tribe. This indicates a shrinking average family size in all three municipalities – Bani Mathar is the exception here and has moved up, relatively speaking, from smallest to second largest family size.

	Awlad Ghuzayyil	Murayja	Bani Mathar	Awlad Sidi 'Abd al-Hakim
2004 (HCP 2007)	6,488 persons (819 households) ø 7.9 persons/HH	2,841 (453) ø 6.3	7,089 (1,152) ø 6.2	2,995 (401) ø 7.5
2014 (HCP 2015)	7,522 (1,074) ø 7.0	3,359 (581) ø 5.8	8,870 (1,469) ø 6.0	2,207 (392) ø 5.6
Change 2004-14	+16% (+31%)	+18% (+28%)	+25% (+28%)	-26% (-2%)

Table 25: *Demographic development of the four municipalities*

The developments in the four selected municipalities of the northern high plateaus also add some perspective to long-running debates about nomad-state relationships and the future of nomadism broadly speaking. Throughout history, pastoral populations have been seen as antagonistic to sedentary centralized states for a variety of socio-economic, political, and geographical reasons.

'Pastoralists' mobility give[s] them visibly less allegiance to individual national governments, and their refusal to form stable groups with which government can treat makes them seem all the less trustworthy. In addition, the arid and semi-arid zones where they operate are remote from centres of government and both inaccessible and expensive to administer.' (Blench and Marriage 1999, 8)

Imperial ideologies did their part to marginalize nomadic populations, whose mode of land use was seen as ineffective. Hence, nomads were often

‘regarded as legally non-existent. They were perceived as not being ‘civilised’ enough to have a right to occupy their lands. [This] ‘agricultural argument’ resulted in the belief that territories inhabited by nomadic peoples were empty and open to conquest or discovery.’ (Gilbert 2007, 688)

This view is clearly echoed in policies like the neoliberal Green Morocco Plan (ch. 2.7, p. 94) with its focus on increasing agricultural productivity and competitiveness. As yet, the steppe seems to resist overly easy conquest, but more and more infrastructures and technologies are enlisted to help modernize and tame it.

Over the past decades, numerous authors have wondered whether the end of nomadism has come (Humphrey and Sneath 1999) or have flat-out declared nomadism dead (Scholz 1999). In one such view, mobile pastoralists ‘are on the verge of extinction as a result of increasing restrictions on their right to use their traditional itinerant territories’ (Gilbert 2007, 714). While this rings true, at least in part, for the increasingly bleak situation in Awlad Sidi ‘Abd al-Hakim, my survey findings also provide a counter-argument: young household heads are nomadic more often than older ones. Even though the circumstances are changing, the story of nomadism continues in Morocco.

In the scholarly literature, the argument has even been made that rangelands and pastoralism will become more important in the coming decades, globally speaking.

‘In most of these areas, there is insufficient rainfall to sustain agriculture, and as a result grazing by large herbivores offers the only sustainable way to turn sunlight into food for people. Climate warming and tropical deforestation promises to expand these lands and, in so doing, will amplify the importance of grazing animals to human economies and to human well-being worldwide.’ (Hobbs et al. 2008, 776–77)

If this is true, lessons learned from eastern Morocco should play a role in preparing other regions and populations for a nomadic future. For what it is worth, the situation in the high plateaus today is less prone to societal conflicts than that in other world regions – at least, there are no issues with competing ethnic groups. Such a constellation would inevitably add complexity to drought dynamics and everything else, as the number of powerful actors and potential alliances would increase.

In an exploration of the ‘political field’ of land use negotiations in eastern Morocco, I concluded: ‘Simple nomad–sedentary or tribe–state dichotomies are useless and misleading’ (Kreuer 2011, 66). One way out is offered by the actor-network approach – taking a step back and unpacking punctualizations – which I have used as the starting point for this study. My empirical survey data have consistently demonstrated that societies consist of actors who can be positioned along all sorts of continuous gradients rather than subdivided into clear-cut, mutually exclusive categories. Various numerically measurable factors like sheep herd size, wealth ranking, age cohort, or geographical location reveal fault lines and divergent developments, but these are often subtle and unstable when taken in isolation. Actor-network theorists therefore ‘claim that it is only as a result of network-building activities that any stable

categories emerge – these do not precede the network’ (Murdoch 1997, 331). In other words, continued efforts of ‘forging alignments, rendering technical, authorizing knowledge, managing failures, re-posing political questions and reassembling as the ground shifts’ (Li 2007, 286) are required to keep categories meaningful. My study tries to do the same, but the assemblages I propose will only be able to make a difference if they are picked up, connected to additional actants, and thus stabilized.

In the next chapter, I will further explore how my findings relate to current global debates that involve drought as a central aspect.

## ***4.2 Drought Matters: For an ANTification of Middle East Studies***

Drought is an integral part of current debates on climate change, food security, and the Arab uprisings of the early 2010s. Insights from my study may possibly support, contradict, or expand certain standpoints within these three debates. After briefly addressing each of them, I will use the second part of this chapter to delineate the theoretical contribution my study will hopefully be able to make to the field of Middle East studies.

Regarding climate change, which is a proven fact despite persisting skepticism among certain segments of society (Latour 2017), Morocco is considered ‘the most vulnerable state in a vulnerable region’ (Schilling et al. 2012, 18) due to its high exposure and sensitivity on the one hand and low capacities for adaptation on the other. Climate models predict increasingly dry conditions in North Africa caused by shifting cyclone tracks (Schilling et al. 2012, 14), but these models are still unreliable and need further refinement. Meanwhile, profound knowledge from empirical case studies is indispensable to properly link such modeling results to the complex socio-economic assemblages existing in places like the high plateaus. In addition, intensifying climate change means that ‘current drought indices may no longer work properly in quantifying future drought’ (Dai 2011, 58). As I will argue in the next chapter, even the notion of drought itself may one day become obsolete, although this seems paradox in a situation of globally escalating drought hazards.

One of the latest attempts by the international community to address humanity’s most pressing challenges, after the preceding Millennium Development Goals had achieved mixed results, are the Sustainable Development Goals. They specifically mention drought in Goal 15.3, which also keeps the debatable idea of desertification (ch. 1.4, p. 38) alive:

‘By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.’ (UN 2015)

Drought itself is not problematized in that quote, but taken as granted. As I have shown throughout this study, simplified, black-boxed conceptualizations of this kind are doomed to falling short when dealing with complex phenomena. My case study should ideally serve as a reminder of this complexity for actors who formulate policies addressing Goal 15.3.

A related, but even more urgent concern on the global development agenda is food security. From a food crisis prevention point of view, the causes of a drought are much less interesting than the response – or absence of a response – to it (Devereux 2007), shifting the focus to policy (cf. next chapter). During my involvement in another research project on this topic, I have co-authored the following lines that summarize the nexus between drought, climate change, and food security in pastoral regions:

‘Drought-induced economic losses are seen as a major threat to global food security, particularly in drylands. The extent of this problem is predicted to increase with future climate change. Livestock systems are of particular concern in this regard. They make an important contribution to total food availability in places where crops cannot be easily grown, which is true for most parts of the world’s drylands.’ (Müller et al. 2015, 153)

Another team of authors points out ‘indications for a link between drought, food security and social instability in Morocco’ (Schilling et al. 2012, 21), making reference to the occasional, usually locally confined, food riots that have accompanied the Kingdom’s history. For any government, ensuring its citizens ‘access to affordable food [...] is particularly difficult in lands where drought is a constant threat’ (Holden 2009, 2), and Morocco is no exception.

Food riots, moreover, were pivotal in the build-up to the recent wave of popular protests in the Arab world known as the ‘Arab spring’ (Gertel 2014). That label has been used to describe a related string of events that started with protests in Tunisia and rapidly spread across much of the Middle East and North Africa. Governments were toppled, countless people were killed, and several protracted conflicts and wars were started in the aftermath. The outcomes were less drastic in Morocco, where street protests led to a number of political reforms, but left the monarch’s absolute power unaffected. Events in Syria took a much more horrifying turn. Although the degree of importance is a matter of debate (Châtel 2014), drought is widely seen as one of the triggers of the 2011 unrest – which subsequently evolved into a civil war and pushed millions out of the country. In Syria, prolonged drought periods in the 2000s were followed by a ‘mass migration of rural farming families to urban areas’ (Kelley et al. 2015, 3242). Combined with an earlier influx of refugees from war-torn Iraq and a history of misguided government policies, this drought-related movement of impoverished families helps explain the Syrian uprising (Kelley et al. 2015; Châtel 2014). And there are further predictions that the changing world climate will create massive amounts of climate refugees worldwide. In part, the potential effects of climate-induced migration and displacement may have been overestimated, however, as most cities grow rapidly with or without rural refugees – this growth itself being the more critical issue (Parnell and Walawege 2011).

A further aspect of the Arab spring is remarkable: more often than not, small rural towns were the epicenters of unrest. Sidi Bouzid in Tunisia, where one of the first, now iconic events that sparked the uprising – the self-immolation of a desperate young man – took

place, is located in a dryland region formerly dominated by nomadic pastoralism. The regional economy had shifted toward sedentary arboriculture and cereal farming, with livestock relegated to a complementary role, in the wake of rangeland privatization policies (Selmi and Elloumi 2007). Similarly, the Syrian uprisings were initiated in provincial towns like Deraa, Hama, and Homs (Châtel 2014). These settlements and their peculiarities need to be better understood by researchers and the wider public, and to be more adequately considered by national and international policy-makers. Without expecting universally valid explanations, 'Ayn Bani Mathar can nevertheless serve as a useful case study of how processes unfolding in rural towns across the MENA region can be captured.

The case of drought in eastern Morocco shows how unconventional scholarly approaches can be employed to generate useful insights that both deepen and broaden the knowledge produced in the discipline of Middle East studies, and offers new opportunities to connect it to other evolving academic fields. At least, this is my claim. But does the ANT way of doing things actually produce useful new assemblages of knowledge? Or does it perhaps merely mean telling the same stories with a slightly different focus? After all, more conventional scholarly accounts would possibly include most of the elements I have: drought, cars, sheep, young musicians, pastoral households, and free-trade agreements. The difference lies in their treatment: in most theoretical perspectives, these things would be parts of the scenery, the backdrop in front of which the play of human actors unfolds. This perspective is not wrong, but neither is it complete. It misses out on stories that should be told because they contribute to a better understanding not just of the play on stage, but of the whole theater, so to speak. Disregarding nonhuman actors and silent transformations may wrongly attribute agency to humans, portraying them as more powerful and independent than they actually are. Paradoxically, this disregard may also do the opposite – by positing the dominance of hidden power structures that demote human beings to hapless puppets of some sinister force (see next chapter). Actor-network and assemblage thinking, by contrast, sets out to reexamine punctualizations, discover new landscapes, and rearrange the configurations of the possible, to 'connect [...] empirically and theoretically rich arguments with new perspectives and insights' (Hammond 2017, 319). Whether this is feasible remains an open question to some extent:

'With luck, assemblages, sharply conceived, should open up new questions, as well as new forms of engagement, not merely tell us what we have known more or less all along. If it turns out to be the latter, then they are indeed likely to end up a passing intellectual fashion.' (Allen 2011, 156)

In the discipline of human geography, where the study and problematization of space currently is a core tenet, these approaches have been met with some reservation. While I have not strictly avoided the idea of local and global scales in this text, ANT puts it up for debate: after all, the local is not an isolated point, it can always be distributed as it is connected to distant actors. The global, in turn, can inescapably be localized and pinned down to concrete

places where interactions happen. More generally, geometric scales are a problematic notion in assemblage thinking and ‘the idea that actors move up and down them, or ‘jump’ them even, is somewhat misplaced’ (Allen 2011, 156). Consequently, ‘there is no zoom going from macro structure to micro interactions’ in social life (Latour 1999a, 19). A possible intersection with the kind of geographical analysis typically practiced in Middle East studies after the recent ‘spatial turn’ can be created by focusing on *places* (which are in turn characterized by connections) rather than *space* as ‘a grid within which and against which distances can be marked off’ (Hammond 2017, 320). Geographers of the Middle East could also reimagine space as consisting of ‘routes, nodes and connections rather than surfaces and frontiers’ (Buzelin 2005, 197) if they wanted to ANTify their approach. The pastoral landscape of eastern Morocco easily lends itself to such a description.

Apart from notions of space, actor-network theory and assemblage thinking offer complementary perspectives on sociological questions, which are often inspired by the work of Pierre Bourdieu in contemporary academia, even though this is less prominently the case in Middle East studies. Rather than structures and practices, ANT authors are interested in arrangements and agency (ch. 1.3, p. 30). Emblematically, Latour completely disregards social class in his analyses, ‘a variable and concept that remains central in Bourdieu’s work’ (Buzelin 2005, 201). The nomadic community of eastern Morocco, viewed through the lens of my survey data, corresponds to a society without distinct classes. Instead, there are provisional groups that can only be differentiated in disparate ways along specific axes and may always be overridden by new, surprising acts of connection assemblage. This does not mean, to be sure, that Bourdieu’s insights should be ignored or rejected in the future. My analysis of distinction (ch. 3.6, p. 150) directly refers to his seminal study of French society (Bourdieu [1979] 2013) and my fieldwork methods owe much to his groundbreaking work. But knowledge production can hugely benefit from the incorporation of new perspectives.

On a more practical level relating to my academic discipline, pastoral economies similar to the one I studied exist in various semi-arid and arid regions across the Middle East and North Africa. My findings and suggestions could be relevant to research on those communities – and to the people themselves – because they are confronted with similar challenges. Drought remains one of the biggest threats across the region. Two authors who aggregated data on natural disasters in the Arab world found that drought had ‘been responsible for the largest number of fatalities’ by far, with all other disaster events combined (including epidemics, earthquakes, and floods) accounting for less than seven percent of human lives lost between 1964 and 1990 (Al-Madhari and Elberier 1996, 28). Droughts had mainly occurred in North Africa rather than the Middle East. And yet, my study has also emphasized that drought seldom works in isolation; it only reveals its full detrimental force when it links up with other agencies. Seen from a structuralist angle, environmental change in the world’s rangelands has chiefly been driven by ‘a political and economic system that prioritizes pri-



vate property, sedentarism, and the generation of profit' (Sayre et al. 2017, 8) much rather than weather phenomena or climate change – or cultural factors, for that matter.

Over the centuries, scholars of the Middle East have often attributed presumptive characteristics of Muslim individuals or societies to their religion, and many people across the world do so today. Arguing against this idea, historian Stacy Holden claims that 'the economic system engendered by environmental conditions explains social and political conservatism in Morocco' much better than Islam does (Holden 2009, 8). I fully agree with this view. My study does not contribute anything to the question whether the nomads of the high plateaus would do things differently if they happened to be born into another religion. From my point of view, this is not a useful question at all, although other analysts may disagree.

In conclusion, I contend that actor-network theory and assemblage thinking are utterly valuable research tools for Middle East studies because they encourage holistic views beyond narrow disciplinary traditions. ANT's potential for crossing such boundaries and reconciling different approaches has been pointed out by several authors, even though it remains an open question 'whether a *single* perspective should attempt to embrace interdisciplinary thinking' (Murdoch 2001, 129). Nonetheless, increasing diversity and multiplicity of approaches is most certainly a positive thing in academic knowledge generation, as it creates new avenues for scholars to collect information and connect it. In fact, assemblage thinking and ANT enable researchers to find and follow surprising topics and actors – or to be found by them, in fact. As I mentioned in the opening chapters of this thesis, drought found me as much as I found drought – and we have both transformed each other, if ever so slightly, over the course of this mutual engagement.

### ***4.3 Policy Implications: The End of Drought?***

Understanding the ways in which drought is enrolled into different assemblages will help formulate policies that mitigate its adverse consequences for all actors, in the high plateaus and elsewhere. This discussion primarily targets the policy-making institutions that are currently most relevant for the nomad lands in eastern Morocco, viz., the various hierarchical levels of the *makhzan*, the central state, which is expected to define the legislative, judicial, and executive framework for all activities taking place in its territories. A few years ago, the FAO formulated a 'menu' of policy options for governments that try to protect and promote a sustainable livestock sector (Pica-Ciamarra, Otte, and Martini 2010), identifying domains of possible livestock-related interventions. While such frameworks can serve as a useful starting point, my approach is broader, because an exclusive focus on the livestock sector will likely not do justice to its entanglement with other economic and social activities. The discussion should, moreover, cover the policy-making that takes place outside the state apparatus – within international development organizations, at academic conferences, or between non-governmental organizations – and the ceaseless mundane interactions of humans and non-

humans in the steppe. Ultimately, who sets and implements a policy may be less important than what this policy actually entails.

As noted earlier, drought in Morocco is often termed a structural phenomenon, which I took to be another way of saying ‘ubiquitous.’ Perhaps more precisely, drought can be conceptualized as an *infrastructural* event that spreads through complex infrastructure networks involving reservoirs, water pipes, and water users; whenever their demands change, hence, ‘the calculus of drought changes’ too (Carse 2017, 905). This dynamic property of water demand is one reason drought management is by no means a trivial task.

However, the main purpose of the renewed understanding of drought that I advocate is not to find techno-political solutions for better disaster management in times of catastrophic drought. This would perhaps be a misguided approach – similar to emergency relief measures that treat the symptoms, but leave the underlying causes of a crisis unchanged or entrench them even further (Czuba, O’Neill, and Ayala 2017). The gist of this critique as it applies to pastoral regions is summarized in this quote on relief interventions by non-governmental organizations:

‘Past problems with pastoralism have been perceived to be an absolute shortage of water, to which boreholes were deemed an answer, and disease, which was attacked through the provision of veterinary medicine. Pastoralism allowed NGOs to provide simple technical solutions to these problems. These were combined with restocking of animals after drought, all of which prioritised animal numbers over effective management. Responses which concentrate solely on restoring the number of animals herded [...] simply set the scene for increased loss the next time around.’ (Blench and Marriage 1999, 19)

Over many decades of disappointing long-term outcomes of such development efforts, it has become quite clear that ‘[t]echnology is no panacea’ (Kallis 2008, 100). Nevertheless, just as the pastoralists in Morocco find it natural to rely on modern communication technologies, such new actors will have a role in coming drought-coping assemblages. At least three policy strategies are frequently discussed where information technologies shield pastoralists from the negative effects of drought: insurance, market interventions, and restocking.

First, a number of proposed drought mitigation strategies include ‘an increased use of insurance’ (Woudenberg, Wilhite, and Hayes 2008, 98). My fieldwork team observed that many locals desire social security and insurance options for themselves and their animals. Even in the case of innovative weather insurance schemes, however, there are inherent risks of producing adverse effects on social and ecological collectives (Müller, Johnson, and Kreuer 2017). Very generally, ‘to restore the status quo may not be the best solution to drought failures’ (Heathcote 1969, 194). Yet, the logic of most insurance programs consists precisely in encouraging a return to the pre-crisis state rather than promoting adaptation and transformation (O’Hare, White, and Connelly 2016). Moreover, many forms of drought relief come with a moral hazard: people may undertake risky and irresponsible behavior such as farm-

ing marginal, drought-prone lands because they count on assistance if crops fail. This has led to the reconsideration of various drought relief programs (Heathcote 2013). Cutting-edge forms of index insurance seem to circumvent the issue of moral hazard, but the costs of risky behavior are actually merely redistributed across the entire community rather than borne by the insurer (Müller, Johnson, and Kreuer 2017).

Second, even under current neoliberalism and its free-market rhetoric, nation states still have the authority to regulate markets to a considerable extent; ‘contractual market exchange depends on the rule setting and sanction enforcement of states’ (Berndt and Boeckler 2009, 537). Price-building mechanisms are one possible intervention point. Could the Moroccan state, for instance, design a market in a fashion that guarantees the producers more or less stable livestock prices, independent of drought-induced changes in the supply and demand balance? Until recently, prices used to be widely regulated for cereals, milk, and some other foodstuffs produced in the region (Abaab et al. 1995). In addition, the prices for animal feed can be controlled by public authorities, although this creates risks of overstocking and an increased dependency on fodder (ch. 2.3, p. 67). Given the current state of international affairs, it may seem impossible for many countries to undo neoliberal reforms – often related to structural adjustment policies – that had widely phased out such subsidies (cf. Devereux 2007). For several reasons, at any rate, pastoralists in Morocco seem to be less affected by price issues than nomads elsewhere. During my fieldwork years, nobody mentioned widely fluctuating prices, neither in livestock nor in other goods – not even in years with low precipitation. This may in part be due to the sealed-off domestic sheep meat market and a fairly stable long-term demand structure (ch. 2.7, p. 94). Moreover, the Kingdom’s diverse geography guarantees that each drought will typically affect only parts of the country. As my study has shown, even the population within one locality can be differentially affected. Hence, drastic local shifts in supply or demand do not easily escalate into large-scale market price changes. Once again, information and transportation infrastructures and technologies play an essential role in creating this stability.

Third, the promotion of restocking after a drought – perhaps a special case of market intervention – is seen with skepticism by many analysts. Without an acknowledgment that the number of animals could obviously not have been sustained on the available resources, one argument goes, the previous levels are simply restored, ‘providing more sacrifices for the next drought’ (Blench and Marriage 1999, 23). On the other hand, observers across different pastoral systems have long identified characteristic boom-and-bust cycles, and it has been argued that maximizing herd sizes is, in fact, the most rational strategy under many circumstances (Fratkin and Roth 1990). In unclear situations like this, simulation modeling can help provide answers, making use of newly available computing technology. My colleagues concluded a modeling study with the following advice after having simulated different scenarios combining pasture resting and fodder subsidies:

'We recommend that drought mitigation measures by governments or NGOs should take into account the critical time *after* a drought when pasture vegetation is particularly vulnerable to degradation, and support local livestock breeders by providing or subsidizing supplementary feed preferably both during and after droughts to let the pasture recover. A complementary effect could be achieved by subsidizing the sale of livestock during droughts, and not subsidizing the restocking immediately after droughts but after one year's rest.' (Müller et al. 2015, 163, emphasis added)

This rangeland recovery period turned out to be a crucial factor for the long-term viability of any specific arrangement, both in economic and ecological terms. It provides an example of the benefits to knowledge production induced by a multiplication of research methods – and of potential actors, keeping in line with the ANT spirit. More inclusive analyses have also been called for in the drought literature in order to set a 'preventive agenda, rather than one focused on predicting and conquering nature' (Hewitt 2013, 12). If drought can come to be understood as something that is always looming, that is the rule rather than the exception, then the responses to it may become more sensible in a long-term perspective. Human societies should perhaps best accept this continuous presence of threats and 'find ways of living in uncertainty' (Law 2004, 15).

Uncertainty is a fundamental ingredient of our world; most of our knowledge can be categorized as true, but not certain. We expect countless things to happen every day and they mostly do, but there is no mathematical certainty that they invariably will (Popper 1990). However, uncertainty 'is not evenly distributed across time and space' (Calkins 2016, 2) and new sources of uncertainty emerge all the time. In relation to phenomena like drought, uncertainty seems to be increasing with climate change, and time-tested methods of identifying the onset of a drought are no longer dependable (Jarawura 2014). Much like crop farmers in the United States who have tried to pull together various socio-technical assemblages 'to better mitigate and prepare for drought' (Woudenberg, Wilhite, and Hayes 2008, 101), Moroccan shepherds will keep looking for improved forecasting, marketing, or communication tools and platforms to help them hedge against existing uncertainties.

Anthropologist Konstantina Isidoros, who carried out fieldwork among Sahrawi nomads, reports a fundamental difference in how these desert dwellers approach uncertainty and insecurity as opposed to most Westerners. In European thinking, she argues, security and stability are seen as the norm – environmentally, politically, economically, and socially. Conscious efforts have to be made in order to avert situations of insecurity, which appear threatening and scary. In the view of dryland pastoralists, by contrast, insecurity is the normal state of things, and humans must constantly work toward constructing security (Isidoros 2018, 74). Security can here be understood as an assemblage in the sense that I have used the term: a complex configuration that is fragile, keeps shifting, and is always at risk of breaking apart. Creatively combining customary knowledge from people who are used to drought and similar sources of incertitude, such as the pastoralists of Morocco, with newly invented

technologies actually promises solutions to a variety of current global challenges, not just environmental ones (Scoones and Nori 2018).

I have argued that drought does not mean the same thing for everyone in eastern Morocco's pastoral communities. One family may suffer huge losses in a given year because of drought, while another household in the same village considers the year a good one and makes economic gains. This may be a fundamentally new situation. It is assumed, in the literature, that 'all herders were equally exposed to drought hazards' (Steinmann 2001, 47) in the past and that policies could therefore be oriented along distinct phases of a 'drought cycle' (Toulmin 1995, 96). A meaningful challenge for drought relief policies, today, would hence be to address this increasingly uneven distribution and make the effects of drought be felt – or rather, be not felt! – more equally throughout the population once again. Vulnerable, resource-poor families, whose 'responses are mediated by social and economic inequality' (Watts 1983, 255), should not be exposed to more suffering than wealthier ones. Setting up policies to reverse such trends, thus, 'depends upon a much greater focus on people, places, and livelihoods most at risk' (Hewitt 2013, 3). Actions that target existing inequalities within a community promise to be the best way of dealing with drought. In generic ANT terms, drought's place in the collective could be renegotiated and stabilized by investing concerted efforts into the weakening or even destruction of the deleterious links that it tries to establish with other actors. Some ideas to this end have been suggested and tested in various poverty-alleviation settings across the world (Banerjee and Duflo 2011).

In times when inequalities are consolidated (Joseph 2012) and even 'increased' (Ostry, Loungani, and Furceri 2016, 39) as a corollary of neoliberal policies, it remains utterly important to keep proposing and promoting ideas to counter that tendency – in North Africa and elsewhere. However, a revolutionary abolition of all neoliberal ideas at once is not the only conceivable way forward and may not even be possible, since 'neoliberalism is neither hegemonic nor universal, and exists in different forms across specific geographical and institutional contexts' (Higgins et al. 2014, 388). It has also proven remarkably flexible, adaptive, and thus durable despite recurring crises (Peck and Tickell 2002), akin to other complex assemblages that are sustained by a plethora of actors. In response, political actors should try to 'differentiate, fine-tune and adapt' rather than imposing one-size-fits-all, blueprint solutions (Scoones 1995, 29). Imagining better alternatives is a permanent task for humanity.

Actor-network pioneer Bruno Latour has taken the quest for equality one step further: not just different groups of people should equally benefit from opportunities to be involved in decision-making processes, but nonhuman entities as well. The elaboration of the collective could thus become a more profoundly democratic exercise. *Political ecology* is the keyword Latour proposes for this process; the initial question is: 'What are the *assemblies* of those *assemblages*?' (Latour 2005, 260). He then suggests possible institutional setups and procedural guidelines for allowing the representation of more actors in a *Parliament of Things*. A real-life example of such representation can be found for a drought-related substance: water.

In the Netherlands, this element has long been represented in political decision-making processes by the National Water Authority. Conversely, Californian almond farmers in the Central Valley have repeatedly suffered from drought damage; their aquifer is not represented in political bodies in a similar way, resulting in depletion. Latour remarks on this tragedy-of-the-commons situation:

‘It is odd that Californians are still ignoring the procedures of the ancient commons, which over millennia had invented clever arrangements for distributing water to all interested parties, taking droughts in their stride.’ (Latour 2017, 273)

A re-thinking of political processes has also been advocated by Jane Bennett, who shares a similar vision with her notion of *vital materialism*. Its ‘political goal [...] is not the perfect equality of actants, but a polity with more channels of communication between members’ (Bennett 2010, 104). A more inclusive collective seems especially desirable in the current atmosphere of right-wing populism, xenophobia, and ‘alternative facts’ preoccupying minds around the globe – partly as a backlash against liberal and cosmopolitan attitudes having become the mainstream ideology in many places (Koppetsch 2019). To achieve this, political actors should acknowledge that there may be multiple alternative ontologies of any given thing, simply due to the emphasis of certain connections and the negligence of others. In the case of my research topic, this results in plural notions of drought. Crucially, these are still notions of one and the same thing, however. Bruno Latour insists ‘on the continuity established among agents’ in what he calls ‘a metamorphic zone’ (Latour 2017, 274); he thus rejects the idea that there are multiple levels of reality that can be analytically separated and dealt with in isolation by different disciplines or institutions.

The renegotiation of the collective’s composition, the opening up of the parliament to nonhuman actors, corresponds to Murray Li’s assemblage-making element of ‘re-posing political questions’ (Li 2007, 286). It requires a shift of focus away from ‘individual humans to their alignment with the rest of the actants in the network and the constraints and opportunities’ that emerge from this alignment (Dwiartama and Rosin 2014). One concrete example could be an increased engagement with spiritual dimensions, leading to the admission of invisible beings into formal politics (as I suggested in ch. 3.3, p. 129). At the very least, ‘the spiritual notions of drought could be exploited to promote environmentally sustainable practices which can act to reduce drought vulnerability at the local level’ (Jarawura 2014, 116); but a consistent application of actor-network principles could achieve much more. New Zealand took an important step in this direction when its parliament granted legal personhood to the Whanganui River in 2017, based on Māori worldviews. Proposals for homologous legal re-definitions have also been debated in other parts of the world (Gordon 2018).

An intriguing way of looking at drought would be to identify *what it wants* in a given setting (although this anthropomorphic expression may seem inapt): what are that specific drought’s inherent interests, propensities, desires? Once these are identified and listed, it may become easier to counteract them. The resulting interventions would have to address

wider aspects of the complex networks that drought is entangled in, such as entitlement failures and other social injustices. Ideally, these interventions would then be able to ‘prevent the drought [...] event from evolving into a food crisis’ (Devereux 2007, 47) or, in fact, any crisis at all.

Could sustained political efforts in this sense even lead to *the end of drought* one day? Some authors have recently announced ‘the end of desertification’ (Behnke and Mortimore 2016b), after all... On the one hand, the end of *drought* as a meaningful analytical concept could be brought about by its extremely broad network of associations with other actors. If drought can explain anything, as seems to be increasingly the case in eastern Morocco, it ends up explaining nothing; the notion is no longer useful and other questions should be asked instead. On the other hand, political interventions could be made so good and reliable that drought, while still existent, stopped being a matter of concern for anyone. In an optimistic scenario formulated recently for pastoralists in the Horn of Africa but transferable to other regions, ‘the normal occurrence of drought would no longer result in widespread food shortages and hunger’ (Little 2013, 248) after the establishment of more robust political and market-economic assemblages.

#### ***4.4 Drought Philosophy: A World of Silent Transformations***

In this final chapter, I will wrap up my thesis and end on a personal and slightly philosophical note. What kind of world do we live in? What can we know about it? How can we transform it – and what can we learn specifically from drought in eastern Morocco? I will outline elements of answers that emerge from my study of drought in a nomadic community. They will remain sketchy by necessity, yet they permit an outlook on possible wider implications of my findings.

Some people tend to become impassioned and indignant because they feel that things are going awry in this world. This is not my message, however, neither regarding global politics nor concerning the state of nomads, drought, and social change in Morocco. Most of the pastoralists I met, in fact, displayed a very serene approach to daily life, which is mirrored in my own attitude. Rather than being upset at existing problems, I am interested in the surprising ways actors find to adapt to new situations, in the marvelous ingenuity of individuals or assemblages, and in the interesting stories that can be told about the world from their perspective. If anything, radical viewpoints should be counterbalanced and put into perspective. Such impulses are quite relevant given the global rise of right-wing populism during the 2010s. But public as well as academic debates often seem to be more interested in the scandalous, the negative, and the extreme.

Two distinguished geographers, Katherine Gibson and Julie Graham, express such considerations in a 2008 article. Across much of the anglophone critical social sciences in general and human geography in particular, they observe, the prevalent ‘academic stance means that

most theorizing is tinged with skepticism and negativity' (Gibson-Graham 2008, 618). Structural similarities to conspiracy theories debase the argumentation of otherwise brilliant thinkers – an impression that I have felt uncomfortable with over the years, too. 'Everything comes to mean the same thing, usually something large and threatening (like neoliberalism, or globalization, or capitalism, or empire)' in these paranoid accounts (Gibson-Graham 2008, 618). Ironically, at the end of the day, this sort of analysis actually 'reinforces what is perceived as dominant' (Gibson-Graham 2008, 618) by disregarding any alternatives that might exist. After having engaged in such ways of doing research for decades, Gibson-Graham's eventual reconsideration led them to questions that I hope can inspire the work of my own generation:

'What if we were to accept that the goal of theory is not to extend knowledge by confirming what we already know, that the world is a place of domination and oppression? What if we asked theory instead to help us see openings, to provide a space of freedom and possibility?' (Gibson-Graham 2008, 619)

Gibson-Graham argue in favor of weak theory that 'welcomes surprise, tolerates coexistence, and cares for the new' (Gibson-Graham 2008, 619), exactly those points that contribute to the appeal of ANT and assemblage thinking. Such varieties of theory 'could draw on the pleasures of friendliness, trust, and companionable connection. There could be a greater scope for invention and playfulness' (Gibson-Graham 2008, 619). Incidentally, these positive properties can typically be found among pastoralists, who 'are resourceful, entrepreneurial and innovative peoples by necessity' (Catley, Lind, and Scoones 2013, 2). Based on my experience in the field and the findings of my survey, I can fully confirm this observation. The high plateaus of eastern Morocco, much like comparable regions, are characterized by 'continuous innovation, adaptive practices, complex governance arrangements and entrepreneurial dynamism' (Catley, Lind, and Scoones 2013, 20). Acknowledging this dynamism should also guard any analyst against overly romanticizing notions of past forms of nomadism. Evidently, nobody must be compelled

'to undertake an essentially spurious enterprise, the restoration of a lost system; pastoralists take a risk like any entrepreneur in an inherently unstable environment. If they lose their herds and have to switch occupations they follow the route of many preceding generations.' (Blench and Marriage 1999, 27)

Does this recognition imply that the ongoing transformations of society and economy should be uncritically accepted? In fact, one critique that has been directed at actor-network theory is that its radical flattening of hierarchies and eradication of differences resembles the very idea of capitalism which turns everything into a commodity (Fuller 2000). Against this argument, I would point out that ANT scholarship does not try to attach price tags to actors or numerically quantify the links between them. Equality is not the same as enforced conformity. Oppressive current forms of capitalism should certainly be transformed into alternative economies that are more equitable for all entities involved. Supposed that a revolution is not



the only way to achieve this, ancient Taoist ideals of wise leadership could become a source of inspiration here. In contrast to Hellenic traditions where human action tends to be intentional, goal-oriented, and involve heroic efforts, a Chinese strategist would ‘transform the relation of powers in a way that would make them silently shift to his favor over time’ (Jullien 2009, 15, my translation). An efficient transformation should be induced by quietly starting a process,

‘from a distance, but in such a way that it is likely to develop on its own; and that it manages, by infiltrating the situation, little by little and without even being noticed, to silently transform it.’ (Jullien 2009, 146, my translation)

This *art of maturation* presupposes a precise observation of the situation in all its complexity. Policymakers should analyze and listen carefully, and resist the convenient shortcuts of ‘lazy thinking’ (Banerjee and Duflo 2011, 16). Assemblage and actor-network approaches offer important perspectives for such a patient and comprehensive appreciation, as I have tried to demonstrate with this study. Applying them means to harness the propensities of humans and nonhumans and channel them into successful new assemblages.

A policy style that seeks to induce silent transformations in this way is promising even when it is driven by a long-term vision of doing things in radically different ways. This is not a new idea – some PDPEO texts and those of an earlier pastoral development project in the region have suggested, for instance, that ‘sets of small interventions could lead to significant improvements’ (USAID 1986, 187). Yet, this principle bears repeating once again three decades later, for eastern Morocco and beyond. Related to a policy approach that eschews heroic acts in favor of silent transformations, a broader scope and more careful execution of analysis in formulating drought policies remains the core desideratum that emerges from my research. While such observation and analysis will take time and effort, it is especially apposite in the case of drought. More time is available in a drought than during other crises, as ‘the drawn-out escalation of drought impacts [...] provides opportunities for varied and geographically extensive human responses to modify risk while damage is in progress’ (Hewitt 1997, 87). Adaptive learning is possible (Scoones 1995).

Given the recurrent character of drought, drought-experienced communities across the globe should be encouraged to learn together and from one another. International exchange could thus be a promising avenue to build more robust knowledge networks. A large herder (*kabir*) from my study area once took part in a pastoralist workshop:

‘I told you I went to Tunisia. We had a meeting with 26 countries, including 16 European countries and others, and there were Morocco, Algeria, and Tunisia, and Senegal and other non-European countries. The topic was the pastoralist, everyone, like ourselves, i.e. the goals of profit and productivity. Their rangelands are like ours. Everyone brought their data tables, photographs from their rangelands. All herders are herders with the same goals, whether European, ‘*arabi*, or from the Gulf states.’ (Interview with Daoudi, ‘Ayn Bani Mathar, June 2, 2010)

While it is not trivial to organize this exchange and to create insights that go beyond superficialities, building stronger links between pastoralist groups seems imperative in today's globalized world. This leads me to the following point about broader trends in the social sciences as they pertain to Middle East studies. I remember vividly how at the beginning of my studies, in the early 2000s, globalization was becoming a mainstream topic. Researchers were excited to find out and discuss how things happening far away affected the most local livelihood conditions, even in remote places such as the Moroccan countryside. In economic geography, too, neoliberal globalization – viewed extremely critically – has been 'the dominant topic of research' (Gibson-Graham 2008, 619), but usually without imagining or promoting economic alternatives. That is why I chose to engage with a different set of approaches in this study.

Contemporary modernity is characterized by more than just increasing connectivity across space: simultaneously, the entanglement of humans and nonhumans is growing more and more intimate. The new material-semiotic focus of ANT and related lines of thinking helps us, as analysts of our world, move beyond the finding that everything is connected to far away objects, and shifts the attention to the nature of these connections. Regardless of the topographical distance between different elements, humans and nonhumans interact all the time to assemble something new. This conceptualization makes a re-thinking of action possible.

Action often consists in 'testing and experimenting' (Calkins 2016, 5); just as humans, nonhuman organisms incessantly try to make their surroundings more inhabitable and put themselves at ease as much as possible by modifying their environments. As these interests often clash with those of others, a messy, vibrant, chaotic, pulsating, unpredictable muddle emerges – our world (Latour 2017, 98–100). Seen in this light, transportation costs to physically carry items around the globe are just a small part of the efforts that are incurred to keep up all these fragile, mutable connections. Nevertheless, tracing the expenditure of physical energy in all its forms might be a way to document this universal link-making activity. Is this the cement of things, as it were, that fundamentally holds the universe together? In her attempt to construct a scientific realist metaphysics, philosopher Claudine Tiercelin comes to the following conclusion: 'The entire distribution of fundamental physical properties is what constitutes the cement of things throughout space-time' (Tiercelin 2011, 297, my translation). This cement, she emphasizes, is fragile – just as what I have referred to as the countless assemblages we all try to surround ourselves with.

Various comparable and compatible conceptualizations of the world have been debated by philosophers. They include an object-oriented ontology, according to which 'everything that exists has the status of an independent object' (Maeder 2017, 71, my translation) – regardless of whether they are human or nonhuman, physically existing or imaginary entities. A so-called metaphysics of relations has also been proposed, based on insights from the study of quantum mechanics. In this view, 'we can in principle know all there is at the basic

level of the world; for what there is at the basic level of the world are relations of quantum entanglement' (Esfeld 2004, 616). Knowledge of its relations is sufficient to give a description of any object in the world, because all we will ever be able to know about it is related to us via such links. This view ties in beautifully with actor-network theory as I understand it, and provides a possible ontology of drought: drought is the sum of its connections to other entities.

Probably the first attempt to study drought through the lens of actor-network theory and assemblage thinking, this dissertation demonstrates a redefined potential role for the social sciences in the age of the Anthropocene. Essentially, the social sciences can contribute to humankind's continuous task of opening up, unpacking, and reinspecting the antiquated punctualizations that surround us, then carefully reassembling them in useful ways, incorporating new actants and discarding outdated ones. These updated assemblages can then accompany the pastoralists of eastern Morocco – and the rest of us – toward a more equitable future.

A further lesson can be taken away from the incremental and accumulative nature of drought. Analysts, to my mind, should study gradual transformations much rather than focusing on dramatic singular events connected to notions of rupture, shock, or revolution – even if those may seem more decisive and interesting at first, and no matter how 'dear' (Julien 2009, 122, my translation) those figures may be to European thinking. My argument is that we should increasingly direct our analytical focus to the cumulative effects of small, but surprising innovations by humans and nonhumans alike. The silent transformations that their assemblages are involved in shape our world at least as profoundly as breaking-news catastrophes or highly symbolic political gestures. The fashion tastes of young people in a rural Moroccan town, the slight malfunction of pastoral cooperatives, the conflicts involving solar panels and olive plantations, or the complex negotiations around free trade agreements reveal not just essential insights into a changing pastoral community; they also uniquely facilitate a glimpse into the future of drought.

## 5 References

- Abaab, Ali, Slimane Bédrani, Alain Bourbouze, and Jeanne Chiche. 1995. "Les politiques agricoles et la dynamique des systèmes agropastoraux au Maghreb." *Options Méditerranéennes* (14): 139–65.
- Acherkouk, Mohamed, Abdesselam Maâtougui, and Mohamed Aziz El Houmaizi. 2012. "Étude de l'impact d'une mise en repos pastoral dans les pâturages steppiques de l'Oriental du Maroc sur la restauration de la végétation." *Sécheresse* 23 (2): 102–12. <https://doi.org/10.1684/sec.2012.0340>.
- ADA. 2010. "Plan Agricole Régional: Région de l'Oriental." Agence pour le Développement Agricole. Accessed March 31, 2011. <http://www.ada.gov.ma/uplds/pars/par08.pdf>.
- Akesbi, Najib. 2009. "Un plan schématique et trompeur." *La Revue Economica* 7: 39–43.
- Akesbi, Najib. 2012. "Marokkanische Landwirtschaft und Freihandel." In Gertel and Breuer 2012, 189–218.
- Akesbi, Najib, Driss Benatya, Larbi Zagdouni, and Ahmed Zouggari, eds. 2007. *Hommage à Paul Pascon: Devenir de la société rurale, développement économique et mobilisation sociale*. Actes du Colloque. Rabat: Imprimerie El Maarif Al Jadida.
- Allaire, Virginie, Arvind Ashta, Laurence Attuel-Mendes, and Karuna Krishnaswamy. 2009. "Institutional Analysis to Explain the Success of Moroccan Microfinance Institutions." Presented at The First European Research Conference on Microfinance, Brussels, 2-4 June 2009. <http://ssrn.com/abstract=1472751>.
- Allali, Khalil, Saad Dalil, and Mohamed Mahdi. 2002. "Le marché des ovins dans la région de Missour: Structure, comportement et performance." In Mahdi 2002, 91–109.
- Allan, William. (1965) 2004. *The African Husbandman*. Classics in African Anthropology. Münster: LIT Verlag.
- Allen, John. 2011. "Powerful assemblages?" *Area* 43 (2): 154–57. <https://doi.org/10.1111/j.1475-4762.2011.01005.x>.
- Al-Madhari, Abdullah Ferhan, and Mohammed Osman Elberier. 1996. "Trends and fatality of natural disasters in the Arab world." *Disaster Prevention and Management* 5 (2): 27–35. <https://doi.org/10.1108/09653569610112899>.
- Anderson, Ben, and Colin McFarlane. 2011. "Assemblage and geography." *Area* 43 (2): 124–27. <https://doi.org/10.1111/j.1475-4762.2011.01004.x>.
- Asensio Llamas, Susana. 2002. "The Politics of Hybridization in Rai Music." In *Songs of the Minotaur: Hybridity and Popular Music in the Era of Globalization*, edited by Gerhard Steingress, 51–82. *Populäre Musik und Jazz in der Forschung* 9. Münster: LIT Verlag.

- Bahou, Abdellaziz. 1996. "Al-Jafaf fi al-Maghrib wa 'alaaqatuhu bil-taqallubat al-munakhiyya al-mu'asara wa bil-dhabdhaba al-Atlantiyya." *Al-Da'm* 2 (2): 20–35.
- Banerjee, Abhijit V., and Esther Duflo. 2011. *Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty*. New York: PublicAffairs.
- Bechchari, Abdelmajid, Ahmed El Aich, Hamid Mahyou, Bouamar Baghdad, and Mohamed Bendaou. 2014a. "Etude de la dégradation des pâturages steppiques dans les communes de Maâtarka et Béni Mathar (Maroc oriental)." *Journal of Materials and Environmental Science* 5 (S2): 2572–83.
- Bechchari, Abdelmajid, Ahmed El Aich, Hamid Mahyou, M. Baghdad, and Mohamed Bendaou. 2014b. "Analyse de l'évolution du système pastoral du Maroc oriental." *Revue d'élevage et de médecine vétérinaire des pays tropicaux* 67 (4): 151–62.
- Behnke, Roy H., and Michael Mortimore. 2016a. "Introduction: The End of Desertification?" In *The End of Desertification? Disputing Environmental Change in the Drylands*, edited by Roy H. Behnke and Michael Mortimore, 1–34. Springer Earth System Sciences. Heidelberg, New York, Dordrecht, London: Springer.
- Behnke, Roy H., and Michael Mortimore, eds. 2016b. *The End of Desertification? Disputing Environmental Change in the Drylands*. Springer Earth System Sciences. Heidelberg, New York, Dordrecht, London: Springer.
- Behnstedt, Peter, and Mostafa Benabbou. 2005. "Données nouvelles sur les parlers arabes du Nord-Est marocain." *Zeitschrift für arabische Linguistik* 44: 17–70.
- Ben Hounet, Yazid, Anne-Marie Brisebarre, and Sandra Guinand. 2016. "The cultural heritage of pastoralism – local knowledge, state identity and the global perspective: The example of local breeds in Morocco." *Scientific and Technical Review (International Office of Epizootics)* 35 (2): 365–70. <https://doi.org/10.20506/rst.35.2.2523>.
- Ben Hounet, Yazid, and Sandra Guinand. 2016. "The Wa'ada of Sid Ahmad Majdûb and of Sidi Yahia: The Intangible Heritage and the Semi-Nomadic Tribes of the Algerian West." *Nomadic Peoples* 20 (2): 245–64. <https://doi.org/10.3197/np.2016.200205>.
- Bendella, Ahmed. 2009. "Les Modes de régulation des conflits: Entre régulation communautaire et régulation judiciaire." In Bonte, Elloumi, Guillaume, and Mahdi 2009, 291–304.
- Benjamaa, Hicham. 2015. "Réglementation bancaire et relation banque-clients: Le grand dérèglement." In Dupret, Rhani, Boutaleb, and Ferrié 2015, 957–66.
- Benlekhal, Abderrahman. 2009. "Mahawir tanmiyat silsilat al-luhum al-hamra' fi itar mukhattat al-Maghrib al-akhdar." *Al-Kassab* 17: 8–9.
- Bennett, Jane. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham, London: Duke University Press.

- Berndt, Christian, and Marc Boeckler. 2009. "Geographies of circulation and exchange: Constructions of markets." *Progress in Human Geography* 33 (4): 535–51. <https://doi.org/10.1177/0309132509104805>.
- Berndt, Christian, and Marc Boeckler. 2010. "Geographies of markets: Materials, morals and monsters in motion." *Progress in Human Geography* 35 (4): 559–67. <https://doi.org/10.1177/0309132510384498>.
- Bessedet, Ahmed. 2005. "Berguent: L'espérance est un acte de foi."
- Bilharma, Bu'amama, and Ahmad Hakimi. 2007. *Mawsim al-wali al-salih Sidi 'Abd al-Qadir bin Muhammad (Sidi al-Shaykh) li-'am 2005*. Oujda: Matbu'at al-Hilal.
- Blench, Roger, and Zoë Marriage. 1999. "Drought and Livestock in Semi-Arid Africa and Southwest Asia." ODI Working Papers 117. London: Overseas Development Institute. Accessed April 04, 2018. <https://www.odi.org/resources/docs/2533.pdf>.
- Bonte, Pierre, Mohamed Elloumi, Henri Guillaume, and Mohamed Mahdi, eds. 2009. *Développement rural, environnement et enjeux territoriaux: Regards croisés Oriental marocain et Sud-Est tunisien*. Tunis: Cérès Éditions.
- Bouazza, Mostafa, Driss Khattach, Mohammed Rachid Houari, and Olivier Kaufmann. 2013. "Apport du modèle géologique 3D à l'étude de la structure de l'aquifère profond d'Aïn Béni Mathar, Maroc Oriental." *Bulletin de l'Institut Scientifique, Rabat, Section Sciences de la Terre* (35): 53–61.
- Bouderbala, Negib. 2007. "Terres collectives et territoires de tribu." In Akesbi, Benatya, Zagdouni, and Zougari 2007, 327–41.
- Boukhalef, Abdelali. 2009. "Aïd Al Adha: Une offre de 6 millions d'ovins et de caprins." *Éco Plus (Le Matin insert)*, November 13.
- Bourbouze, Alain. 2003. "Enjeux et débats sur la réorganisation des espaces pastoraux du sud méditerranéen: De l'influence du « melk », du camion, de l'orge, du marché et des « kbir »." In *Organisation spatiale et gestion des ressources et des territoires ruraux: Actes du colloque international*, edited by Patrick Dugué and Philippe Jouve, 190–96. Montpellier: UMR Sagert.
- Bourbouze, Alain. 2006. "Systèmes d'élevage et production animale dans les steppes du nord de l'Afrique: Une relecture de la société pastorale du Maghreb." *Sécheresse* 17 (1-2): 31–39.
- Bourdieu, Pierre. (1984) 1993. *Sociology in Question*. Published in association with Theory, Culture & Society. London, Thousand Oaks, New Delhi: Sage.
- Bourdieu, Pierre. (1979) 2013. *Distinction: A Social Critique of the Judgement of Taste*. London, New York: Routledge.
- Boutaleb, Abderrahim, and Ilaria Firmian. 2014. "Community governance of natural resources and rangelands: The case of the Eastern Highlands of Morocco." In *The Gover-*

- nance of Rangelands: Collective Action for Sustainable Pastoralism*, edited by Pedro M. Herrera, Jonathan Davies, and Pablo Manzano Baena, 94–107. London, New York: Routledge.
- Bretan, Andreea. 2010. *Die syrische Steppe: Mobile Viehzucht, internationale Entwicklungshilfe und globale Märkte*. Nomaden und Sesshafte 13. Wiesbaden: Dr. Ludwig Reichert Verlag.
- Breuer, Ingo. 2007a. *Existenzsicherung und Mobilität im ariden Marokko*. Nomaden und Sesshafte 9. Wiesbaden: Dr. Ludwig Reichert Verlag.
- Breuer, Ingo. 2007b. "Marketing from the margins: The Ilimchan pastoralists of the pre-Sahara." In Gertel and Breuer 2007, 117–32.
- Breuer, Ingo, and Jörg Gertel. 2012. "Ländliche Lohnarbeit und Kommodifizierung von Arbeitskraft." In Gertel and Breuer 2012, 125–43.
- Breuer, Ingo, Jörg Gertel, David Kreuer, and Johannes Frische. 2012. "Landwirtschaftliche Existenzsicherung am Limit?" In Gertel and Breuer 2012, 83–111.
- Breuer, Ingo, and David Kreuer. 2011. "Market Spaces in a Globalising Periphery: Livestock Trade, Borders, and Liberalisation in Eastern Morocco." In Gertel and Le Heron 2011, 151–71.
- Brisebarre, Anne-Marie. 2002. "L'Ayd al-kabir: Un élément structurant de la production et de la commercialisation des ressources pastorales." In Mahdi 2002, 111–24.
- Burke, Edmund, III. 2009. "The Transformation of the Middle Eastern Environment, 1500 B.C.E.–2000 C.E." In *The Environment and World History*, edited by Edmund Burke, III and Kenneth Pomeranz, 81–117. California World History Library 9. Berkeley, Los Angeles, London: University of California Press.
- Büssow, Johann. 2011. "Negotiating the Future of a Bedouin Polity in Mandatory Syria: Political Dynamics of the Sba'a-'Abada during the 1930s." *Nomadic Peoples* 15 (1): 70–95. <https://doi.org/10.3167/np.2011.150104>.
- Büssow-Schmitz, Sarah. 2016. *Die Beduinen der Mamluken: Beduinen im politischen Leben Ägyptens im 8./14. Jahrhundert*. Nomaden und Sesshafte 19. Wiesbaden: Dr. Ludwig Reichert Verlag.
- Buzelin, Hélène. 2005. "Unexpected Allies: How Latour's Network Theory Could Complement Bourdieusian Analyses in Translation Studies." *The Translator* 11 (2): 193–218.
- Calkins, Sandra. 2016. *Who Knows Tomorrow? Uncertainty in North-Eastern Sudan*. New York, Oxford: Berghahn Books.
- Carse, Ashley. 2017. "An Infrastructural Event: Making Sense of Panama's Drought." *Water Alternatives* 10 (3): 888–909. <http://www.water-alternatives.org/index.php/alldoc/articles/vol10/v10issue3/387-a10-3-13>. Accessed February 20, 2018.

- Castillo, Lucía, and Ana Ladio. 2017. "Mammals and birds as ethno-indicators of change: Their importance to livestock farmers in Arid Patagonia (Argentina)." *Environment, Development and Sustainability* 19. <https://doi.org/10.1007/s10668-017-9983-z>.
- Catley, Andy, Jeremy Lind, and Ian Scoones. 2013. "Development at the Margins: Pastoralism in the Horn of Africa." In Catley, Lind, and Scoones 2013, 1–26.
- Catley, Andy, Jeremy Lind, and Ian Scoones, eds. 2013. *Pastoralism and Development in Africa: Dynamic Change at the Margins*. Pathways to Sustainability. London, New York: Routledge.
- Célérier, Jean. 1927. "Les problèmes économiques du Maroc oriental." *Annales de Géographie* 36 (203): 462–67. <https://doi.org/10.3406/geo.1927.8986>.
- Ceriani, Lidia, and Paolo Verme. 2012. "The origins of the Gini index: Extracts from Variabilità e Mutabilità (1912) by Corrado Gini." *The Journal of Economic Inequality* 10 (3): 421–43. <https://doi.org/10.1007/s10888-011-9188-x>.
- Chaarani, Bahija, and Ibrahim Mahi. 2008. "Impact of Drought on Livestock Productivity in Morocco." In *Drought Management: Scientific and Technological Innovations*, edited by Antonio López-Francos, 49–55. Options Méditerranéennes, Série A 80. Zaragoza: CIHEAM.
- Châtel, Francesca de. 2014. "The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution." *Middle Eastern Studies* 50 (4): 521–35. <https://doi.org/10.1080/00263206.2013.850076>.
- Chatty, Dawn. 1986. *From Camel to Truck: The Bedouin in the Modern World*. New York: Vintage Press.
- Chatty, Dawn. 2010. "The Bedouin in Contemporary Syria: The Persistence of Tribal Authority and Control." *Middle East Journal* 64 (1): 29–49. <https://doi.org/10.3751/64.1.12>.
- Chbouki, Nabil, Charles W. Stockton, and Donald E. Myers. 1995. "Spatio-Temporal Patterns of Drought in Morocco." *International Journal of Climatology* 15: 187–205.
- Chichaoui, Houda. 2001. "Étude d'un marché régional de la viande rouge: Cas de la région de Casablanca." Mémoire d'Ingénieur, Institut Agronomique et Vétérinaire Hassan II.
- Chiche, Jeanne. 2001. "Les effets des programmes d'encouragement à l'élevage sur la production des ovins et des caprins au Maroc." *Options Méditerranéennes* 46: 55–64.
- Chiche, Jeanne. 2003. "Étude des conflits pastoraux dans le versant sud du Haut Atlas." Ouarzazate: CBTHA. Accessed July 14, 2017. <http://www.abhatoo.net.ma/content/download/22694/418375/version/1/file/Conservation+de+la+biodiversit%C3%A9+par+la+transhumance+dans+le+versant+sud+du+haut+atlas%28CBTHA%29.Etude+des+conflits+pastoraux+dans+le+versant+sud+du+haut+atlas.pdf>.
- Chiche, Jeanne. 2007. "History of mobility and livestock production in Morocco." In Gertel and Breuer 2007, 31–59.



- Czuba, Karol, Tyler J. O'Neill, and Ana Patricia Ayala. 2017. "The Impact of In-Kind Food Assistance on Pastoralist Livelihoods in Humanitarian Crises: An evidence synthesis." The Humanitarian Evidence Programme. Oxford: Oxfam GB. Accessed April 23, 2017. <http://fic.tufts.edu/assets/Pastoralism-Systematic-Review.pdf>.
- Dai, Aiguo. 2011. "Drought under global warming: A review." *WIREs Climate Change* 2: 45–65. <https://doi.org/10.1002/wcc.81>.
- Daoudi, Fatiha. 2015. *Vécu frontalier algéro-marocain depuis 1994: Quotidien d'une population séparée*. Paris: L'Harmattan.
- Davis, Diana K. 2007. *Resurrecting the Granary of Rome: Environmental History and French Colonial Expansion in North Africa*. Series in Ecology and History. Athens: Ohio University Press.
- Deleuze, Gilles, and Félix Guattari. (1980) 1987. *A Thousand Plateaus: Capitalism and Schizophrenia*. Minneapolis: University of Minnesota Press.
- Devereux, Stephen. 2007. "The impact of droughts and floods on food security and policy options to alleviate negative effects." *Agricultural Economics* 37 (Supplement s1): 47–58.
- Diamond, Jared. 2005. *Collapse: How Societies Choose to Fail or Succeed*. New York: Viking.
- Downing, Tom E., and Karen Bakker. 2000. "Drought Risk in a Changing Environment." In *Drought and Drought Mitigation in Europe*, edited by Jürgen V. Vogt and Francesca Somma, 79–90. Dordrecht: Kluwer Academic Publishers.
- DPA Figuig. 2006. "Étude sur l'opérationnalisation de la stratégie de développement des parcours et de l'élevage dans l'Oriental: Thème 3 : Gestion de l'aléa de la sécheresse." Bouarfa: Direction Provinciale de l'Agriculture de Figuig.
- Dupret, Baudouin, Zakaria Rhani, Assia Boutaleb, and Jean-Noël Ferrié, eds. 2015. *Le Maroc au présent: D'une époque à l'autre, une société en mutation*. Dialogue des deux rives. Casablanca: Fondation du Roi Abdul-Aziz Al Saoud.
- Dwiartama, Angga, and Christopher Rosin. 2014. "Exploring agency beyond humans: The compatibility of Actor-Network Theory (ANT) and resilience thinking." *Ecology and Society* 19 (3): 28. <https://doi.org/10.5751/ES-06805-190328>.
- Dwyer, Mark James, and Kirill Vladimirovich Istomin. 2008. "Theories of Nomadic Movement: A New Theoretical Approach for Understanding the Movement Decisions of Nenets and Komi Reindeer Herders." *Human Ecology* 36: 521–33. <https://doi.org/10.1007/s10745-008-9169-2>.
- ECWP. 2014. "Programs Achievements & Perspectives." Emirates Center for Wildlife Propagation. Accessed April 24, 2017. <http://www.ecwp.org/programs-achievements-perspectives/>.

- El Ayadi, Mohammed, Hassan Rachik, and Mohamed Tozy. 2007. *L'islam au quotidien: Enquête sur les valeurs et les pratiques religieuses au Maroc*. Religion et Société. Casablanca: Editions Prologues.
- El-Kazaz, Sarah. 2017. "Thinking in Four Dimensions: New Directions in Spatial Analysis of the Middle East." *International Journal of Middle East Studies* 49 (3): 535–45. <https://doi.org/10.1017/S0020743817000423>.
- Elmorchid, Ibrahim. 2017. "Al-Hiba al-dimughrafiyya fi al-'alam al-'arabi: Ni'ma am qunbula mawquta? Al-Maghrib unmudhajan." *'Umran* 6 (21): 55–79.
- Elwert, Georg, Hans-Dieter Evers, and Werner Wilkens. 1983. "Die Suche nach Sicherheit: Kombinierte Produktionsformen im sogenannten Informellen Sektor." *Zeitschrift für Soziologie* 12 (4): 281–96.
- Emadi, Mohammad H. 1995. "Pastoralists, Participation and Policy: An Action Oriented, Systemic and Participatory Approach to Improve the Relationships Between Pastoralist Nomads, Government and Natural Resources in Iran." PhD Thesis, School of Agriculture and Rural Development, University of Western Sydney.
- Endfield, Georgina H., and David J. Nash. 2002. "Drought, desiccation and discourse: Missionary correspondence and nineteenth-century climate change in central southern Africa." *The Geographical Journal* 168 (1): 33–47. <https://doi.org/10.1111/1475-4959.00036>.
- Esfeld, Michael. 2004. "Quantum entanglement and a metaphysics of relations." *Studies in History and Philosophy of Modern Physics* 35: 601–17. <https://doi.org/10.1016/j.shpsb.2004.04.008>.
- Esper, Jan, David Frank, Ulf Büntgen, Anne Verstege, Jürg Luterbacher, and Elena Xoplaki. 2007. "Long-term drought severity variations in Morocco." *Geophysical Research Letters* 34 (L17702). <https://doi.org/10.1029/2007GL030844>.
- Eyal, Gil. 2002. "Dangerous liaisons between military intelligence and Middle Eastern studies in Israel." *Theory and Society* 31 (5): 653–93. <https://doi.org/10.1023/A:1021302211194>.
- Ezzine, Hicham, Ahmed Bouziane, and Driss Ouazar. 2014. "Seasonal comparisons of meteorological and agricultural drought indices in Morocco using open short time-series data." *International Journal of Applied Earth Observation and Geoinformation* 26: 36–48. <https://doi.org/10.1016/j.jag.2013.05.005>.
- Fagouri, Said. 2009. "Stratégie de l'ANOC." *L'Eleveur* 17: 10–11.
- Faier, Lieba. 2011. "Fungi, trees, people, nematodes, beetles, and weather: Ecologies of vulnerability and ecologies of negotiation in matsutake commodity exchange." *Environment and Planning A* 43: 1079–97. <https://doi.org/10.1068/a4382>.
- FAO. 2017. "FAOSTAT." Food and Agriculture Organization of the United Nations. Accessed April 22, 2017. <http://www.fao.org/faostat/en/#data/CL/visualize>.

- Felski, Rita. 2016. "Comparison and Translation: A Perspective from Actor-Network Theory." *Comparative Literature Studies* 53 (4): 747–65.
- FIDA. 2002. "Projet de développement des parcours et de l'élevage dans l'Oriental (PDPEO): Rapport d'évaluation intermédiaire." 1304-MA. Fonds International de Développement Agricole.
- Fratkin, Elliot. 1997. "Pastoralism: Governance and Development Issues." *Annual Review of Anthropology* 26: 235–61.
- Fratkin, Elliot, and Eric Abella Roth. 1990. "Drought and Economic Differentiation Among Ariaal Pastoralists of Kenya." *Human Ecology* 18 (4): 385–402.
- Fuller, Steve. 2000. "Why Science Studies Has Never Been Critical of Science: Some Recent Lessons on How to Be a Helpful Nuisance and a Harmless Radical." *Philosophy of the Social Sciences* 30 (1): 5–32.
- García, Rolando Victor. 1981. *Nature Pleads Not Guilty. Drought and Man: The 1972 Case History 1*. Oxford, New York: Pergamon Press.
- Gertel, Jörg. 2005. "Empirische Methoden und ihre Bedeutung bei der Konstruktion von Wissen." In *Methoden als Aspekte der Wissenskonsstruktion: Fallstudien zur Nomadismusforschung*, edited by Jörg Gertel, 1–16. Orientwissenschaftliche Hefte 17. Halle. [http://www.nomadsed.de/fileadmin/user\\_upload/redakteure/Dateien\\_Publikationen/Mitteilungen\\_des\\_SFB/owh8gertel.pdf](http://www.nomadsed.de/fileadmin/user_upload/redakteure/Dateien_Publikationen/Mitteilungen_des_SFB/owh8gertel.pdf). Accessed July 01, 2017.
- Gertel, Jörg. 2007. "Mobility and Insecurity: The Significance of Resources." In Gertel and Breuer 2007, 11–30.
- Gertel, Jörg. 2014. "Krise und Widerstand." In Gertel and Ouaisa 2014, 32–75.
- Gertel, Jörg, and Ingo Breuer. 2007. "Introduction." In Gertel and Breuer 2007, 3–9.
- Gertel, Jörg, and Ingo Breuer, eds. 2007. *Pastoral Morocco: Globalizing Scapes of Mobility and Insecurity*. Nomaden und Sesshafte 7. Wiesbaden: Dr. Ludwig Reichert Verlag.
- Gertel, Jörg, and Ingo Breuer, eds. 2012. *Alltagsmobilitäten: Aufbruch marokkanischer Lebenswelten*. Bielefeld: transcript Verlag.
- Gertel, Jörg, and Ralf Hexel, eds. 2018. *Coping With Uncertainty: Youth in the Middle East and North Africa*. London: Saqi Books.
- Gertel, Jörg, and Richard Le Heron. 2011. "Conclusion: Embodied Risks of Exchange Relations." In Gertel and Le Heron 2011, 321–34.
- Gertel, Jörg, and Richard Le Heron, eds. 2011. *Economic Spaces of Pastoral Production and Commodity Systems: Markets and Livelihoods*. Ashgate Economic Geography Series. Farnham: Ashgate.

- Gertel, Jörg, and Rachid Ouaisa, eds. 2014. *Jugendbewegungen: Städtischer Widerstand und Umbrüche in der arabischen Welt*. Bielefeld: transcript Verlag.
- Gibson-Graham, J. K. 2008. "Diverse economies: Performative practices for 'other worlds'." *Progress in Human Geography* 32 (5): 613–32. <https://doi.org/10.1177/0309132508090821>.
- Gilbert, Jérémie. 2007. "Nomadic Territories: A Human Rights Approach to Nomadic Peoples' Land Rights." *Human Rights Law Review* 7 (4): 681–716.
- Goldman, Mara J., Meaghan Daly, and Eric J. Lovell. 2016. "Exploring multiple ontologies of drought in agro-pastoral regions of Northern Tanzania: A topological approach." *Area* 48 (1): 27–33. <https://doi.org/10.1111/area.12212>.
- Gordon, Gwendolyn J. 2018. "Environmental Personhood." *Columbia Journal of Environmental Law* 43 (1): 49–91.
- Gruschke, Andreas. 2011. "Nomads and their Market Relations in Eastern Tibet's Yushu Region: The Impact of Caterpillar Fungus." In Gertel and Le Heron 2011, 211–29.
- Gruschke, Andreas. 2012. *Nomadische Ressourcennutzung und Existenzsicherung im Umbruch: Die osttibetische Region Yushu (Qinghai, VR China)*. Nomaden und Sesshafte 15. Wiesbaden: Dr. Ludwig Reichert Verlag.
- Guerin, Adam. 2016. "Disaster Ecologies: Land, Peoples and the Colonial Modern in the Gharb, Morocco, 1911-1936." *Journal of the Economic and Social History of the Orient* 59: 333–65. <https://doi.org/10.1163/15685209-12341401>.
- Guessous, Fouad, Ismaïl Boujenane, Mohamed Bourfia, and Hamid Narjisse. 1989. "Sheep in Morocco." In *Small ruminants in the Near East: Volume III: North Africa*, 16–83. FAO Animal Production and Health Paper 74.
- Hammond, Timur. 2017. "The Middle East without Space?" *International Journal of Middle East Studies* 49 (2): 319–22. <https://doi.org/10.1017/S0020743817000083>.
- Hamzaoui, Lakhdar. 2010. "Biographie." Accessed July 01, 2017. <http://rohhal.net/biogr.pdf>.
- Haraway, Donna. 1988. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies* 14 (3): 575–99.
- Hardin, Garrett. 1968. "The Tragedy of the Commons." *Science* 162: 1243–48.
- Hardouin, Loïc A., Alexandre Robert, Marie Nevoux, Olivier Gimenez, Frédéric Lacroix, and Yves Hingrat. 2014. "Meteorological conditions influence short-term survival and dispersal in a reinforced bird population." *Journal of Applied Ecology* 51: 1494–1503. <https://doi.org/10.1111/1365-2664.12302>.
- HCP. 2007. "Population légale du Maroc: Recensement Général de la Population et de l'Habitat 2004." Haut Commissariat au Plan. Accessed March 11, 2017. <http://www.hcp.ma/file/103036/>.

- HCP. 2015. "Population légale d'après les résultats du RGPH 2014 sur le Bulletin officiel N° 6354." Haut Commissariat au Plan. Accessed March 11, 2017. <http://rgph2014.hcp.ma/file/167576/>.
- HCP. 2016. "La population nomade au Maroc d'après les données du Recensement Général de la Population et de l'Habitat de 2014." Haut Commissariat au Plan. Accessed March 11, 2017. <http://rgph2014.hcp.ma/file/182130/>.
- Heathcote, Ronald Leslie. 1969. "Drought in Australia: A Problem of Perception." *The Geographical Review* 59 (2): 175–94.
- Heathcote, Ronald Leslie. 2013. *Drought and the Human Story: Braving the Bull of Heaven*. Farnham: Ashgate.
- Hewitt, Kenneth. 1997. *Regions of Risk: A Geographical Introduction to Disasters*. Themes in Resource Management. London, New York: Routledge.
- Hewitt, Kenneth. 2013. "Environmental Disasters in Social Context: Toward a Preventive and Precautionary Approach." *Natural Hazards* 66: 3–14. <https://doi.org/10.1007/s11069-012-0205-6>.
- Higgins, Vaughan, Clive Potter, Jacqui Dibden, and Chris Cocklin. 2014. "Editorial: Neoliberalising rural environments." *Journal of Rural Studies* 36: 386–90. <https://doi.org/10.1016/j.jrurstud.2014.10.006>.
- Hobbs, N. Thompson, Kathleen A. Galvin, Chris J. Stokes, Jill M. Lockett, Andrew J. Ash, Randall B. Boone, Robin S. Reid, and Philip K. Thornton. 2008. "Fragmentation of rangelands: Implications for humans, animals, and landscapes." *Global Environmental Change* 18: 776–85. <https://doi.org/10.1016/j.gloenvcha.2008.07.011>.
- Holden, Stacy E. 2009. *The Politics of Food in Modern Morocco*. Gainesville: University Press of Florida.
- Humphrey, Caroline, and David Sneath. 1999. *The end of Nomadism? Society, state, and the environment in Inner Asia*. Durham, NC: Duke University Press.
- Isidoros, Konstantina. 2018. *Nomads and Nation-Building in the Western Sahara: Gender, Politics and the Sahrawi*. London, New York: I.B.Tauris.
- Jarawura, Francis Xavier. 2014. "Perceptions of Drought among Rural Farmers in the Savelugu District in the Northern Savannah of Ghana." *Ghana Journal of Geography* 6: 102–20.
- Johnstone, Andrew. 1997. "A Flash Flooding Event in the High Atlas Mountains of Morocco." *Geography* 82 (1): 85–90.
- Joseph, Suad. 2012. "History and Its Histories: Story-Making and the Present." MESA Presidential Address 2011. *Review of Middle East Studies* 46 (1): 6–23.

- Jullien, François. 2009. *Les Transformations silencieuses*. Chantiers, I. biblio essais. Paris: Le Livre de Poche.
- Jungfer, Eckhardt. 1983. "Alimentation insuffisante des couches aquifères et ses conséquences dans la région d'Ain Beni Mathar (Province d'Oujda, Maroc Oriental)." In *Ground Water in Water Resources Planning: Proceedings of a Symposium*. Vol. 2, edited by UNESCO. 3 vols, 581–91. Koblenz: UNESCO; International Association of Hydrogeologists; National Committee of the Federal Republic of Germany for the International Hydrological Programme and the Operational Hydrological Programme.
- Kallis, Giorgos. 2008. "Droughts." *Annual Review of Environment and Resources* 33: 85–118. <https://doi.org/10.1146/annurev.envIRON.33.081307.123117>.
- Kamil, Hassan. 1993. "Penser et agir " jdoub ": Gestion du risque et rationalité des comportements d'élevage des pasteurs nomades de Missour ( Maroc oriental )." Mémoire de D. E. A., Université de Provence Aix-Marseille I.
- Kelley, Colin P., Shahrzad Mohtadi, Mark A. Cane, Richard Seager, and Yochanan Kushnir. 2015. "Climate Change in the Fertile Crescent and Implications of the Recent Syrian Drought." *Proceedings of the National Academy of Sciences of the United States of America* 112 (11): 3241–46. <https://doi.org/10.1073/pnas.1421533112>.
- Khalil, Mohamed. 2007. "Trading livestock: Eastern Moroccan sheep meat commodity chains." In Gertel and Breuer 2007, 107–15.
- Kim, Jaegwon. 1993. *Supervenience and Mind: Selected Philosophical Essays*. Cambridge Studies in Philosophy. Cambridge: Cambridge University Press.
- Kirsch, Scott, and Don Mitchell. 2004. "The Nature of Things: Dead Labor, Nonhuman Actors, and the Persistence of Marxism." *Antipode* 36 (4): 687–705. <https://doi.org/10.1111/j.1467-8330.2004.00443.x>.
- Knippertz, Peter, Andreas H. Fink, Andreas Reiner, and Peter Speth. 2003. "Three Late Summer/Early Autumn Cases of Tropical–Extratropical Interactions Causing Precipitation in Northwest Africa." *Monthly Weather Review* 131: 116–35.
- Koné, Ibrahima. 2010. "Agriculture/ Plan Maroc Vert: une promo pour attirer les entrepreneurs." Accessed July 01, 2017. <http://www.yabiladi.com/articles/details/2429/agriculture-plan-maroc-vert-promo.html>.
- Koppetsch, Cornelia. 2019. *Die Gesellschaft des Zorns: Rechtspopulismus im globalen Zeitalter*. X-Texte zu Kultur und Gesellschaft. Bielefeld: transcript Verlag.
- Kousksou, Tarik, Amine Allouhi, Mohammed Belattar, Abdelmajid Jamil, Tarik El Rhafiki, Ahmed Arid, and Youssef Zeraoui. 2015. "Renewable energy potential and national policy directions for sustainable development in Morocco." *Renewable and Sustainable Energy Reviews* 47: 46–57. <https://doi.org/10.1016/j.rser.2015.02.056>.

- Kreuer, David. 2011. "Land Use Negotiation in Eastern Morocco." *Nomadic Peoples* 15 (1): 54–69. <https://doi.org/10.3167/np.2011.150103>.
- Kreuer, David. 2012. "Wissensmobilität: Entwicklungsinterventionen und lokale Praxis marokkanischer Transhumanz." In Gertel and Breuer 2012, 303–16.
- Kreuer, David. 2014. "Ramallah: Formen des Widerstands." In Gertel and Ouaisa 2014, 268–84.
- Kreuer, David. 2015. "L'urbanisation en steppe." In Dupret, Rhani, Boutaleb, and Ferrié 2015, 135–41.
- Krieger, David J., and Andréa Belliger. 2014. *Interpreting Networks: Hermeneutics, Actor-Network Theory & New Media*. Bielefeld: transcript Verlag.
- Laskier, Michael M. 1990. "Developments in the Jewish Communities of Morocco 1956–76." *Middle Eastern Studies* 26 (4): 465–505. <http://www.jstor.org/stable/4283394>. Accessed April 24, 2017.
- Latour, Bruno. 1993. *We Have Never Been Modern*. Cambridge, Massachusetts: Harvard University Press.
- Latour, Bruno. 1999a. "On recalling ANT." In *Actor Network Theory and After*, edited by John Law and John Hassard, 15–25. Sociological Review Monographs. Oxford: Blackwell Publishing.
- Latour, Bruno. 1999b. *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge, Massachusetts, London: Harvard University Press.
- Latour, Bruno. 2004. *Politics of Nature: How to Bring the Sciences into Democracy*. Cambridge, Massachusetts, London: Harvard University Press.
- Latour, Bruno. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- Latour, Bruno. 2017. *Facing Gaia: Eight Lectures on the New Climatic Regime*. Cambridge, UK, Malden, MA: Polity Press.
- Law, John. 1992. "Notes on the Theory of the Actor-Network: Ordering, Strategy, and Heterogeneity." *Systems Practice* 5 (4): 379–93.
- Law, John. 2004. *After Method: Mess in social science research*. International Library of Sociology. London, New York: Routledge.
- Law, John. 2009. "Actor Network Theory and Material Semiotics." In Turner 2009, 141–58.
- Lazarev, Grigori. 2008. "L'élevage pastoral dans les Hauts Plateaux de l'Oriental du Maroc." Les notes d'analyse du CIHEAM 37. Centre International de Hautes Études Agronomiques Méditerranéennes.

- Le Cuziat, Joseph, Eric Vidal, Philip Roche, and Frédéric Lacroix. 2005. "Human Activities Affect the Potential Distribution of the Houbara Bustard *Chlamydotis Undulata Undulata*." *Ardeola* 52 (1): 21–30.
- Le Houérou, Henry N. 1996. "Climate change, drought and desertification." *Journal of Arid Environments* 34: 133–85.
- Li, Tania Murray. 2007. "Practices of assemblage and community forest management." *Economy and Society* 36 (2): 263–93. <https://doi.org/10.1080/03085140701254308>.
- Linke, Janka. 2017. "Market Positions of Tibetans in Qinghai: The Rush For Caterpillar Fungi." In *Tibetan Pastoralists and Development: Negotiating the Future of Grassland Livelihoods*, edited by Andreas Gruschke and Ingo Breuer, 63–81. Nomaden und Sesshafte 20. Wiesbaden: Dr. Ludwig Reichert Verlag.
- Little, Peter D. 2013. "Reflections on the Future of Pastoralism in the Horn of Africa." In Catley, Lind, and Scoones 2013, 243–49.
- Livesey, Graham. 2010. "Agency, Assemblages, and Ecologies of the Contemporary City." In *Agency: Working With Uncertain Architectures*, edited by Florian Kossak, Doina Petrescu, Tatjana Schneider, Renata Tyszczyk, and Stephen Walker, 114–24. Critiques 5. Abingdon, New York: Routledge.
- Lyautey, Louis Hubert. 1937. *Vers le Maroc: Lettres du Sud-Oranais (1903-1906)*. Paris: Librairie Armand Colin.
- Maas, Utz, and Stephan Procházka. 2012. "Moroccan Arabic in its wider linguistic and social contexts." *STUF - Language Typology and Universals* 65 (4): 329–57. <https://doi.org/10.1524/stuf.2012.0021>.
- Maeder, Marcus. 2017. "Kunst, Wissenschaft und Natur: Zur Ästhetik und Epistemologie der künstlerisch-wissenschaftlichen Naturbeobachtung." In *Kunst, Wissenschaft, Natur: Zur Ästhetik und Epistemologie der künstlerisch-wissenschaftlichen Naturbeobachtung*, edited by Marcus Maeder, 13–81. Edition Kulturwissenschaft 119. Bielefeld: transcript Verlag.
- Mahdi, Mohamed, ed. 2002. *Mutations sociales et réorganisation des espaces steppiques*. Casablanca: Imprimerie Najah El Jadida.
- Mahdi, Mohamed. 2007. "Pastoralism and institutional change in the Oriental." In Gertel and Breuer 2007, 93–105.
- Mahdi, Mohamed. 2009a. "La Tribu au secours du développement pastoral." *Études rurales* 184: 133–48.
- Mahdi, Mohamed. 2009b. "Nouveaux acteurs, nouveaux enjeux." In Bonte, Elloumi, Guillaume, and Mahdi 2009, 307–17.
- Mahdi, Mohamed. 2014. "Between hope and disillusionment: The migration of nomadic pastoralists to Europe." In *Seasonal Workers in Mediterranean Agriculture: The Social Costs of Eat-*



- ing Fresh*, edited by Jörg Gertel and Sarah R. Sippel, 211–21. Earthscan Food and Agriculture. London, New York: Routledge.
- Mahdi, Mohamed, Nadia Harrami, and Ayad Ablal. 2007. "Nouvelles recompositions de la famille dans le Maroc Oriental: Réalité et représentations sociales." In Akesbi, Benatya, Zagdouni, and Zouggari 2007, 69–78.
- Malherbe, Michel. 2008. *Quand l'histoire change les noms de lieux: Les lieux à dénominations multiples*. Paris: L'Harmattan.
- McCartney, Eugene S. 1934. "Greek and Roman Weather Lore of Two Destructive Agents, Hail and Drought." *The Classical Weekly* 28 (3): 17–23.
- Menger, Carl. (1871) 2007. *Principles of Economics*. Auburn, Ala. Ludwig von Mises Institute.
- Métral, Françoise. 2000. "Managing Risk: Sheep-rearing and Agriculture in the Syrian Steppe." In *The Transformation of Nomadic Society in the Arab East*, edited by Martha Mundy and Basim Musallam, 123–44. Cambridge, UK: Cambridge University Press.
- Mitchell, Don. 1995. "There's No Such Thing as Culture: Towards a Reconceptualization of the Idea of Culture in Geography." *Transactions of the Institute of British Geographers New Series* 20 (1): 102–16.
- Mitchell, Timothy. 2002. *Rule of Experts: Egypt, Techno-Politics, Modernity*. Berkeley, Los Angeles, London: University of California Press.
- Montet, Édouard. 1902. "Les Confréries religieuses de l'Islam marocain: Leur rôle religieux, politique et social." *Revue de l'histoire des religions* 45: 1–35. <http://www.jstor.org/stable/23661804>. Accessed January 08, 2018.
- Müller, Birgit, Leigh Johnson, and David Kreuer. 2017. "Maladaptive outcomes of climate insurance in agriculture." *Global Environmental Change* 46: 23–33. <https://doi.org/10.1016/j.gloenvcha.2017.06.010>.
- Müller, Birgit, Jule Schulze, David Kreuer, Anja Linstädter, and Karin Frank. 2015. "How to avoid unsustainable side effects of managing climate risk in drylands: The supplementary feeding controversy." *Agricultural Systems* 139: 153–65. <https://doi.org/10.1016/j.agsy.2015.07.001>.
- Müller, Martin, and Carolin Schurr. 2016. "Assemblage thinking and actor-network theory: Conjunctions, disjunctions, cross-fertilisations." *Transactions of the Institute of British Geographers* 41: 217–29. <https://doi.org/10.1111/tran.12117>.
- Müller-Hohenstein, Klaus. 1978a. *Die ostmarokkanischen Hochplateaus: Ein Beitrag zur Regionalforschung und zur Biogeographie eines nordafrikanischen Trockensteppenraumes*. Erlanger Geographische Arbeiten Sonderband 7. Erlangen: Selbstverlag der Fränkischen Geographischen Gesellschaft.

- Müller-Hohenstein, Klaus. 1978b. "Nordafrikanische Trockensteppengesellschaften: Zur ökologischen Erklärung der räumlichen Differenzierung der Vegetation zwischen Mittelmeer und Sahara." *Erdkunde* 32: 28–39.
- Munholland, Kim. 1968. "Rival Approaches to Morocco: Delcassé, Lyautey, and the Algerian-Moroccan Border, 1903-1905." *French Historical Studies* 5 (3): 328–43.
- Murdoch, Jonathan. 1997. "Towards a geography of heterogeneous associations." *Progress in Human Geography* 21 (3): 321–37. <https://doi.org/10.1191/030913297668007261>.
- Murdoch, Jonathan. 2001. "Ecologising Sociology: Actor-Network Theory, Co-construction and the Problem of Human Exemptionalism." *Sociology* 35 (1): 111–33.
- Nefzaoui, Ali, Hichem Ben Salem, and Mohamed El Mourid. 2014. "Appropriate Technologies for Drought Mitigation in Agropastoral Areas of North Africa." *Journal of Arid Land Studies* 24 (1): 41–46.
- Norman, James. 2015. "Recipes for Change Validation Report: Lamb Tagine with Moroccan Truffles." Copenhagen: CGIAR Research Program on Climate Change, Agriculture and Food Security. Accessed April 04, 2018. <https://cgspace.cgiar.org/rest/bitstreams/53693/retrieve>.
- O'Connor, Tom. 2017. "Muslims and Jews at War in Syria and Israel Both Pray for Rain as Drought Hits Middle East." *Newsweek*, December 29. Accessed January 01, 2018. <http://www.newsweek.com/muslims-jews-war-syria-israel-both-pray-rain-drought-hits-middle-east-765056>.
- O'Hare, Paul, Iain White, and Angela Connelly. 2016. "Insurance as maladaptation: Resilience and the 'business as usual' paradox." *Environment and Planning C: Government and Policy* 34 (6): 1175–93. <https://doi.org/10.1177/0263774X15602022>.
- Ostry, Jonathan D., Prakash Loungani, and Davide Furceri. 2016. "Neoliberalism: Oversold?" *Finance & Development* 53 (2): 38–41.
- Parnell, Susan, and Ruwani Walawege. 2011. "Sub-Saharan African urbanisation and global environmental change." *Global Environmental Change* 21S: S12–S20. <https://doi.org/10.1016/j.gloenvcha.2011.09.014>.
- Paskoff, Roland. 1957. "Les Hautes Plaines du Maroc oriental: La région de Berguennt." *Cahiers d'outre-mer* 10 (37): 34–64. [http://www.persee.fr/doc/caoum\\_0373-5834\\_1957\\_num\\_10\\_37\\_4194](http://www.persee.fr/doc/caoum_0373-5834_1957_num_10_37_4194). Accessed March 21, 2017.
- Paulus, Iris. 1994. *Le fonctionnement du marché ovin au Maroc: Approche méthodologique et résultats de l'étude pilote au Moyen Atlas*. Schriftenreihe des Seminars für Landwirtschaftliche Entwicklung Humboldt-Universität zu Berlin, Landwirtschaftlich-Gärtnerische Fakultät 166. Weikersheim: Margraf.

- Peck, Jamie, and Adam Tickell. 2002. "Neoliberalizing Space." *Antipode* 34 (3): 380–404. <https://doi.org/10.1111/1467-8330.00247>.
- Pfeifer, Karen. 1999. "How Tunisia, Morocco, Jordan and even Egypt became IMF "Success Stories" in the 1990s." *Middle East Report*, no. 210: 23–27. <https://doi.org/10.2307/3012499>.
- Pica-Ciamarra, Ugo, Joachim Otte, and Chiara Martini. 2010. "Livestock Sector Policies and Programmes in Developing Countries: A Menu for Practitioners." Rome: Food and Agriculture Organization of the United Nations. Accessed April 04, 2018. <http://www.fao.org/docrep/012/i1520e/i1520e00.pdf>.
- Popper, Karl R. 1990. *A World of Propensities*. Bristol: Thoemmes.
- Porch, Douglas. 1986. *The Conquest of Morocco*. Reprint. New York: Fromm.
- Province de Jérada. 2007. "Monographie de la Province de Jérada." Province de Jérada.
- Rachik, Hassan. 2000. *Comment rester nomade*. Casablanca: Afrique Orient.
- Rachik, Hassan. 2002. "Comment disparaît une norme." In Mahdi 2002, 57–63.
- Rachik, Hassan. 2009. "Les Nomades et l'argent." In Bonte, Elloumi, Guillaume, and Mahdi 2009, 79–89.
- Robbins, Paul. 2004. *Political Ecology: A Critical Introduction*. Critical Introductions to Geography. Malden, Oxford, Carlton: Blackwell Publishing.
- Roosth, Sophia, and Susan Silbey. 2009. "Science and Technology Studies: From Controversies to Posthumanist Social Theory." In Turner 2009, 451–73.
- Rovelli, Carlo. 2018. *The Order of Time*. London: Allen Lane.
- Sayre, Nathan F., Diana K. Davis, Brandon Bestelmeyer, and Jeb C. Williamson. 2017. "Rangelands: Where Anthromes Meet Their Limits." *Land* 6 (2): 31. <https://doi.org/10.3390/land6020031>.
- Schatzki, Theodore R. 2002. *The Site of the Social: A Philosophical Account of the Constitution of Social Life and Change*. University Park, PA: The Pennsylvania State University Press.
- Schilling, Janpeter, Korbinian P. Freier, Elke Hertig, and Jürgen Scheffran. 2012. "Climate change, vulnerability and adaptation in North Africa with focus on Morocco." *Agriculture, Ecosystems and Environment* 156: 12–26. <https://doi.org/10.1016/j.agee.2012.04.021>.
- Scholz, Fred. 1999. "Nomadismus ist tot." *Geographische Rundschau* 51 (5): 248–55.
- Scoones, Ian, ed. 1995. *Living with Uncertainty: New directions in pastoral development in Africa*. London: Intermediate Technology Publications.
- Scoones, Ian. 1995. "New directions in pastoral development in Africa." In Scoones 1995, 1–36.

- Scoones, Ian, and Michele Nori. 2018. "Pastoralism, Uncertainty, Resilience: Introducing the PASTRES Project." Accessed July 31, 2018. <https://steps-centre.org/blog/pastoralism-uncertainty-resilience-introducing-pastres-project/>.
- Selmi, Salah, and Mohamed Elloumi. 2007. "Tenure foncière, mode de gestion et stratégies des acteurs: Le cas des parcours du Centre et du Sud tunisien." *VertigO Hors Série* 4.
- Sen, Amartya. 2000. *Development as Freedom*. New York: Anchor Books.
- Sippel, Sarah Ruth. 2014. *Export(t)räume: Bruchzonen marokkanischer Landwirtschaft*. Global Studies. Bielefeld: transcript Verlag.
- Skounti, Ahmed. 2012. *Le sang et le sol: Nomadisme et sédentarisation au Maroc*. Les Ayt Merghad du Haut-Atlas oriental. Études 33. Rabat: Imprimerie El Maarif Al Jadida; Institut Royal de la Culture Amazighe.
- Slegers, Monique F. W. 2008. "'If only it would rain': Farmers' perceptions of rainfall and drought in semi-arid central Tanzania." *Journal of Arid Environments* 72: 2106–23. <https://doi.org/10.1016/j.jaridenv.2008.06.011>.
- Slimani, Halima, Ahmed Aidoud, and Françoise Rozé. 2010. "30 Years of protection and monitoring of a steppic rangeland undergoing desertification." *Journal of Arid Environments* 74 (6): 685–91. <https://doi.org/10.1016/j.jaridenv.2009.10.015>.
- Solway, Jacqueline S. 1994. "Drought as a 'Revelatory Crisis': An Exploration of Shifting Entitlements and Hierarchies in the Kalahari, Botswana." *Development and Change* 25: 471–95.
- Steinmann, Susanne H. 2001. "Gender, Pastoralism and Intensification: Changing Patterns of Resource Management in Eastern Morocco." PhD Thesis, Graduate School of Geography, Clark University.
- Stewart, Jon, David Javerbaum, Rory Albanese, Steve Bodow, and Josh Lieb. 2010. *Earth (The Book): A Visitor's Guide to the Human Race*. New York: Grand Central Publishing.
- Swearingen, Will D. 1992. "Drought Hazard in Morocco." *Geographical Review* 82 (4): 401–12.
- Swift, Jeremy. 1989. "Why are Rural People Vulnerable to Famine?" *IDS Bulletin* 20 (2): 8–15. <https://doi.org/10.1111/j.1759-5436.1989.mp20002002.x>.
- Tarik, Rachid. 2012. "Réchauffement climatique: L'adaptation anticipée à la sécheresse." *Le Matin*, December 11. No. 14 881. Accessed April 11, 2013. <http://www.lematin.ma/reader/2012,11,12,lematin.html>.
- Thomas, Nick J.W., and Mustapha Bounejmate. 2005. "The Use of Satellite Imagery to Detect Agricultural Field Encroachment on the Communal Rangelands of the Aïn Béni Mathar Commune, NE Morocco." Accessed April 04, 2018. <http://www.isprs.org/proceedings/2005/ISRSE/html/papers/458.pdf>.

- Tiercelin, Claudine. 2011. *Le Ciment des choses: Petit traité de métaphysique scientifique réaliste*. Science & Métaphysique. Paris: Ithaque.
- Toth, Russell. 2015. "Traps and Thresholds in Pastoralist Mobility." *American Journal of Agricultural Economics* 97 (1): 315–32. <https://doi.org/10.1093/ajae/aau064>.
- Toulmin, Camilla. 1995. "Tracking through drought: Options for destocking and restocking." In Scoones 1995, 95–115.
- Tozy, Mohamed. 2002. "Des tribus aux coopératives ethno-lignagères: Histoire d'une mutation en cours sur les hauts plateaux de l'Oriental." In Mahdi 2002, 19–38.
- Tozy, Mohamed. 2009. "Leaders et leadership: Configurations complexes, ressources politiques et influence potentielle des leaders dans le cas de l'Oriental marocain." In Bonte, Elloumi, Guillaume, and Mahdi 2009, 363–78.
- Trautmann, Wolfgang. 1985. "The Impact of the Agrarian Revolution on Nomadism of the Algerian Steppe." *Nomadic Peoples* (17): 23–33.
- Trautmann, Wolfgang. 1989. "The nomads of Algeria under French rule: A study of social and economic change." *Journal of Historical Geography* 15 (2): 126–38.
- Troin, Jean-François. 1975. *Les Souks marocains: Marchés ruraux et organisation de l'espace dans la moitié Nord du Maroc*. Connaissance du monde méditerranéen. Aix-en-Provence: Édisud.
- Trottier, Julie. 2008. "Water crises: political construction or physical reality?" *Contemporary Politics* 14 (2): 197–214. <https://doi.org/10.1080/13569770802176929>.
- Tsing, Anna Lowenhaupt. 2015. *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton, Oxford: Princeton University Press.
- Turner, Bryan S., ed. 2009. *The New Blackwell Companion to Social Theory*. Blackwell Companions to Sociology. Chichester: Wiley-Blackwell.
- UN. 2015. "Transforming our world: the 2030 Agenda for Sustainable Development." A/RES/70/1. General Assembly of the United Nations. Accessed April 27, 2017. [http://www.un.org/ga/search/view\\_doc.asp?symbol=A/RES/70/1&Lang=E](http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E).
- USAID. 1986. "Final Report: Activities, Findings and Conclusions of the Range Management Improvement Project 608-0145 Morocco." Washington, D.C. U.S. Agency for International Development.
- USAID. 2006. "Promotion des viandes ovines à l'Oriental." U.S. Agency for International Development. Accessed March 31, 2011. [http://pdf.usaid.gov/pdf\\_docs/PNADH517.pdf](http://pdf.usaid.gov/pdf_docs/PNADH517.pdf).
- Vidal-González, Pablo, and Badiha Nahhass. 2018. "The use of mobile phones as a survival strategy amongst nomadic populations in the Oriental region (Morocco)." *GeoJournal* 83 (5): 1079–90. <https://doi.org/10.1007/s10708-017-9823-6>.

- Waal, Alexander de. 1989. *Famine that kills: Darfur, Sudan, 1984-1985*. Oxford Studies in African Affairs. Oxford: Clarendon.
- Wainwright, Oliver. 2015. "In Iceland, 'respect the elves – or else'." *The Guardian*, March 25. Accessed March 16, 2017. <https://www.theguardian.com/artanddesign/2015/mar/25/iceland-construction-respect-elves-or-else>.
- Wandel, Johanna, Harry Diaz, Jim Warren, Monica Hadarits, Margot Hurlbert, and Jeremy Pittman. 2016. "Drought and Vulnerability: A Conceptual Approach." In *Vulnerability and Adaptation to Drought: The Canadian Prairies and South America*, edited by Harry Diaz, Margot Hurlbert, and Jim Warren, 15–36. Energy, Ecology, and the Environment Series 9. Calgary: University of Calgary Press.
- Watts, Michael. 1983. "On the Poverty of Theory: Natural Hazards Research in Context." In *Interpretations of Calamity: From the Viewpoint of Human Ecology*, edited by Kenneth Hewitt, 231–62. The Risks & Hazards Series 1. Winchester: Allen & Unwin.
- Wehr, Hans, and J Milton Cowan. 1994. *A dictionary of modern written Arabic: (Arabic-English)*. 4th ed. Urbana, IL: Spoken Language Services.
- Wilhite, Donald A. 2000. "Drought as a Natural Hazard: Concepts and Definitions." In *Drought: A Global Assessment*. Vol. 1, edited by Donald A. Wilhite, 3–18. London: Routledge.
- World Bank. 2013. "Implementation Completion and Results Report (TF-58314) on a Grant in the Amount of US\$ 43.2 Million from the Global Environment Facility Trust Fund to the Office National de l'Electricité et de l'Eau potable (ONEE) of the Kingdom of Morocco for an Integrated Solar Combined Cycle Power Project." ICR00002693. The World Bank. Accessed April 04, 2018. [https://www.thegef.org/sites/default/files/project\\_documents/647-P041396\\_0.pdf](https://www.thegef.org/sites/default/files/project_documents/647-P041396_0.pdf).
- Woudenberg, Donna L., Donald A. Wilhite, and Michael J. Hayes. 2008. "Perception of Drought Hazard and its Sociological Impacts in South-Central Nebraska." *Great Plains Research* 18: 93–102.
- Yacoubi, Mohamed, Mohamed El Mourid, Nabil Chbouki, and Claudio O. Stockle. 1998. "Typologie de la sécheresse et recherche d'indicateurs d'alerte en climat semi-aride marocain." *Sécheresse* 9 (4): 269–76.