In Goat we Trust:
An Ethnographic Case Study on Pastoralist Livelihoods and Climate Resilience in the Makreri Village Community in India

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Abstract

This ethnographic case study examines the rural livelihood strategies and climate resilience of indigenous Bhil people of Makreri village community in semi-arid Rajasthan, India. This study explores the strategies that the Bhil smallholders have applied when adapting to current changes in local climate and furthermore, when preparing for future interruptions related to global climate change. This study focuses on alteration in rural livelihood strategies and aims at understanding what has urged the Makreri community to trust on goat production when rearranging their livelihoods. This study presents the livelihood strategies of the Makreri Bhil people, their perceptions of livelihood security and the ways they experience the opportunities and risks related to goat production in the course of global climate change.

The empirical data consists of 32 thematic interviews, 24 livelihood asset surveys and researcher's field notes from a two-month fieldwork period conducted in the village Makreri in Rajasthan, India between April 2016 and May 2016. The research data is analysed by using the method of abductive thematic analysis. The theoretical approach of the study is based on resilience thinking first introduced by ecologist Crawford Stanley Holling and other scholars of the Resiliences Alliance, and theories of social capital, livelihoods and social resilience by social scientists Neil Adger, Mick Kelly, Nicoline de Haan, and economist Laurenz de Haan.

The main results show that in the local environment of semi-arid Rajasthan rearing of goats is considered a favourable and often accessible alternative to agriculture. Due to the multiple uses of livestock, rapid reproduction and easy transformation into cash resources, goat production has taken a central role in ensuring rural livelihoods and food security. Goat milk has also an important position in the local barter system where women exchange milk and other goods and services. As the animal is easy to turn into liquid money, owning a few goats also guarantees the owner with a steady access to formal and informal credit. Therefore, the study indicates that in an area where formal institutions have failed to provide the local communities with key resources and services, social networks and informal systems of resource redistribution have a central role in building resilience.

Keywords Resilience, goat production, climate change, rural livelihoods, social capital
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Tiivistelmä
Pro gradu -tutkielmassani tarkastelen Bhil -alkuperäiskansan toimeentulostrategioita ilmastoresilienssin näkökulmasta Makrerin kyläyhteisössä Rajasthanin osavaltiossa Intiassa. Tutkimuksen tarkoituksena on ymmärtää, millaisia strategioita yhteisön pienviljelijät ovat käyttäneet sopeutuessaan nykyisiin ja valmistautuessaan tuleviin ilmastonmuutoksen paikallisesti havaittuihin vaikutuksiin. Tutkimus tarkastelee muutoksia maaseudun toimeentulostrategioissa ja pyrkii ymmärtämään niitä tekijöitä, joiden ansiosta Makrerin pienviljelijät ovat turvautuneet vuohen tuotantoon etsiessään uusia toimeentulon muotoja. Tutkimuksessa tuodaan esille vuohen tuotantoon turvautuneiden pienviljelijöiden näkemyksiä turvatusta toimeentulosta sekä vuohen tuotantoon liittyvistä mahdollisuuksista ja riskeistä ilmastonmuutoksen vaikutuksille alttiilla alueella.

Etnografisen tutkimuksen empiirinen aineisto koostuu 32 temaattisesta haastattelusta, tutkijan kenttämuistiinpanoista sekä kotitalouksien toimeentuloa koskevasta kyselytutkimuksesta, johon kerättiin 24 vastausta. Aineisto on kerätty kahden kuukauden kenttätyöjakson aikana Makrerin kylässä huhtikuun 2016 ja toukokuun 2016 välillä. Tutkimusaineiston analyysiin on käytetty abduktiivisen analyysin menetelmää. Tutkimuksen teoreettinen viitekehys perustuu ekologi Crawford Stanley Hollingin esittelemään resilienssiajatteluun, sekä sosiaalisen pääoman, toimeentulon ja sosiaalisen resilienssin teorioihin, joita yhteiskuntatieteilijät Neil Adger, Mick Kelly, Nicoline de Haan ja ekonomisti Laurenz De Haan ovat esitelleet.

Tutkimustulokset osoittavat, että kuivuudelle alttiin Rajasthanin alueella vuohien kasvatusta pidetään suotuisana ja pienviljelijöille taloudellisesti saavutettavissa olevana vaihtoehtona maanviljelylle. Vuohen tuotannolla on keskeinen rooli maaseudun ruokaturvan ja toimeentulon takaamisessa. Vuohi on monikäyttöinen, nopeasti lisääntyvä eläin, joka on helppo myydä ja muuttaa käteisvarannoksi. Vuohenmaidolla on tärkeä asema myös paikallisessa vaihtokauppajärjestelmässä, jota yhteisön naiset käyttävät elintarvikkeiden, tavaroiden sekä palveluiden uudelleen jakoon. Tutkimus osoittaakin, että alueella, jolla viralliset instituutiot eivät ole onnistuneet tarjoamaan turvatun toimeentulon ja perustarpeiden toteutumisen kannalta keskeisiä voimavaroja ja palveluita kyläyhteisön jäsenille, sosiaalisilla verkostoilla ja epävirallisilla resurssien uudelleenjakojärjestelmillä on tärkeä rooli myös resilienssin rakentamisessa.

Asiasanat
Resilienssi, vuohen tuotanto, ilmastonmuutos, maaseudun elinkeinot, sosiaalinen pääoma

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1 Livestock Production and Climate Change Adaptation

> We found the water bond empty, land crackling on the bottom. She directed her animals towards the mountains to continue the search. One after another the goats disappeared into the golden light of dawn. The rising sun, accompanied with the twinkling of goat bells, painted a portrait of unequalled, yet deceptive tranquillity. "We have a saying that goats eat everything but stones." she said, "but sometimes when I walk here, I wonder if I should feed them with stones. There's nothing else left anymore."
>
> Field notes, 16th of April 2016

The looming threat of climate change has become one of the most pressing issues of our time and its exacerbating effects are already remarkable in many parts of the world. In the past decades two principal policy approaches, mitigation and increasingly adaptation, have dominated the global discourse on climate change (Metz 2010, p. 65). However, a continuous rise in mean temperatures for the rest of the century is very much unpreventable. Regardless of our best efforts, climate change related losses will be ensued in the progress of global warming (Adger et al. 2009). The magnitude of change is about to be out of our abilities to manage, and both, social and biophysical options for adaptation will be stretched to the limits (Nelson 2011, p. 113).

Academic literature is increasingly arguing that there is a strong demand to focus not only on climate change mitigation and adaptation but also on climate resilience, a concept which unites the two critical aspects of climate change measures, adaptation, and the capacity of the social-ecological systems to renew, learn, and deploy disturbances as opportunities for transformation (Nelson et al. 2007, p. 396). Although humankind has always been living with and adapting to continuously changing climatic conditions, the future challenges are projected to be of such a magnitude that not only the local communities directly exposed but also the global population at large are both facing an unprecedented challenge rising from the global climate change (Christoplos et al. 2009).

The Global South is considered exceedingly vulnerable to the mischievous impacts of climate change. In developing countries, shortages of water and food and increasing risks to health are mundane for millions of people (Kaushik & Sharma 2015, p. 41). As many developing countries are heavily dependent on climate sensitive production sectors, global warming is likely to cause remarkable economic losses and affect both, national economies, and local livelihoods. More than 700 million people in rural India are directly dependent on climate-sensitive activities, agriculture, forestry, and natural resources such as water and grasslands (Government of India 2008). With climate-sensitive production strategies in the core of their livelihood portfolio, they often lack proper measures for

climate adaptation (Crate and Nuttal 2009, p. 14–15). Social marginalization, alongside with chronical poverty, is limiting the adaptive capacity of most dryland farmers, forest dwellers and nomadic shepherds of the arid and semi-arid lands of India (Government of India 2008). Unpredictable weather conditions, lengthy dry seasons and unreliable rainfall is hitting the hardest the people already living in the threshold of human survival, with no steady access to the basic prerequisites of life; food, water, and shelter (IPCC 2001, p. 2). Along the years pastoralism, a subsistence pattern relaying on livestock production on native pastures, has proved its adaptability to climatic changes probably better than any other rural land use strategy (Davies & Nori 2008).

After being hit by a series of prolonged droughts in the beginning of the 21st century, the arid- and semi-arid Rajasthan in India has been subjected to a significant shift in the subsistence patterns. Inhabitants of the Indian drylands have been obliged to introduce additional climate adaptation measures to respond to the emerging challenges and are increasingly seeking new livelihood opportunities inside the pastoralist production system. While uncertain crop production has failed to meet the subsistence needs in the drylands, also the demographic livestock ration has been reversed upside down by small ruminants coming to dominate the livelihood strategies of small-scale and marginal farmers (Robbins 1994, p. 6-8). Goat production, in particular, has proved its remarkable potential in the rural drylands of Rajasthan. Currently, the state holds over 14% of the Indian goat population and as the total number of heads in the area has exceeded 21.6 million, goat has proved its crucial position in the arid economy and ecology (Bhawan 2012, p. 23).

Under the traditional low input production systems, goat production has overcome most of the financial constraints of small holders and the animal occupies a multi-functional position in the rural livelihoods (Dey et al. 2007). Goat production has a significant role in the income generation and household nutrition of landless, small, and marginal farmers in agro-pastoral subsistence societies. For the resource poor dryland dwellers, goat has a significant economic importance providing high value milk products and round the year employment with low investments and input cost (Kumar et al. 2010, p. 1).

Due to the progressive goat meat demand and flexible markets, goat is often the most significant source of income and store of wealth in the rural economies where the animal is considered as a liquid asset, easily realizable into cash in the times of drought or other natural calamities (Kumar et al. 2010, p. 1). Because of its economic advantages, goat production sector in India has witnessed continuous growth over the past decade and the country accounts for one fifth of the world goat production (Dey et al. 2007). Simultaneously, emerging markets are providing new opportunities for the marginal producers as global livestock sector is undergoing fundamental changes at a rapid pace. Globalization,

together with growing demand for milk and meat products in developing countries, especially in Asia, is reshaping the global livestock markets (Gertel & Le Heron 2011, p. 5-7).

My research rests on a case study carried out in Makreri, a traditional Bhil village situated in semi-arid Rajasthan. In the course of repetitive and prolonged dry spells in the past decade, increasing number of Makreri households have incorporated goat production into their subsistence systems to sustain the livelihoods during the droughts. The research aims at understanding the motivation behind the strong tendency of the local households to prefer goat production over other production strategies. Furthermore, the research seeks to assess the climate resilience of Makreri subsistence system where goat production is understood as a drought resilient adaptation measure for changing climate. To grasp the cultural meaning of goat production the research attempts to explain how social relations are embedded in local subsistence system and how goat production is either reconstructing or strengthening the existing social structures. By that means, the research aims at evaluating what kind of adaptation measures seem available for rural smallholders often encountering the changing climate from an unequal socioeconomic position.

1.1 Introduction to Case Study Area

> Despite the restless movements near and around the community water tank, the village was deathly quiet; no one fetching water, no one washing clothes. No jovial chit chat reverberating around the village. The last bucket of water had been fetched from the dug well and the midday heat, today +49 °C, dried up the last drops of hope. The rumours told about the government's emergency water transportations but yet the despair spoke louder; no one knew whether the water truck would reach the village or not.
>
> Field notes 11th of May 2016

In India, the negative impacts of climate change are already experienced in the drylands of Rajasthan located in the northwest of the country. In the area climate has always been characterized by hot and dry winds accompanied with destructively high temperatures during the first months of the year and followed by the monsoon rains in the end of June. Rajasthan, as a state covering approximately 10% of India's land area, has only 1.2% of the country's water resources and experienced altogether 48 drought years in the 20th century. In only nine years none of the districts suffered from severe water shortages and local livelihood strategies in the area have always been determined by low productivity of the arable farmlands, scarce rainfall, and limited groundwater resources (Rathore 2004, p. 1–2).

Climate change is projected to add pressure to the local environment by increasing average mean temperatures and reinforcing the intensity of the rainfall events - both implications already evidenced in the area. Simultaneously, increased spatial and temporal unpredictability of the monsoon season has been experienced and is predicted for the future. The Southwest monsoon, which provides 94 per cent of rainfall in the state of Rajasthan, is witnessing an alarming change and is recorded to become unpredictable regarding the onset, duration, and the amount of rainfall. These fluctuations have been perceived to cause periodic conditions of extreme wet, on the one hand, and extremely dry on the other, both adversely affecting agricultural yields, water resources and human livelihoods (Stanford Woods Institute for the Environment 2014).

The research for the case study was carried out in Makreri, a village situated in Bhilwara, a drought-prone district in the heart of Rajasthan, with average annual rainfall of 603.3 mm per year, out of which only five percent is received outside the monsoon season (Ministry of Water Resources of Government on India 2013, p. 3). Makreri is a traditional one caste Bhil village with a total population of 710 people divided into 148 households, all of them living below the income-based poverty line[1] defined by the Indian state government. The Makreri households leaned on a mixed cash and subsistence-based economy in which neither of the sectors was strong enough to provide round the year employment or ensure sufficient income or food security. In such a subsistence system rainfed crop production and wage employment have traditionally supported each other over the changing seasons. In the course of repetitive and prolonged dry spells in the past decade, an increasing number of Makreri households have incorporated goat production into their subsistence systems to first of all, compensate for failed harvests and furthermore sustain the livelihoods during the droughts.

The strong tendency of local households to prefer goat production became evident during the first and second phase of a Village Community Empowerment (VCE) project[2] implemented in the area in 2010–2016. I became familiar with the project outcomes when I hold the position of project coordinator from August 2015 to March 2016. One of my responsibilities was to carry out the final evaluation of the second phase of the project in January–February 2016. During the evaluation trip I visited several villages in the area and gained understanding of the local surroundings.

[1] Income poverty in India has been defined in terms of the cost of basic education, healthcare and required calorie intake. In this manner, the poverty line in the rural areas is below the daily income of Rs. 32 while in the urban areas the line is Rs. 47.

[2] The Village Community Empowerment project was funded by the Ministry for Foreign Affairs of Finland and implemented in cooperation with the Student Union of University of Jyväskylä and the Bal Rashmi Society India. The project aimed at improving the living conditions of rural communities with scheduled castes and tribes status.

Makreri was one of the beneficiary villages. From the project reports I learns that under the Income Generation Loan Programme, the project allocated 24 microloans to the Makreri households, out of which, 21 loans were invested in goat production. Similar investment strategies were documented in all the other project villages as well. However, it was not only the VCE beneficiary households who engaged themselves into goat production, but it seemed that also the other Makreri families were actively seeking financing solutions outside the Income Generation Loan Programme to begin with small-scale goat production and tackle the drought-related hazards.

As a country with developing status and over one fifth of its population living below the poverty line (Planning Commission of India 2013), India is still holding on the national development agenda prioritizing economic development and poverty reduction over climate change adaptation efforts and reduction in carbon dioxide emissions (Tandon, 2013, p. 28-29). Following the decades of isolation and socio-political marginalization, the disproportionate distribution of the implications of global warming are predicted to reinforce the existing inequalities and limit the political power of the marginalized segments of the society (Bryant & Bailey 1997, p. 28). Low profits, and limited access to most primary necessities of life generate extreme vulnerabilities to climate related shocks. The structures of poverty and social deprivation are hence inherently incorporated in the issue of global climate change, which is increasingly a matter of human rights and social justice (Crate & Nuttal 2009, p. 14–15).

Global climate change is predicted to place a disproportionately heavy burden on the livelihoods of indigenous people residing the rural areas with community forest resources and rain-fed agriculture in the core of their livelihood portfolios. Rajasthan, being one of the areas most affected, is providing a home for 8.6 % of India's indigenous communities, with the Bhil people listed as the largest indigenous group in the country. Following decades of political neglect and social exclusion by the Indian state government, the scheduled tribes are among the most deprived socio-economic groups in the country (Ibid, p. 14–15). Their financial constraints are often coupled with social marginalization, illiteracy, and unequal access to resources, all of them characterizing the local life of Makreri and influencing the local levels of adaptive capacity.

The rural development in the state of Rajasthan is hindered by several challenges from chronic water scarcity to the lack of basic infrastructure and services. Makreri is one amongst the many rural communities not connected to the public water supply system and the village lacks any system for sanitation. In the absence of established and functioning water points and hand pumps, the households depend on one communal borehole well and a communal water harvesting tank as the primary source

of drinking water. Poor sanitation in turn, is linked to transmission of diseases such as cholera, and diarrhea, both relatively common in the area.

While over 60% of Rajasthan's farmers lack access to irrigation and are depending on the uncertain rainfall for their livelihoods and food security, agricultural land in Rajasthan is becoming increasingly fragmented. Majority of the farmers in the area have a holding of one hectare or less, one fifth of the rural population in the region remain landless (Rathore 2005). The majority of Bhil people in Makreri depend on either the sharecropping contracts or community land and forest resources for their subsistence production. For their food security, all of the Makreri households depend upon the Antyodaya Anna Yolana sponsored scheme under which the poorest of the poor families (e.g., those with the Scheduled Castes or Tribes status) are entitled to receive a monthly allowance of stable cereals with a highly subsidised price.

1.2 Research Problem

> It was a shadow of an animal, a cow so skinny it hurt to see the hip bones stick through its weather-beaten skin. It was only the harsh, rasping *moo*, that certified it actually was a living creature, not a walking skeleton, when the couple, a stooping old lady and the animal, passed by the yard. "See", she said, as if I wasn't staring already. "It's like travelling in time. That's how the village looked ten years ago. Not much life in there, ha? You see a cow like that, and I guarantee the lady hasn't eaten for days. You feed the cow but what's there left for you anymore?"
>
> Field notes, 9th of April 2016

This research aims to examine the alterations in livelihood strategies the Bhil people in Makreri have taken in order to respond to past changes in the local environment. Furthermore, the research seeks to assess how these alterations in livelihood strategies have affected their resilience and adaptability to current and forthcoming hazards either directly or indirectly related to global climate change. The inherent motivation behind the research was to explain what has urged the dryland communities to trust on goat production when rearranging their adaptation strategies while encountering various financial constrictions coupled with unpredictable climate conditions. Simultaneously, the thesis aims at assessing how the recent shift from crop to goat production in the local subsistence pattern has affected the community's capability to respond to the global environmental change. The objective of the research is thus to discuss how goat production, understood as a climate adaptation mechanism, has affected the climate resilience of the indigenous and scheduled Bhil community in Makreri and

to estimate how the existing institutional structures in the area support the marginal and small-scale livestock owners in building resilience.

The research rests on ethnographic fieldwork carried out in the village Makreri in Rajasthan, India. The two-month fieldwork was conducted between the months of April and May in 2016, with majority of the data stemming from theme interviews and participatory observation as outlined in the following sub-chapters. Although qualitative case studies commonly draw from empirical data collected from the field, the respective cases are always tied to their particular historical, socio-economic and physical contexts which equally call for attention (Stake 2005, p. 447). In this regard, previous case studies have guided the fieldwork and provided the tools to facilitate an enhanced understanding of the Makreri case study. This research resorts to other literature on Indian pastoralism, both as an instrument to cross-examining results and as means to instruct analysis of the empirical data. The ground-breaking English literature of Anandam Kavoori (1999, 2015), Vijay Paul Sharma (2003, 2015), Ilse Köhler-Rollefson (2003) and Garima Kaushik (2015) have widened my understanding of small-scale goat production in India and furthermore clarified the historical and socio-economic circumstances partly determining the livelihood alternatives of indigenous communities. Furthermore, the work of Saverio Krätli and Nikolaus Schareika (2010), Tobias Hagmann and Chinwe Ifejika Speranza (2010), Javier Nori (2005), Nicoline De Haan (2000) and their vast literature on African pastoralism, a topic more researched on, has been an important source of inspiration providing a variety of lenses through which the data has been discussed.

For its theoretical framework the research rests on the concept of resilience, explored in the context of global climate change and understood as the ability of an individual, a household or a community to access, reorganize and mobilize resources in order to mitigate damage, take advantage of opportunities, and cope with the effects of disasters and shocks (Keck & Sakdapolrak, 2010). The resilience theory draws on systems thinking where a system is understood as a range of interrelated variables that interact with each other (Rodin 2014, p. 3). A change in one element causes change in other elements and thus affects all the system functions (Orr 2014). In this manner, the systems thinking is helpful to gain understanding of the linkages between otherwise distinct elements and perceive the counter-intuitive consistency behind the actions (Blakeley 2016, p. 8). Resilience thinking is not designed to choose among livelihood outcomes, but to perceive the system dynamics that may be preferred over others (Walker et al. 2006). Hence, issues such as access to different forms of capital, incompatible cross-scale dynamics, and interdependencies between different actors provide a basis for resilience analysis and were considered applicable for the research.

This research seeks to answer the following questions:

1. How has the introduction of goat production affected the livelihood security of the Bhil community?
2. How do the existing institutional structures in the area support the marginal and small-scale livestock owners in building resilience?
3. How are social relations embedded and reproduced in the small-scale goat production system in Makreri?

1.3 Livestock Production in Changing Climate

According to archaeological evidence, the pastoralist production system took rise in Africa over 6000 years ago as a direct response to unpredictable weather and increasingly arid climatic conditions (Davies & Nori 2008). Since then, the livestock keepers have continuously governed the shifting, if not depleting, resources either by growing the herd sizes to buffer against dry spells or by making modifications in livestock types as a response to climatic stress arising from the arid and semi-arid landscape (WISP 2010, p. 1). Pastoralist livestock production, while often considered to be a central contributor to climate change and land erosion, has thus been a prominent land use strategy and adaptation mechanism for populations encountering high rainfall variability and prolonged droughts. Academic research on pastoralist production systems, however, remains exceedingly inadequate the world over, whereas Indian pastoralism, in particular, is widely ignored in academic and anthropological literature (Sharma et al. 2003, p. 1).

Several endeavours have been taken when seeking to define pastoralism. Yet, most of them have failed to grasp the different forms and vast disparity of livestock systems that exist in the world within a variety of local climatic conditions and socio-cultural and economic circumstances (WISP 2010, p. 4). Essentially, pastoralism is understood as a subsistence system deploying natural resources on open pastures, often in the areas scarce on resources (Krätli & Schareika 2010, p. 605). The definition, however, remains incomplete, as it only comprises the ecological component of pastoralist production and understands it firmly as a natural production strategy. Instead, pastoralism should be defined as a complex social entity and cultural system, which does not only rely on livestock and local ecology but incorporates a plethora of cultural, political, and economic elements and a complicated network of social relations (Salzman 2004).

Nori et al. (2005, p. 5) define pastoralism as "the finely-honed relationship between local ecology, domesticated livestock and people in rangelands, particularly in resource-scarce and ecologically-variable regions, often at the threshold of human survival" (Ibid., p. 5). This definition is applicable

to describe the wide range of social-ecological systems, diverse livelihood strategies and differing degrees of mobility of the nomadic, transhumance[3] and agro-pastoral population in the drylands (Hagmann & Ifejika Speranza 2010, p. 594). Nevertheless, several pursuits have been taken to divide the pastoralist production systems into different categories based on their ethnic origin or levels of mobility. As commonly understood, nomadic production is characterized by random movements in the open pastures dictated by the availability of grazing land, while transhumance pastoralism is determined by seasonal movements following precise routes. Agro-pastoralism, in turn, is also extensive in nature but practised alongside with crop production (Niamir-Fuller 1999). To draw attention to the cultural components of pastoralist production, Sharma et al. (2003, p. 3) have defined the Indian pastoralist as the "members of caste or ethnic groups with a strong traditional association with livestock-keeping [--] where households are responsible for the full cycle of livestock breeding". Thereby, a great share of the pastoralist groups in India are connected to their livestock by their myth of origin narrating their ancestral roots, identity, and purpose of life in the particular circumstances (Ibid., p. 3).

However, in an environment where pastoralism serves as one of the most viable livelihood options, animal husbandry has become an increasingly common strategy for drought adaptation also amongst the populations without pastoral cultural inheritance, and furthermore, at all levels of social ladder (Kavoori 2016, p. 30). Communities with traditional hunter-gatherer identity have integrated livestock into their production strategies as depleting natural resources and various nature conservation and wildlife protection schemes have restricted their livelihood opportunities (Blench 2001, p. 46). Hence, in order to underline the inherent flexibility, not only inside the pastoralist production system but also between the various activities inside the dryland livelihood portfolios, Kavoori (1999, p. 189) proposes that "Rajasthani pastoralists are simply members of a more generally distributed society who move in and out of pastoralism as circumstance and opportunity indicate." Considering the boom-and-bust nature of pastoralist production in arid lands of Rajasthan, it can be understood as a climate adaptation strategy coming to dominate livelihood activities in the times of scarcity and risk (Ibid., p. 189).

One of the central features of pastoral systems have commonly been their ability to manage uncertainty and increasingly arid environments – circumstances becoming more and more common in the course of global climate change. Decreasing precipitation rates and increasing temperatures are projected to give rise to major changes in land use strategies all around the world. While marginal

[3] Transhumance is a type of pastoralism where livestock is seasonally moved between fixed summer and winter pastures.

agricultural lands are expected to lose their potential for crop production, the areas unsuitable for crop production are presumably returning to the state where the open hectares were deployed by pastoralist production. At the same time pastoral communities have incorporated temporal crop production into their livelihood portfolios in order to compensate livestock losses and complement livelihood opportunities in the aftermath of droughts (Niamir–Fuller 1999, p. 110–111). In this regard, it may be appropriate to not separate livestock and crop production from each other but approach them as “two points on a one continuum, with individuals, households and communities making alterations along the scale” in response to short-term shocks and long-term trends (WISP 2010, p. 5). Mixed farming systems can thus be approached as a strategy for adaptation and resilience (Ibid., p. 5).

Providing a complete definition of pastoralism is complex and generalizations are required. In this thesis, pastoralism is a term referring to extensive livestock production characterized by mobile management strategies and the use of common property resources. The term pastoralist therefore refers to people practicing pastoralism, whether nomadic, transhumance or agro-pastoral in nature. This is applicable as pastoralists have a range of different adaptive mechanisms and the production system is considered relatively flexible, particularly because of its adjustable levels of mobility. Yet, it is important to note that such mechanisms are effective only when managing foreseen eventualities and thus cannot be expected to react to unforeseen future disruptions (Ibid., p. 31). These alterations in the unknown future are probably the greatest challenges deriving from global climate change.

Since the beginning of the 20th century, two distinctive narratives have framed the public discourse on pastoralism, which itself is an ambiguous subject often inducing various misconceptions while avoiding conceptual characterization. Academic literature on pastoralism has become a manifestation of conflicting ontological beliefs and contradictory perceptions of being in the world. Besides academia, the contesting ideologies of human-environment interactions have also clashed in the political arena where dryland pastoralism have become a particular focus of the equilibrium/non-equilibrium debate concerning central features of the process dynamics driving social-ecological system functions (Hagmann, 2006; Hagmann & Ifejika Speranza 2010).

Equilibrium thinking came to dominate the ecological discourses in the beginning of the 20th century and since then have instructed the ecosystem management and land use practices. Until the 1960s it was commonly acknowledged that rangelands tend to approach a fixed equilibrium that is maintained through density-dependent feedback mechanism. Arid ecosystems were understood as equilibrium environments, presuming internal regulation which eventually would guarantee the gradual and often predictable changes in the vegetation, and thus facilitate the return to the pre-disturbance state after any hazardous event (Wu & Loucks 1995). In an equilibrium environment, a certain biological self-

balancing mechanism ensures that livestock and vegetation balance around the carrying capacity of an ecosystem as the degrading vegetation would limit the reproductivity of livestock (Scoones 1996). Within this line of thought, pastoralist communities in modern society were often identified as the main threat to ecosystem stability and the overstocking of pastoralist communities was understood as a manifestation of unsustainable use of natural resources resulting in land degradation and desertification (Hardin 1968).

With the onset of industrialization, the low-input low-output pastoralist system combined with gathering of natural resources was understood as an underutilization of arable lands (Hutchinson & Herrmann 2007, p. 106–107). Simultaneously, Garret Hardin's concept of the 'tragedy of the commons' (1968) fuelled the environmental regime perceiving livestock rearing on the open pastures as an inefficient and degrading land use strategy, which, as follows, was responsible for land erosion and desertification. Hardin understood the commons as a failed paradigm of resource distribution and governance which, unlike the land governed under private property rights, would inevitably lead to mismanagement and lack of regulation (Ibid). Together these suppositions contributed to the reinforcement of a discourse understanding pastoralism as a posthumous holdover from the ancient years, which thereby needed to be brought up to date to meet the needs of modern society (Hagmann & Ifejika Speranza 2010, p. 595). Thus, political interventions were directed to reduce the number of livestock in the given territory and the land under pastoral production was increasingly fragmented and transferred to serve industrial purposes, agricultural schemes, mining of multinational companies, and additionally, national parks (Sharma et al. 2003, p. 29–30).

These long-held assumptions were increasingly challenged in the 1960s and onwards when the new range ecology school provided new insights into the dryland livelihoods (Hagmann & Ifejika Speranza 2010, p. 595). It became widely acknowledged that ecosystems are far removed from an equilibrium. Rather than following predictable succession or being in a final state of equilibrium, it was increasingly argued that the dryland ecosystems are in a constant flux; the plant cover is continuously shifting in response to natural processes or human-environment interactions driven by stochastic and abiotic events. Thus, unlike in the equilibrium model, human actions are not understood as a source of outside disturbance but as an internal element of the range ecosystems (Heshmati and Mohebi 2012, p. 714–715). The non-equilibrium narrative emphasizes that rather than disruptive deviations, uncertainty and unpredictable access to resources must be understood as constructive elements of the arid ecologies (Warren, 1995, p. 193).

The dichotomy between the two separate narratives on equilibrium/non-equilibrium was further consolidated as a series of persistent droughts hit many pastoralist communities in the beginning of

the 21st century. Repeated natural calamities resulted in abject poverty and increasing food insecurity and obliged many scholars to reconsider their perspectives regarding the future development trajectories of pastoralist production. Given the emerging threat of climate change, various voices have questioned the sustainability of pastoralist systems, defining it as "outdated, unproductive or even irrational economic activity" (Hagmann & Ifejika Speranza 2010, p. 595), with Elliot Fratkin and Terrence McCabe (1999, p. 5) presenting that widespread famines and progressive aid dependency will lead to an eventual disappearance of extensive livestock production on open rangelands.

Although the view was adopted by many, the scholars of the new range ecology school argue against the extinction of the entire production system. By giving prominence to the non-equilibrium nature of the pastoralist systems, the new range ecology school underlines the adaptive capacity of pastoralist communities, and moreover, highlights the dynamic human-environment interactions in the drylands (Hagmann and Speranza 2010, p. 595). Richard Waller (1999), for instance, has indicated that pastoral resilience is justified by its rapid recoveries after natural calamities. As a key source of resilience, he highlights the flexible nature of the livestock trade facilitated through a well-organized trader network. With a constant flow of repeated expansions and contractions, the trade in animals reflects the local changes in survival circumstances, and animal sales are common risk reduction and recovery measures in the drylands (Ibid. 195–196). Livestock is therefore serving pastoral communities with insurance against sudden disasters and deteriorating climate. Thus, besides a market-oriented enterprise, pastoralist production strategy can be understood as a sophisticated risk reduction mechanism in the local landscape of opportunities and risk (Blench 2001, p. 48).

1.4 Changing Landscape of Risk

> Up until this night the people of Rajasthan have been staring at a land so parched that even the lizards died thirsty. Now, almost within the instant, the rain was beating down the weak tin roof leaking from the corners. The water run on the tinder-dry land, reaching the doorway, and slowly flowing inside. One after another the villagers clambered out of their houses. With a hint of suspicion in their faces, everybody reiterated the similar words: "Rains have never come before the end of June, the world is not how it used to be."
>
> Field notes, 22nd of May 2016

Risk management has always been a central feature of human life and development interventions have targeted the question of how the poor and vulnerable respond to risk. At present, global climate

change is reshaping the prevailing landscape of risks as its effects are estimated to affect the livelihoods, food security and health in the local communities. The impacts of climate change are mediated by institutional frameworks and social structures within and beyond their local communities. Thus, vulnerability to climate change is not only connected to a great number of natural risk factors arising from the disaster circumstances but is also a phenomenon integrated into the structures of a range of socio-economic elements (Christoplos et al. 2009, p. 3).

Sociologists such as Anthony Giddens (1998) and Ulrich Beck (2009) have both devoted their work to examine how the notion of risk has become a dominant feature of late modern social life, with Beck introducing the idea of the contemporary life as an epoch of the world risk society, where life is overshadowed by ambivalences without guarantees. The late modern days in the end of the 20th century did not only bring the topic of climate change into the core of political agendas and public debate, but modern life gave rise to a great number of new risks such as pollution, newly discovered pandemics, and global crime often coming along with globalization (Beck 2009, p. 21). Climate change is rarely the only stressor challenging the livelihood strategies of rural households, but often reinforcing the existing structures and stress factors, producing whole new vulnerabilities and thus, changing the entire landscape of risk (Christoplos et al. 2009, p. 3).

Karen O'Brien and Brian Leichenko (2000, p. 221) have approached the same phenomenon in their work as they highlighted the problem of the double exposure to the two major forces of globalization and climate change, both simultaneously affecting economic processes and livelihoods on global and local level. Rural populations, marginalized groups, and women are often the ones encountering multiple risks and seeking adaptation to balance the dangers posed by globalization and long-term global warming. Thus, one of the major challenges deriving from climate change is the fact that the losers of the climate gamble tend to be losers of globalization and trade liberalization alike (Ibid., p. 221). Ian Christoplos (2010, p. 20), however, emphasizes that "double exposures are nothing new to the rural poor or local governments" (Ibid., p. 20). Local actors, individuals, and households in the global south have always been juggling livelihood choices, opportunities, and risks. The constant battle between needs and wants often provokes conflicting objectives, requiring trade-offs and re-organization of livelihood strategies (Chambers 2006). When trying to capture opportunities and mobilise resources to avoid the risks, the rural poor may conceivably be more concerned about the idiosyncratic risks i.e., crop failures, unemployment, illness, and other personal hurdles, which are faced in an individual level rather than being prepared to tackle the *covariate risks* such as climate change and global warming, which are often concerns of a broader level of society (Christoplos 2010, p. 15).

Lisa Schipper (2007) is exploring the changing landscape of risk and emphasizes that the climate change related risks and the risks deriving from the social and economic sphere are often acting in a mutual relationship and further strengthening each other. Therefore, the concern of climate change is inseparable from other development problematics and from the questions of social justice and human rights (Schipper 2007). Improved health and nutrition conditions, for instance, contribute to the capability to tolerate shocks and further introduce the measures necessary for coping and adaptation. Socio-economic development, yet again, is often a prerequisite for rapid recoveries and rehabilitation after natural calamities. Similarly, quality education and functional skills in literacy will facilitate climate change preparedness and early adaptation, as a certain degree of knowledge is required to enable the participation in the institutional processes through which resources and information distribution are commonly actualized (Christoplos et al. 2009).

2 Resilience Thinking and Risk Management

The following chapter will explore the two central theoretical concepts of this thesis - resilience and livelihoods – which provide the theoretical framework for the analysis of the Makreri case study. The first subsection of the chapter will define the concept of resilience and subsequently discuss resilience in connection to climate change and furthermore as a social conception. With their metalevel analysis on social resilience Markus Keck and Patrick Sakdapolrak (2010) presented a wide variety of recent literature on resilience and their work guided the formation of the theoretical framework of this research. In their research Keck and Sakdapolrak introduced various articles on social resilience emphasizing social capital, human agency, and furthermore knowledge and discourses as a form of power – topics that were of current relevance and are considered important also in the context of Makreri. Finally, the chapter will investigate the notion of livelihood – another bearing concept of this research – as assessment of climate resilience is closely tied to the questions of how local livelihood strategies are planned and played out.

2.1 To Bounce Back: Resilience as an Ability to Tolerate Disturbances

> We barely talked. He was old, serene but probably curious and me, I wanted to believe in his age-old wisdom. Our shared activities were limited to silent observation. We had a habit of sitting by the temple, watching the leaves of the grand old banyan tree withering before our eyes. We were sitting there again, leaning against the mint green stone wall when the early summer whirlwind hit the village. The whirlwind left the

> banyan tree not only naked of leaves but lopped off the branches, too. For the first time we looked at each other. “There has been hard times – and hard times will come“, he said. And then there was silence again.
>
> Field notes, 29th of April 2016

After the last decades of the 20th century, resilience has become a central concept of various scientific disciplines from natural sciences (Holling 1973) to economics (Perrings 2006), sociology (Adger 2000), and psychology (Werner 1979). Resilience is increasingly applied to facilitate interdisciplinary cooperation and exchange of thoughts between two distinctive academic communities of natural and social sciences (Keck and Sakrapoldrak 2010, p. 6). Intrinsically, the notion of resilience could be understood as an incentive to both natural and social scientists to engage in collaborative research under the shared goal of sustainability as one of the foundational features of resilience thinking was the notion that “without people, there is no disaster” (O’Keefe et al. 1976 quoted in Adger 1999, p. 251). As “environmental problems cannot be addressed in isolation of the social context” (O’Brien et al. 2009, p. 5), the human dimension of climate change i.e., the issue of exposure and ability to manage disasters is a crucial feature which needs to be considered in climate change literature (Christoplos 2009).

The concept of resilience has developed gradually from its preliminary focus on the persistence of ecological systems, through an alignment towards coupled social-ecological systems and concerns of human adaptation to environment, to its most recent readjustment covering the critical aspect of social transformation in the face of global change (Keck and Sakdapolrak 2010, p. 6). This development trajectory, and its three thresholds, also constitute the critical grounding that determine the concept of resilience, i.e., persistability, adaptability, and transformability (Ibid., p. 6), where a threshold is understood as a point where the system shifts from one regime to another and therefore indicates the level of a control, in which change generates a critical feedback “causing the system to self-organize along a different trajectory (Pisano 2012, p. 13).

Holling (1973) was the first author to introduce the notion of resilience in the field of natural science. With his work on ecosystem dynamics, Holling thoroughly challenged the former stationary, equilibrium-based models of ecosystems and approached them as complex processes that adhere to periodicity, shift between different ecological regimes, and hold the potential to abide differing states and still remain stable (Keck and Sakdapolrak 2010, p. 6). With the concept of resilience, Holling stressed “the persistence of systems and their ability to absorb change and disturbance and still maintain the same relationships between populations and state variables” (Holling 1973, p. 14).

Thereby, when shifting the thinking from desirable stability to the logic of resilience, more prominence was given to the features that supported the system through perturbations and instability and which furthermore contributed to system's intrinsic flexibility and ability to tolerate disturbances (Keck and Sakdapolrak 2010, p. 7).

2.2 Social Resilience and Risks

The concept of resilience spread from natural sciences to the study of social entities, and with the notion of social resilience the authors of resilience thinking addressed the social actors – be they individuals, communities, or social organizations – and their abilities to persist, cope with and adapt to the natural and social hazards of different kinds. As with the ecological resilience, the three thresholds (i.e., coping capacities, adaptive capacities, and transformative capacities) constitute the critical grounding that determine the concept of resilience (Keck and Sakdapolrak 2010, p. 10–11).

In the context of social resilience coping capacities refer to the immediate and "absorptive" actions taken to secure short-term survival in the moment of disaster with the available resources directly at hand. Adaptive capacities, then again, refer to the "preventive" actions that are applied to learn from the past disasters and accordingly prevent the future catastrophes (Béné et al. 2012, p. 31). Thus, the most prominent difference between coping and adaptation is rooted in the temporal context of the responsive measures. While coping is understood to describe rapid reactions and tactical agency, adaptation refers to long-term strategic planning with a future-oriented perspective (Keck and Sakdapolrak 2010, 11). Finally, transformative or "participative capacities" incorporate the questions of access and participation into the analysis of social resilience (Voss 2008, p. 39). Transformation refers to the processes in which institutional realities are reformed in order to improve social prosperity and strengthen societal resistance. What separates the transformative actions from that of adaptation, is the straightforward aspiration for radical change and progressive development in the face of prevailing or potential risk (Keck and Sakdapolrak 2010, p. 10–11).

In this manner, all the empirical studies on social resilience share the common purpose to answer to the questions "Resilience to what?" and "What is the threat or risk?" (Obrist et al. 2010, p. 289). In resilience literature risks are often presumed to stem from the external factors outside the social entities (e.g., effect of increasing cereal prices on family expenditure). However, changes in the internal system dynamics (e.g., impact of the death of the bread winner on family income) might as well pose several risks for different social units. Rather than being mutually exclusive, the interplay between the internal and external risk factors might strengthen each other and create additional

perturbations (Gallopín 2006, p. 295). Thus, social and ecological dynamics are both creating their own set of risks, and social entities are ordinarily exposed to multiple risk factors simultaneously (O'Brien & Leichenko 2008, p. 221).

The idea of resilience is understood to provide a whole new perspective to approach risks and uncertainties as the resilience thinking is built on the "Heraclitean notion of 'everything changes, nothing remains still'" (Keck and Sakdapoldrak 2010, p. 9). Thus, social resilience as such is understood as an inherently dynamic process which escapes stagnation and perceives uncertainty and change as normality rather than unexpected anomalies (Ibid., p. 9). The analysis of social resilience extends beyond the imminent risks and focuses to grasp the measures that a social system can apply to adapt, not only to the risks at hand, but to something surprising and yet to come (Glavovic et al. 2003, p. 291). Hence, resilience thinking is an applicable framework respecting the inherent uncertainty of climate change (Mertz et al. 2009).

The idea of learning through time have become characteristic for the social resilience as successful responses to uncertainty and change require a certain set of skills and expertise (Cutter et al. 2008). De Haan (2000, p. 349) has integrated the lived experiences and learning through time into the process of resilience, in a manner that agency "is embodied in the individual but embedded in social relations, through which it can become effective" (Ibid., p. 349). De Haan (2000, p. 347) has also recognized that the options for adaptation are embedded in the social, cultural, and historical fabric and controlled by either formal or informal/traditional institutions (Ibid. 2000, p. 347). Annual rainfall, for instance is determined by climate, rangeland is managed under the common property rights and meat prices are influenced by the law of supply and demand in the markets. However, as deviations in rainfall are bound to create variations in climate, and the low profits will prompt the farmers to retain their animals from sale, there is a need to emphasize human agency and capability to reshape social structures. Hence, the notion of social resilience presumes the idea that rather than severe setbacks, perturbations and disasters may also open up new development trajectories and invite innovation and change (Bohle et al. 2009, p. 8). Therefore, a central aim of the analysis of social resilience is to determine which are those factors that improve the ability of social actors to manage the risks more comprehensively (Obrist et al. 2010, p. 291).

The irony of resilience thinking, however, lays in the notion that within the rise of resilience thinking, local capacities in crisis regions has been rediscovered as means for transformation and risk management. The technocratic nature of resilience thinking accepts risk as a normal condition for socio-economical systems and the attention has thus been shifted away from the root problems of inequality, natural disasters, poverty, and hunger. The resilience thinking therefore holds a risk of

labelling the despairing human fight for survival with the concept of resilience, simultaneously neglecting the need for risk prevention. In this regard, the notion of resilience could lead to the depolitization of social structures and make room for the simplistic models of natural determinism (Pelling & Manuel-Navarrete 2011). Due to its conceptual heritage entrenched in the study of ecosystem dynamics, the notion of social resilience accommodates a risk of "re-naturalization of society". Thus, the actor-oriented perspective is to cancel out the mechanistic interpretations of humans in nature, and further, to emphasize the participation and politics – the factors that designed the landscape of risk in the first place (Lindskog 2001).

2.3 Social Capital and Unequally Distributed Risks and Resources

The interpretation of social resilience is centred on targeting the problematics related to human agency, social participation, power relations and knowledge. Thus, the notion of social resilience comes alongside with the idea of capacity (Cannon 2008). The resilience literature often draws on insights from the former approaches of social vulnerability and sustainable livelihoods – approaches which targeted to define a wide variety of livelihood assets e.g., natural, human, financial, social, and physical capital (Obrist et al. 2010, p. 286–287). As highlighted by Neil Adger, there is a certain connection between poverty and climate vulnerability. Lack of resources – one of the key characteristics of chronical poverty – impedes abilities to manage the negative implications of natural hazard. In other words, the poor, for instance, often lack the financial or other resources to rebuild housing after flooding, or purchase fodder in the aftermath of drought (Adger 1999; Christoplos et al. 2009).

However, the problem is not just the ultimate *lack* of resources but the inability to *access* resources. In this regard, the issue of access has a multidimensional meaning; first, referring to the ability to physically reach the resources, but also considering the social and institutional dimension to obtain resources through socio-political and economic relations (Adger & Kelly 1999). The concept of resilience is thus inseparable from the more generic questions of inequality, poverty and geographical as well as socio-economical marginalization, which all are central elements determining the ability of a household or a community to access and mobilize resources (O'Brien et al. 2004).

More recent academic literature on social resilience gives particular prominence to the temporal and spatial ecological, social and institutional context and stress the embedded nature of social practises. Thereby, the person's ability to deal with risks, learn from past disasters and prepare for future hazards is not depending only on the person's individual pursuits or aspirations; rather than that, social

resilience is determined by the variety of societal elements that both facilitate and limit actor's capacity to access assets, learn through time and participate in decision-making (Lorenz 2010). Individuals, households and communities build their asset packages upon the existing social relations and networks, and thus, social capital could be considered as a crucial determinant of social resilience. Several authors have stressed the importance of social capital, with Mark Pelling and Chris High (2005) proposing that for rural communities, informal social relations are the most valuable resources to take collective action and tackle the challenge of climate change (Pelling and High 2005, p. 309). Therefore, analysis of social resilience requires constant juggling between social structures and individual agency (Bohle et al. 2009).

Much of the work on social relations thus consider social capital as a key resource for social resilience. However, as with assets, the issue of access to resources have become of interest in the social resilience research, with Hans-George Bohle (2006) addressing the dual character of social capital which, as he writes, is often enabling but occasionally restricting and exclusionary (Bohle 2006). Thus, the questions of justice, equity or power cannot be ignored in the agenda of resilience literature. In order to grasp the access landscape, Benjamin Etzold et al. (2012, p. 187) have drawn attention to the importance of institutions in the process of asset distribution. Social networks and practices are not only shaped by the institutional forces understood as cultural norms and shared values but social practices themselves also structure the institutions per se (Ibid., p. 187). In this regard, social capital (e.g., gender, ethnicity, or kinship) often determines the opportunities of participation and access (Obrist et al. 2010, p. 291). Thus, "social resilience is institutionally determined, in the sense that institutions permeate all social systems and institutions fundamentally determine the economic system in terms of its structure and distribution of assets" (Adger 2000., p. 354).

Several authors have emphasized that resilience at one level does not certainly ensure resilience at another level (Keck and Sakdapolrak 2010, p. 12) Thus, social resilience, rather than being a straightforward application, is a complex process which often requires trade-offs and triggers inequalities within the one social unit under research – whether it is an urban megalopolis, rural community, or single household (Glavovic et al. 2003, p. 292). Women and men in the same household may encounter rather distinct risks and may respond to them with different strategies. Women, for instance, are more likely to reduce their food intake in a risk situation than the men in the same household (Fritschel et al. 2014). Moreover, it is of importance to understand that "one form of resilience can reduce other forms of resilience" (Walker & Salt 2006, p. 121). There can thus be contradictions between social resilience and ecological resilience. Goat production, for instance may reinforce social resilience at one scale, for instance in the local community, yet the effects of grazing

may endanger the resilience of the dryland ecosystem. In a similar manner, resilience to drought does not necessarily ensure resilience to flooding (Ibid., p. 121). In this regard, the process of building and maintaining social resilience seems to be a highly equivocal and conflictive process.

In attempting to grasp the questions of trade-offs and justice of distribution, David Cannon (2008, p. 12) has presented communities as “places where normal everyday inequality, exploitation, oppression and maliciousness are woven into the fabric of relationships.” He thus proposes that the question of social resilience is also a question of unequally distributed risks and unequally distributed prospects to manage these risks (Ibid., 12). Furthermore, Keck and Sakdapolrak (2010, p. 14) argue that Bourdieu’s relational understanding of society (i.e., the conceptions of “field”, “capital” and “habitus”) can provide the foundation to understand the issue of inequality (Ibid., 14). The magnitude of risk the social actors are about to encounter is influenced by both, their customary way of doing things (regulated by their habitus) and by their positions in the field (regulated by the capital they have) (Obrist et al. 2010, p. 288).

2.4 Normative Nature of Resilience

Resilience is often understood as a desirable state of affairs. Therefore, the concept of resilience is normative in nature with knowledge and culture having a crucial role in determining resilience (Duit et al. 2010). Adaptation and risk reduction strategies are always guided by “a cultural narrative that creates a set of expectations and sensitises people to some problems more than others” (Furedi 2007, p. 485). As such, “perceptions of risk, preference, belief, knowledge, and experience are key factors that determine, at the individual and societal level, whether and how adaptation takes place” (Schwarz et al. 2011, p. 1138). Thus, the question of social resilience is always associated with the question of who is to determine what is perceived as a risk and what is not. The exposure to risk is always an individual experience and the measures required are dependent on the perspective taken. Hence, social resilience comprises also the questions of who is to determine the risk and whether the poor and marginalized get to participate in the transformation of social structures (Voss 2008, p. 41).

Societal transformations (e.g., political reforms, technological innovations or policies promoting climate-smart agriculture) are often complex processes embedded in the prevailing power relations and influenced by various social elements such as cultural norms, ethics and knowledge which are all deeply rooted in the social fabric and often protected from conflicting interests (Béné et al. 2012, p. 28–29). Therefore, when the certain groups or social actors lack voice or are intentionally silenced in

the process of decision-making, the lack of opportunities to participate can become a central obstruction for social resilience (Keck & Sakdapolrak 2010, p. 10).

In this regard, social resilience is a product of transnational imaginaries and discourses, out of which the dominant discourses tend to defeat the marginal ones (Voss 2008, p. 41). It is thus of importance to question who defines resilience, for what purposes, and with what consequences particular philosophies and conceptions of world are communicated and reproduced through the notion of resilience. Hence, resilience theory "needs to acknowledge and incorporate much more explicitly the role of stakeholder agency and the process through which legitimate visions of resilience are generated" (Larsen et al. 2011, p. 491). As hegemonic discourses tend to determine the prospective directions for risk management and thus, development, it is therefore important to understand knowledge and power as interrelated components defining one another (Ernstson 2008, p. 174).

According to Giddens, we live in a society "which unlike any preceding culture lives in the future rather than the past" (Giddens 1998, p. 94). Thus, for Giddens (1990), modern-day social life is all about constant efforts to control nature and eradicate or at the very least, minimize risk, which in the end is an eccentric conception expressing something that is yet to happen and is thus imaginary in its essence. As being "something in the mind" (Cardona 2004, p. 47), the perception of risk is deeply rooted in our cultural psyche which, in fact, controls our actions to conceptualize and eradicate risks (Flyvbjerg 2001). Therefore, the conceptualization of risk is not a given but a socio-cultural construction that reflects our epistemological and ontological beliefs of the world (Cardona 2004, p. 47). In this respect, several authors have presented concerns over the ostensible objectivity of modern science. Ulrich Beck (2009) and Arturo Escobar (1999), for instance, have addressed that although natural science is commonly considered as culturally neutral, objective knowledge, it is often instructed by a perceivable Western understanding of nature – something detached from the society that the human mind is incapable of comprehending.

The contemporary discourse on risks can be comprised as a continuation of an old academic tradition of Western cultural imperialism which, in the Said'ian fashion, holds on to the European construction of the rest as *Other* – irrational and intellectually undeveloped societies – which thereby are *at risk* of something (Bankoff 2004). In consequence, the understanding of nature and the perception of environmental risks are both culturally constructed and vary from one culture to other (Oliver-Smith 2004). It is further argue that uncertainty and constant change are central features of a nomadic way of being in the world. In the life world of nomads, ontological and epistemological beliefs pass the idea of static state of equilibrium and reality is something transient, always in a process of becoming and thus, coping and adaptation are of the essence of nomadic ontology (Deleuze & Guattari 1986).

Following similar line of thought, Saverio Krätli and Nikolaus Schareika (2010) question the argument that drylands are at immediate risk of climate change. The notion of risk, as they argue, is a reflection of the well-established academic discourse which understands resource scarcity and uncertainty as abnormalities in the equilibrium and, simultaneously fails to capture the constantly changing essence of dryland ecosystem manifested in its non-equilibrium nature (Ibid.).

2.5 Holistic Understanding of Livelihoods

The concept of livelihood is not new. It was first introduced in the work of Evan Evans-Pritchard describing the Nuer's ways of making a living in 1940. However, Evans-Pritchard used the concept to describe both, the strategies people use to secure their basic necessities, and the economic resource base disposable for this purpose (De Haan & Zoomers 2005, p. 348). Recently, this view has been criticised for representing a rather hidebound vision of a man, portraying him as homo economicus mainly motivated by self-serving economic goals. The critics have thus emphasized that for the portrayal of man to be complete it is important to incorporate not only economic activities but also the human perceptions and ideas, norms and values, hopes and fears (Kaag et al. 2004, p. 51). In this respect, Wallmann (1984 quoted in De Haan 2006, p. 10) has pointed out that:

> Livelihood is never just a matter of finding or making shelter, transacting money, getting food to put on the family table or to exchange on the marketplace. It is equally a matter of ownership and circulation of information, the management of skills and relationships and the affirmation of personal significance and group identity. The tasks of meeting obligations, of security, identity and status, and organizing time are as crucial to livelihood as bread and shelter.

This is not to underrate the value of material prosperity, but to emphasize that the non-material reality is also a central aspect of well-being. Thus, the concept of livelihood should be understood more as a dynamic process than a system (Ibid., p. 10). As noted by de Haan, Bebbington (1999, p. 2022) has best managed to grasp the holistic understanding of livelihoods:

> A person's assets, such as land, are not merely means with which he or she makes a living: they also give meaning to that person's world. Assets are not simply resources that people use in building livelihoods: they are assets that give them the capability to be and to act. Assets should not be understood only as things that allow survival, adaptation, and poverty alleviation: they are also the basis of agents' power to act and to reproduce, challenge or change the rules that govern the control, use and transformation of resources.

Bebbington indicates that poverty could not be understood as merely a lack of income of material prosperity but rather as a phenomenon involving several dimensions (Ibid., 2022). The understanding

of livelihood as a multidimensional, holistic process is applicable to recognizing how the poor themselves perceive poverty. The holistic notion of livelihood draws attention to a variety of capitals on which the poor are dependant when building their livelihoods. Besides customary assets such as land or livestock the concept takes into consideration various aspects of human and social capital, and gives prominence to the convertible combinations of, and trade-offs between distinct capitals (De Haan & Zoomers 2005, p. 33). For instance, if a woman in Makreri does not have a goat to milk, she will deploy her social networks, her social capital, in order to gain access to milk. In similar fashion, labour – one of the building blocks of human capital – can be transformed into physical capital when it is used to build a rainwater harvesting system or shed for the animals (See: Ibid., p. 33).

For this reason, livelihood strategies are considered as actions embedded the social institutions, cultural values, moral concerns, politics and religion. Hence, livelihood research should perceive the dynamics in the process of making a living, depict the reciprocal relationship between people and their environments (synchronic dynamics), and capture the changes in the relationship over time (diachronic dynamics) (Kaag et al. 2004, p. 5). When livelihood is understood as a holistic process, topics such as risk, social resilience and marginalization appear captivating premises for analysis.

3 Source Materials

Methodological choices depend upon the research topic, the type of data collected and the objectives of the research. The social sciences often aim at understanding lived experiences and human behaviour to understand the participants' interpretation of the world (Maykut & Morehouse 1994). Social scientists thus emphasize the close relationship between the researcher and the respondents and "the socially constructed nature of reality" (Denzin & Lincoln, 2000, p. 12). Social approaches are able to capture a deep understanding of lived experiences and provide a rich description of local contexts. In this sense, it is crucial to make methodological choices that can facilitate the attempt to gain understanding of the values, believes and lived experiences of the respondents. This chapter explains how the data for this research has been collected and analysed, and furthermore, clarifies how the methodological choices support the pursuit of answering the primary research questions seeking to understand the value of small-scale goat production in the context of climate change adaptation.

3.1 Methodology

> Most of the days in the field I felt like I was failing. It was hard to build trust with the locals. I wasn't fast enough to react their responses, but I was tired, oh boy. Sometimes the villagers were so busy protecting me from dirtying my hands that it was almost impossible to participate in local activities. Yet, there was this one place where I always felt like I belonged, where I experienced the certain type of fellowship I thought would be at the core of ethnographic research.
>
> By the well, when waiting for my turn to get water, I wasn't a rare intruder anymore, but rather a member of a small community, totally eligible to give, and even more likely, to receive advice regarding how to raise decent children or tie my hair, how to decorate the house or milk a goat. How to make ends meet and where to go for a skilled tailor. But still, when the water was fetched and the laundry was left to dry, we all became total strangers again, wandering around the village, sometimes crossing each other's paths but rarely showing any signs of acknowledgment.
>
> Field notes, 2nd of May 2016

The case study material for this research has been collected through ethnographic fieldwork to gain understanding of the everyday experiences of climate change effects and adaptation in the case study area. Ethnography as defined by Brewer (2000, p. 5): "is not a particular method for data collection but a style of research that is distinguished by its objectives to understand the social meanings and activities of the people in a given 'field' or setting, and an approach, which involves close association with and often participation in this setting" (Ibid., p. 5). The aim of ethnographic research is to analyze the cultural processes and the variety of meanings different actors have given to them (Atkinson et al. 2001). The style of research seeks to give significance and visibility to the stories of ordinary people and strives to provide a comprehensive understanding and description of the subject (Gregory 2005). This thesis, like ethnographic research in general, is based on observations of people in their contextual environments. Observation traditionally requires both physical presence in examined surroundings and concrete interaction situations with the local people (Lappalainen et al. 2007). Multiple methods of data collection may be employed to facilitate an exchange of understandings that allow an in-depth depiction of the respondents and their community (Brewer 2000, p. 11).

The ethnographer aims at learning how to work and act in the local social and cultural system, making ethnographic research highly reflexive requiring involvements of the ethnographer's self in the fieldwork. The field experiences and results are filtered, interpreted, and analytically located in relation to the social and cultural background of the researcher and his/her actions in the field (Ådahl 2014). This kind of conscious self-examination of the researcher's presumptions at its best will lead to an enhanced understanding of the intersubjective processes which affect our communication and acquisition of information. Hence, ethnographic research requires deliberate reflection on the interdependences between the ethnographer and research participant and on "the construction of

ethnographic authority" (Robben 2012, p. 514). This kind of physical and emotional presence makes ethnographic research special (Lappalainen 2007, p. 10) and the alternations of participation and analytical detachments help the researcher to understand the living conditions of the members of the community in question (Ådahl 2004).

3.2 Empirical Data and Its Collection

The research rests on 32 semi-structured theme interviews and 24 livelihood asset surveys that were carried out on the household level in the village of Makreri. All the respondents who answered to the livelihood asset survey, also participated in the interviews. In the beginning of their interviews, the respondents filled in a short questionnaire regarding their family size, average income, land property and education etc. The data was used as a background information and targeted the local asset base while the interviews concentrated more on the other part of livelihoods; what makes life meaningful. The main objective of the interviews was to provide an in-depth understanding of the local livelihood strategies at the front of the implications of global climate change. Thus, with an overall interest in the alterations of livelihood strategies, the interviews inquired into local asset portfolios, institutional frameworks, and the risks and challenges the households have or are expected to encounter.

Theme interviews can provide an important insight into the experiences, beliefs, understandings and emotions of the interviewees. The method focuses on exploring the lifeworld of the local people and thus highlights the state of affairs in which the local people experience – and to say – live the world (Hirsijärvi & Hurme 2008, 47–48). Furthermore, with the method of interviews, it is possible to explore the ways in which different groups and individuals perceive their positions and experience the same phenomena (Lappalainen 2007, 92). In this regard, thematic interviews support the objective of the research to explore the local experiences and understandings of global climate change. The interview questions were constructed around the four themes classified as 1) livelihood strategies and goat production, 2) institutional structures and processes, and 3) climate change related risks. After the first nine interviews I also added few questions and a theme 4) social capital. With the method of theme interviews, the interviewees were guided to discuss the vast issues of climate related risks or the enabling and constraining nature of the local institutions at large and furthermore reflect their position in relation to the shared local and global phenomena.

In the context of ethnographic research, the interview questions are not only based on the researcher's preconceptions in relation to the previous research literature but in relation to the field under research. The research topics are thus being processed during field work: the researcher discusses with the

respondents and therefore his or her understanding of the relationships and events in the field can take a different shape after each interview. For this reason, the interviews and the research themes change with the time spent on the field. Thus, the difference between the first and the last interview is often significant (Tolonen & Palmu 2007, p. 92).

During the interviews it became apparent that many of the previously planned questions were not sufficiently concrete or corresponded to the local reality. In the beginning, the research aimed at understanding the marketing activities and access to market information more deeply. However, it turned out to be difficult to find rural farmers with a considerable number of livestock. Most of the villagers were new to the pastoral production system and sought to grow their herd sizes and thus were not actively seeking better marketing opportunities. My attention hence shifted to social networks and local barter system where the woman exchanged good and services.

A severe drought affected the area during my field work and therefore the focus was also on changing climate and local responses to seasonal variations. Several questions led the respondents to think about the strategies they used in order to become more prepared for the future changes in the local livelihoods. However, I noticed that the participants were commonly very aware of the strategies but simultaneously had no means to actualize them. Thus, it sometimes seemed that my highlighted interest in local capabilities downplayed the limited resource portfolios of the local population. To gain a better understanding of the local reality, I reflected on the interview process and assessed what questions could be asked to gain understanding of local climate measures after each day in the field, often in cooperation with my interpreter. This process sharpened the focus of my research as I noted that the respondents emphasized the role of local safety nets and social relationships in the interviews.

However, the interview data was limited in the sense that the fieldwork was carried out during the dry season, and thus the male household heads were often not around but working in the local sandstone mines. There is hence a gender and age bias in my sample, with women and elderly people making up the majority. On the other hand, goats were often considered to be an animal under the decision-making domain of women and thus the biased sample is not necessarily a problem. Furthermore, I assume that the respondents overly emphasized the risks and livelihood strategies associated with the dry season as the problems were all at hand. For this reason, this research is not able to fully capture the annual cycle of livelihood strategies but rather concentrates more on drought-related risks and responses.

It was surprising how openly the respondents shared their experiences. However, at times it felt like I was not able to reach a deep understanding of the local reality. All the interviews followed a similar

pattern, yet something was missing. Only after I started to analyse the data and investigated my field notes and interview materials as a whole, I recognized that the informal events and chatting with local people complemented the data collected through thematic interviews. Sometimes the observations and informal chatting provided me with my most crucial information, although later I understood that I was able to understand the meaning of my observations only with the knowledge I gained through the interviews.

The interview situations in the field were not recorded. The language barrier between me and my interpreter and hectic surrounding in the interview situations affected the length and the quality of the recordings in a way, that it did not support the data collection. I kept notes of the interview situations with a pen and paper. I wrote down the answers but also made notes regarding the surroundings, facial expressions, and different tones the respondents used.

3.2.1 Participation and Observation

Ethnographic research strives to find out things that are commonly considered as less important, but which structure the life worlds of the local people. Asking, in some cases, is not the best possible way to find out these implicit structures. An unquestioned trust in the spoken data, as Salzman emphasizes, may turn the attention away from the non-discursive dimensions of how people communicate; using their body language or more obscurely, through what is left untold (Salzman 2004, p. 101). Hymes (1981, p. 84) similarly remarks that there is more to be discovered than can be found out by asking and urges not to rely only on "the small portion of cultural behaviour that people can be expected to report or describe, when asked, and the much smaller portion that an average person can be expected to manifest by doing on demand" (Ibid., p. 84).

Moreover, relying on only the data collected through interviews is never effortless or problem-free. The particular stories and experiences articulated in an interview situation are, for instance, always enabled and constrained by the local socio-cultural context, with cultural norms and values guiding the ways in which the self and the circumstances are comprehended, described and communicated (Salzman 2004). Furthermore, the data acquired through interviews is always inevitably subjected to how the researcher has formed the interviews as well as to how trust and relationships are built between the researcher and the respondents. On a more practical level, also the ways in which the questions and answers are translated may subject the original message to changes (Fontana & Frey 2005). These concerns call for methodological pluralism.

In participant observation, the researcher aims at immersing herself into the life and daily practices of the local people. This is to understand the insider's view of what is being observed. In this sense, the participant observer is not only seeking to see what is going on in the observed setting but *feels* what it means to be an active member of the group (Harris & Johnson 2000). In this sense, the method of participant observation shifts attention away from the spoken to the way how things are done, thus inviting a more practical, hands-on approach to investigate the interactions between individuals and their surroundings.

My two-month fieldwork was a dive in the local culture and social context. By spending my leisure time in the village, I was able to share the everyday lives of local residents and observe the circulation of daily activities. The personal relationships that developed during my stay provided me with an enhanced understanding of the values, hopes and beliefs of the Bhil in Makreri, and thus facilitated the interpretations from their points of view. Often the key to sharing stories was about letting my personal values and cultural background be othered and exposed to interpretations. These spontaneous conversations rambling through a range of different themes provided me important insights into everyday life and daily challenges in the village.

During the very first days in Makreri it became apparent that doing field research in the village would require a lot of time spent in the communal clinic – a local meeting point for both random passers-by and important members of the community. Sipping chai in the shadows of the relatively modern stone house did not feel like an "immersion in the practical world" (Pálsson 1995, p. 10). However, the hours spent in the clinic deepened my understanding of the settings of local decision making; how things were done in the village, how all the village level decisions were made over a cup of tea and how it was always the same people around the table while others were not invited.

Therefore, participant observation is not only a tool to add flesh to hard facts or obtain more nuanced data but can be considered as an important part of the process of enskilment – or in the words of Gibson (1979, p. 419) a process of "understanding in practice". In similar fashion Cristina Grasseni (2008, p. 153) argues that "since identity and cultures are rooted and reproduce themselves in the naturally and culturally constructed environments we inhabit, practices literally shape the way we look at the world". For Grasseni 'seeing' demands knowing what to observe and what is worth the story. These culturally related traits often have to be learnt as they are closely connected to particular features and aspects of the local context, including the certain activities in which one participates. Here Grasseini refers to her own fieldwork on livestock husbandry in Bergamo, Italy and emphasizes her disappointment of not being able to 'see' the livestock as a whole – with their specific marks and certain characteristics – or to say, through the eyes of the local people (Grasseni 2008, p. 153).

In this sense, to understand a local geographical and socio-cultural context completely different from my own, my fieldwork entailed an ambition to train myself to look at the seemingly dry environment in a local way. In the beginning I was completely incapable of seeing, for instance, the “forest” where the local people went to gather fruits and berries. For me, the land was a desert: “parched” and “eroded”. In my field notes “even the lizards died thirsty.” However, a distinctive change in the way I described the local surroundings in my field notes developed gradually during my stay. By the end I noted that instead of “one lonely tree standing on top of the hill” the village was surrounded by the forests providing a range of different medical or editable plants and seeds for human and animal use. If these had not been my own fieldnotes, I would have assumed that the physical surroundings had radically changed over the course of the researcher’s stay.

3.3 Fieldwork Reflections

To gain understanding of people, phenomena, different cultures and socio-political context through ethnographic fieldwork, the fieldwork experiences must always be thought through and reflected. This type of critical thinking is a conscious process through which the interplay between theoretical knowledge and practices in the field translate the field experiences into knowledge (Gelter 2003). This section will explain the process of reflection and critical thinking that has guided my fieldwork and the analysis of my data.

3.3.1 The Researcher’s Position and Reflexivity

> She told them to sing, her friends, not as a polite request but rather an order. I tried to sleep but each time I closed my eyes, I hear the command in her voice. I saw her bare feet hit the ground, the metal anklets banging against each other. I heard the singing. I heard her words echoing in my head: “I dance. Dance, dance, dance. It’s the only way to forget I’ve lost three children.”
>
> Again. I closed my eyes and saw how she lifts her ghoonghat, how the light blue gauze slips down her shoulder, revealing bruises on her neck. I saw the sores on her feet. She is barely seventeen, just run away from her husband to the desert. I hear the murmur of her family, gathered around to pray he wouldn’t hurt her anymore. The indistinct voice fills the air, and my head, too. Three days in the desert and bringing her back home to her abuser was really the best her family could do.
>
> I closed my eyes, once more, and saw the smoke escaping between her few teeth, playing in the air. She took a dried tendu leaf from under her worn-out bra, white, as it had been one day, filled the leaf with tobacco, shook out the last flakes from her pocket,

> rolled it loosely and hand it over to me. She took my hands between hers and lowered her head, as if she were about to tell me a secret. "I don't smoke. Women do not", she whispered "but sometimes you just have to feel the dizziness in your head. Nothing else helps anymore."
>
> I came here with a somewhat naïve idea of asking how it is going, how you make ends meet. Oh, you stupid, white privileged girl. If you want an adventure, why not try scuba diving, maybe a bungee jump? If you want to learn something new, what about doing a google search? This is not a right place for you and your curiosity – your stupid idea of a learning something new about life.
>
> Field notes, 8th of April 2016

Power relations between the researcher and respondents must be acknowledged in the research process, as it is often the respondents that have less power than researchers. The researchers always carry their personalities as well as their economic and cultural resources and personal perspectives that produce a hierarchical relationship between the researcher and the respondents (Skeggs 2004). Tolonen & Palmu (2007, p. 94) have emphasized that it is important to recognize that the decisions of what is being studied, and what is considered as important or correct information will affect the power relations at play .

The researcher's gender is one of the important dimensions, even an instrument, in ethnographic fieldwork. Researchers forms relationships with the respondents and learn to see, think, and be in another cultural setting as a person representing his or her sex, age, sexual orientation, beliefs, level of education, ethnicity, and class. These features always affect the researcher's subjective experience in the field. A researcher's gender influences the researcher's interests and often determines how the researcher can access the lived experiences of the respondents of his or her own sex and the opposite one. Therefore, researchers must acknowledge their background and otherness in relation to the people being studied (Bell et al. 1993, 1–2, 7, 19–21).

In this study, most of the respondents were women of various ages. Sometimes their male partners wanted to participate in the interviews to discuss the hard household economics but lost interest when the discussions touched more of the lived experiences and goat production which was commonly considered to be under the decision-making domain of the women. According to my understanding, the women felt it easy to share their life and more precisely their experiences, hopes, dreams and hardships with me. The more I spent time in the village, the more our discussions concerned the topics of being a woman. Despite the different backgrounds and experiences, we still shared a similar understanding of the world through our shared gender. Thus, I feel my gender affected the way in which my research attention shifted away from markets to social relations and later to the local

exchange economy through which women redistributed resources and exchanged goods and services in the village.

I held considerably different knowledge from the respondents on topics such as global warming or climate change prevention. For the local population, climate change was more of a lived experience while I relied upon scientific publications without ever really experiencing the actual effects of global warming in my everyday life. In Makreri, changes in weather were predicted by following the animal behavior or natural phenomena and knowledge of seasonal variations were based on traditional knowledge and past experiences. Some participants with a mobile phone get weather information also from their relatives by text messages. My knowledge, although drawing from international weather forecasts and detailed meteorological data, was most often inaccurate in the local context. The Internet would not have kept me alive for long in the village. Notwithstanding, it was easy to sense that the local people felt ashamed and belittled the power of their traditional knowledge.

3.3.2 Research Ethics

Development studies is an ethically complex and often contested field of research as it contains an "ethical or normative point of departure", that is, it seeks to make a difference and to "do good'", thus intervening "in the lives of others, often claiming to know what is good for 'the other'" at totally different levels of social, economic, political, and cultural capacity (Sumner 2007, p. 59). Therefore, the question who does and who does not define what development is, lies at the center of development ethics, particularly because those definitions mark out the ones *in need* of development and moreover determine what should be done. Although most development research is guided by some sense of concern regarding prevailing social injustices, this normative aspect of development studies must be considered ethically complex (Ibid., 59, 61).

The overriding concern for post-development theorists is that an outsider is never able to achieve a level of objective knowledge of other people's lives. Knowing anything is always a subjective experience (Ibid., p. 62). Rahnema (1997, p. 395) explores the research practices and ways in which outsiders can get involved and 'get to know', albeit knowing something still remains a subjective experience. By asking "who are we – who am I – to intervene in other people's lives when we know so little about any life, including our own?" Rahnema stresses how important it is for researchers to reflect on their own position and power relations in the field of development (Ibid., 395).

Curtin (2005) emphasizes that development scholars and professionals should consider themselves as learners by acknowledging that other cultures could have something to teach, too. Regardless of

methodological choices, Curtin stresses that researchers may assume the role of a learner only by reviewing their research premises and elaborating a rigorous awareness of local realities. Moreover, he calls for increased attention to power relations at play (Ibid). This type of sensitivity to power is particularly important when working with marginalized people (Janes 2016, p. 77).

After the first days in the field, I encountered an ethical crisis and questioned the importance of my work. I arrived in Makreri during the dry season. After the village wells run out of water in the beginning of May, the local community relied on the government emergency water transportations. Most of the respondents encountered considerable difficulties to feed their families as the dry season limited the opportunities for gardening and the latest crop had been harvested almost a half year ago. The problems at hand were bigger than any thesis. The moral questions and the ethical and political interference of fieldwork relations have recently been criticized by many within and outside the discipline. Scheper-Hughes (1995, p. 417–418), however, has answered the postmodern critiques by leaning on a concept of "good enough" ethnography and acknowledged that "[w]hile the anthropologist is always a necessarily flawed and biased instrument of cultural translation, like every other craftsperson, we do the best we can with the limited resources we have at hand: our ability to listen and to observe carefully and with empathy and compassion". According to Scheper-Hughes (1995, 418) "[s]eeing, listening, touching, recording can be, if done with care and sensitivity, acts of solidarity. Above all, they are work of recognition. Not to look, not to touch, not to record can be the hostile act, the act of indifference and of turning away" (Ibid., p. 418).

The ethics of the research process – the second approach to understand the ethics of development – addresses how research guidelines instruct the actual research in practice. These research guidelines, often technical in nature, can be understood as a rather narrow but nevertheless necessary checklist related to the research process itself (Sumner 2007, p. 64). My research was guided by ethical principles such as reciprocity, anonymity, confidentiality, informed consent, and safety as defined by Sumner and Tribe (2008, p. 39–40). With regard to the research process, I often approached my research questions by asking myself how I would feel about myself or a family member taking part and answering these questions.

I was afraid that my position in the VCE project would affect the study. The respondents were informed that my research was not connected to and did not affect the VCE project or its continuation, and that all answers were confidential and treated anonymously. Respondents were selected randomly, though almost all extended households had at least one member voluntarily participating. Informed consent was realized during the process as the participants were advised about their right to refuse to participate, and due to urgent domestic work, some of the respondents actually did. One of

the participants withdrew during the interview as she did not feel comfortable discussing household economics while her husband was not around. Respondents are not mentioned by name and their answers are not possible to trace back to them. Moreover, after discussions with the local workers we decided not to compensate the respondents with any gifts to avoid a situation where some of them would feel obliged to participate in order to improve his or her economic situation. After the research, however, soap and basic hygiene products were delivered to the local clinic for communal use.

Although most of the respondents noted that curiosity and wish to become understood were the central reasons that motivated them to participate in the interviews, at times I was concerned if the local people associated me with the development workers and expected to gain monetary benefits from the research. Furthermore, I am not certain if I was able to communicate the purpose of a master's thesis and if we shared a similar understanding regarding the effectiveness of this research. If the respondents had particular objectives and expected them to be fulfilled through this research, it may be disappointing if the results do not meet the expectations, and if, for instance, the research will not gain the public attention they hoped. Hence, I have found the writing process particularly difficult as I feel obliged to make the best out of the time and other resources the local people have granted for my research. Furthermore, I noted that, in my ethnographic research the participants were interested in how their answers are interpreted and used. Thus, I felt I was responsible to the respondents for the use of the data. However, it must be acknowledged that it is nearly impossible to conduct a research in a way that none of the participants would feel disappointed or misunderstood.

3.3.3 Translations and Cultural Interpretations

Many prominent anthropologists, including Bronislaw Malinowski, Franz Boas, and Claude Levi-Strauss, have emphasized the interdependence of language and culture in their work (Hymes 1964). Yet, it was clear to me that the data must be collected with the help of an interpreter. The use of interpreter always requires a certain level of attention and may sometimes be problematic. According to Sumner and Tribe (2008, p. 119) it must be acknowledged that the interpreter's understanding and interpretations and the intended messages of the respondents may differ from one another. Furthermore, the interpreter may consider some topics irrelevant or obvious and thus exclude them from the translations, even if the topics might interest the researchers themselves (Bujra 2006, p. 174–175).

My interpreter previously worked for the Village Community Empowerment (VCE) project as a field facilitator. According to the fieldwork plan, I was supposed to work with her to get familiar with the

local context and carry out the in-depth interviews with the VCE project coordinator who had better skills in English. However, during the first interview I was able to notice the project coordinator had his own intentions regarding the research objectives. He strongly associated me with the donor organization and as the funding for the project was in jeopardy due to the cuts in the Finland's development cooperation budget during the application round in 2016, he wanted to emphasize the good results of the project. Furthermore, several cultural practices related to the female-male communication limited the discussions when the project coordinator participated. I discussed these problems with him, and we jointly decided to continue the interviews with the field facilitator. Although her skills in English were not good enough to provide verbatim translation, she, however, was able to translate the content of the interviews. Therefore, I did not consider our language barrier as a major problem as my intention was not to carry out discourse analysis, for instance, but to learn about human behavior in the local context. While the translations were reduced to the content interpretation, I was actually able to pay more attention to the facial expression, gestures, laughs and variations in the tone and thus learned to see minor, but after all crucial things in the environment. To minimize misunderstandings and misinterpretations I decided to add some non-verbal dimensions to the interview situations. For instance, at the end of each interview, all the participants drew a timeline of their livelihood strategies in relation to the seasonal weather variations. In the end, the timelines helped me to gain understanding of the integrated nature of different livelihood strategies better than the interviews alone, regardless of the translations.

In this sense, our cooperation with the interpreter worked fluently. Rather than a translator I considered her as my cultural interpreter. She was born in the nearby village and lived through similar experiences as the respondents. In this sense, the local people found it easy to share their daily issues in her presence and the interview situations felt relaxed. The discussion also touched on some of the more sensitive topics when there were no male participants around. Moreover, in addition to the cultural and religious beliefs and practices, as a goat owner herself, the interpreter was also able to explain me some practicalities related to goat production and veterinary services, completely new topics for myself, and in this respect helped me, to reformulate my interview questions to fit with the local reality.

4 Theoretical Approaches

This chapter presents the theoretical approaches used in this research. This assumption about reality guide research by framing the asked questions and the results we expect to receive. Theoretical

perspective can therefore be considered as lens through which the researcher looks, helping either to focus or distort the view (Crossman 2000).

4.1 Ontological Perspectives

> She carried a handful of orange tendu fruits inside the hem of her skirt of a matching color. "Orange gold", they said, so juicy that one could easily imagine the fruit contains all the water that has ever flown through the Palka river in Bijoliya. She looked at me below her eyebrows, with her bindi mark wrinkling up on her forehead, handed me one of the fruits and laughed at my question: "No darling, no. You don't *go* to get the fruits." She patted the land twice, giving a spark for a small cloud of dust, perhaps to reinforce her message, maybe just for the sake of irony. "You get what it gives", she said and patted the land once more. "Simple as that."
>
> Field notes, 5th of May 2016

Natural and physical scientists have necessary tools and adequate procedures to create precise models of prediction and measure the averages. Their work on anticipated physical effects of global warming have recently been in the limelight and presented at length for instance in the series of IPCC reports. These reports, however, have been unsuccessful in addressing the human dimension of climate change. When limited to indisputable facts; evaporation losses, temperature increases, and estimated precipitations, the research on climate change remains detached from human experiences (Finan 2009, p. 175). While several authors have addressed the continuous tendency in academia to prefer instrumental rationality over value rationality, much of the research on climate change alike is restricted to measuring and modelling its physical impacts and future mitigation strategies (Flyvbjerg 2001, p. 3–4). We are however living in an era where there is a recognized need to comprehend and to form knowledge which supports the strategic actions required for strengthened climate resilience. Anthropologists have a habit of approaching climate change as a human problem, comprehending that the global challenges related to climate change are embedded in our social structures and cultural traditions. Strategic planning and social adaptation therefore call for anthropological knowledge of human realities and behavioural patterns which is in a central role, for instance, when integrating local responses into national and international policymaking (Puntenney 2009, p. 324). However, Forsyth (2001, p. 9) reminds that when seeking to understand the different cultural realities, one should not lose track of the veritable, ongoing environmental and climatic processes and their anticipated physical impacts, the *brute facts* – temperature increases, desiccation, and the hectares of

agricultural land lost – which alongside with the cultural constructions constitute *the environment* and occur despite of our perceptions or consciousness of them (Ibid., p. 9).

In compliance with these notions, this research rests on critical realism, an ontological and epistemological perspective that reconciles the philosophy of natural science resting to causation and quantity to a philosophy of social science resting more on events and quality in order to describe a confluence of the natural and social worlds (Danermark et al. 2002, p. 2). The epistemological standpoint of critical realism adopts the "both/and approach" to social research and seeks to move beyond dualism by dissolving the traditional dichotomies between nature and society, structure and agency, and furthermore abstract and concrete (Ibid., p. 2). Critical realism thus embraces an ontological perspective where realism and relativism consolidate (Ibid., p. 2). In this respect, it is possible for a critical realist to hold on to ontological realism (the world is the way it is, independent of our understanding, of our perceptions and theories, of it) while acknowledging epistemological constructivism and relativism assuming that our understanding of this world is unavoidably constituted from our perceptions of it. In this regard, our empirical knowledge – i.e., our empirical data of the world we study – is affected by our conceptual beliefs and cultural viewpoints. When seeking empirical knowledge of the world we, therefore, engage in a process in which both theory and data reiterate and reproduce each other (Hansen & Simonsen 2004). Hence, in contrast to scientific objectivism, critical realism holds that there is no chance of obtaining a single completely correct and scientific understanding of the world which is independent of any particular perspective – a viewpoint what Putnam (1999) portrays as "an eye view of the God".

The premise for critical realism is based on three ontological domains – the *actual*, the *empirical* and the *real* (Danermark et al, 2002, p. 20). The actual domain consists of the events that occur in the world, whether experienced or not, where the empirical domain comprises and is limited to our experiences of the world and is hence the domain in which our data is collected, and research accomplished. In this respect, our contact with the empirical domain inevitably reflects our socio-cultural values and ontological beliefs. The domain of the real, in turn, provides the place for an underlying causal mechanism which generates the factual events in the world (Bhaskar 1978, p. 46). When such mechanisms create any kind of event, it occurs – whether experienced or not – in the domain of the actual and becomes "an empirical fact" only when observed in the empirical domain (Danermark et al, 2002, p. 199). Critical realism is thus seeking to uncover how we experience the events that occur in the world, and the mechanisms which produce the events in the more structural level beyond our understanding (Schuyler House 2010).

4.2 The Power of Example

> Her eyes were turquoise like the deep Indian Ocean, brighter though, constantly changing. It was hard to say whether it was those eyes that revealed the devastating despair on her face or was it just her tired face that made her eyes shine so bright.
>
> She ripped a piece of an old men's shirt when I passed a pair of big black boots on the stairs and entered the porch. She folded the piece, placed it inside an old blanket, took a needle and sewed it on. Her hands moved softly, trembling though, as if she thought her stitches would have the power to bring past, present and the future all together and somehow make it count. As if she thought it would be her late husbands' clothes that will keep her warm through the monsoon when the worn-out blanket was not enough anymore, and her late husbands' boots that will keep her safe when he has gone.
>
> If you ask me what poverty looks like, if you ask what it means to be a woman in a male dominated society all I can think of is those eyes – the color of turquoise and the tired face framing them. She had the face of poverty. Her eyes told the stories I didn't dare to ask, and the stories I wasn't prepared to hear. And the boots, it was the same story – another chapter maybe – a story of a place where a home is not a safe place for a woman without a husband, neither for a woman married to one.
>
> Field notes, 18th of April 2016

The challenge of global climate change is alarming in its amplitude, and above all, a manifestation of the interconnected relationship between social and natural systems. Although the majority of the current climate change discourse targets the technical and instrumental questions of how to mitigate and how to adapt, climate change is also a moral concern. Fundamental value questions of *what is desirable* and *what should be done* lie at the core of climate debate and thus invite to counterpoise instrumental rationality, i.e., the questions of *how to* with value rationality, i.e., the questions of *why something should be done* (Brown 2013, p. 235; Kincheloe & McLaren 2005, p. 308). Drawing from the Aristotelian notion of Phronesis, often understood as practical rationality, Bent Flyvbjerg emphasizes that social sciences are applicable to elucidate the questions of "where we are, where we want to go, and what is desirable according to diverse sets of values and interests" (Flyvbjerg 2001, p. 167). The situational and contextual nature of rationality is tied to local practices and everyday realities and is thus determined by the horizons of meaning through which one understand the world (Stake 2005, p. 449).

In a similar vein, an American anthropologist Clifford Geertz (1973, p. 3–30) argues that broad investigations into factual details are often limited to hide more than they actually reveal from the local context. With his approach of thick description, Geertz focuses on hidden information, aiming

at obtaining a comprehensive understanding of a certain phenomenon. Through close analysis, qualitative research can embrace human behavior in a way that does not only define the characteristic of behavior but rather contextualize the actions to reveal the underlying meanings of behavior (Ibid., p. 3–30). Thick description can therefore facilitate the empirical research on values, motives and beliefs behind particular phenomena and recognize the range of different values and interests by looking into the particular cases (Flyvbjerg 2001).

According to Geertz (1973, p. 23) "small facts speak to large issues" and hence micro and macro level research have the ability to complement each other (Ibid., p. 23). Case studies of the very local can communicate relevant information regarding the variety of the challenges related to climate change. Despite its global nature, the implications of climate change will take a different form in different contexts. Furthermore, the responses to climate change differ from place to place. Strategies for climate resilience and climate change adaptation usually come with a large price tag. Continuous uncertainties on how to finance the climate resilience measures, both now and in the future, frame the climate debate and hence much of the responses have taken place autonomously, thus making the research on the local and the contextual indispensable (Christoplos et al. 2009).

When seeking to answer the questions of what people do and what opportunities or alternatives they have, it is important to examine the actions at the local level, giving an insight into the ways how people respond to the multiple risks and challenges. The people at the local level take decisions under certain conditions depending "on what development, poverty and livelihood mean to them, as well as the constraints under which they make these decisions and the power relations at play" (Bebbington 1999, p. 2033). Thus, by incorporating the research into the local lifeworld, we can both deepen our understanding of the theoretical conceptions such as resilience or vulnerability and inversely when investigating the local through the frames of the theoretical approaches we can arrive at a better understanding of the local and contextual structures and circumstances affecting the local livelihoods (Stake 2005, p. 445).

My research in the village Makreri can be considered as a qualitative case study. According to Flyvbjerg (2007, p. 390) the term case study refers to a detailed examination and illustration of a certain phenomenon. Social sciences have traditionally strived to produce context-independent, objective and generalizable information similar to natural sciences. The value of practical and contextual information produced by case studies have thus been commonly questioned. It is generally accepted that the information obtained from case studies cannot be generalized and therefore case studies have often been valued only either as a pilot studies or as a part of a large series of case studies of the same type and topic (Flyvbjerg 2007, p. 390–391). Ethnographic research, however, is often

based on case studies and Flyvbjerg (2007) for example has presented several notions supporting the validation and reliability of them. He emphasizes that in the study of humans all information is always context specific. Universal generalizations and predictive information are impossible to generate. Recent phenomenological studies of learning show that in human learning individual cases play a major role. According to Flyvbjerg, at the initial level of learning, competence is usually based on general theories, rules, and formulas. No matter the discipline, however, it seems the top experts have based their expertise on thousands and thousands of certain cases. Flyvbjerg argues that it is the contextual knowledge which lays in the heart of expertise (Flyvbjerg 2007, p. 391–393).

Pierre Bourdieu (1977, p. 8, 15) argues that while creating generalizations the researcher can lose the opportunity to understand something essential about the social reality under research. According to Bourdieu, generalization, which seeks to create rules and common theories, is not a necessary part of true expertise, "virtuosity," which is based precisely on experiential knowledge of countless cases and the "inevitable improvisation" deriving from it (Ibid., p. 8, 15). Flyvbjerg (2007, p. 395–402), furthermore stresses how formal generalization is overrated, while the “power of example” yet remains undervalued. While the advantage of large samples is based on its breadth, the strength of the case study lies in its depth. It can describe the local stories as rich and living, even contradictory, such as social reality and life itself. Thus, as Flyvbjerg (2007, p. 402) points out, the case study can succeed in “exploring phenomena first-hand instead of reading maps of them” (Ibid., p. 402). Therefore, the case study at its best can describe the local stories as rich and living, even contradictory, such as social reality and life itself (Ibid., p. 400).

In the beginning, I was afraid to use direct citations from the interviews. Because of the use of interpreter and our limitations regarding the shared language I was afraid that the citations would reflect the way how me and the interpreter discussed the topics and how I sought understanding with my own words and language structures rather giving voice to the respondents. However, the use of citations often enables the readers to interpret the source material and make their own analysis of it. In addition, citations are used to add transparency and validity by presenting examples from the actual discussions (Nikander 2010, p. 433). Therefore, I have used the citations not to indicate the discourses or the way how the respondents discussed the topics, but to bring the readers closer to the respondents life world.

4.3 Abductive Thematic Analysis

Thematic analysis is a basic analysis method commonly used in qualitative studies. With thematic analysis, several similarities and differences in the data are identified in order to form a comprehensive description of the phenomenon. Thematic analysis thus goes beyond analysing the numeric appearance of phases and words and moves on to recognize implicit and explicit themes in the data. Thematic analysis therefore focuses on both what is actually communicated and what was said, though not directly expressed. In this sense, some of the findings (e.g., the range of local livelihood strategies) were obvious, whilst the value of social relations in the local barter system were not directly communicated but identified from the research material with careful analysis.

In abductive content analysis, as defined by Richard Boyatzis (1998), theory can be used as an auxiliary tool, which loosely frames the making of interpretations of the collected research material. Analysis is thus likened to an already existing theory or model in a manner that the theoretical framework is used to support or explain the empirical findings. In a similar manner, abductive analysis can also reveal that the empirical data does not correspond to the previous research. In this study, the primary purpose of abductive analysis was not to test or qualify the theory but rather use the framework as a tool for content clarification and classification. Abductive analysis was thus used to look at the research material in a versatile and thorough way, and the theories served the analysis as a methodological tool to discover different levels from the data.

For example, from the data it was possible to identify three types of households from the village: female-headed households, nuclear families, and extended families. The data was thus divided into three categories determined by the type of household. In the second part of the analysis, the data in each of these household categories was organized into themes. The themes mainly resembled the thematic interview questions asked in the field, although social safety nets had such a central position in the data that rather than considering them as one of the many strategic resources for climate change adaptation and resilience, they were analysed as an individual theme rising from the data. Climate related risks, in turn, have been analysed as a contextual background and the thesis is not seeking to provide thorough analysis of what is considered as a risk. These themes helped to organize the vast and sometimes inconsistent data into a more coherent form.

The source material collected from the field was saved only on my notebook. When reading through the material, I used different colours to identify the themes and household categories. At this point the data that was organized in themes was transcribed to an electronic document. The themes were divided into sub themes which later were fragmented into small sections coded with a particular label

to recognize important elements and to understand the key moments that construct the themes. In the last part of the analysis, frequency, and co-occurrence of different types of codes were identified and compared to the type of households to assess whether some types of households have different capabilities to respond to shocks and stressors than the others. Instead of a coding software programme, the data was coded with the help of Microsoft Word text processing programme. By using the search tool, the repetitive words and subthemes were identified and coded. This type of manual work helped me to become familiar with the data as I had to read the material through for several times to learn what is there to search and discover in my source material.

With the method of abductive content analysis, the research material was first conceptualized with the help of resilience thinking, then fragmented into small sections and finally reorganized into a novel entity linking the results to the broader context and to previous research in the same field of study. During the process, however, I come to learn, that theory-based content analysis can be problematic in a manner that when selecting theories to support the analysis, it is possible to prefer the ones which go well with the collected data and reject the theories which do not support it. And conversely, while reading through the data, it is easy to find similarities and neglect the differences. Nevertheless, theory-based content analysis aims at understanding certain phenomena at a broader level and thus can facilitate the balance between theory and data in the research.

5 Assessing Climate Resilience

The Makreri mixed cash and subsistence economy rested upon five different building blocks, with the production sectors being 1) wage employment in the local mining industries combined with subsistence strategies of 2) crop production, 3) collection of forest products and 4) herding of cattle and small ruminants. Furthermore, 5) the national social welfare and pension schemes were the only source of cash income for many of the local households. In such mixed cash and subsistence economies all the different components are strongly interrelated, and the subsistence production is supported by the cash income generated in commercial wage employment.

To assess the community level resilience of the Makreri population, it is important understand that factors that affected its adaptive capacity – its ability to exploit opportunities that may arise from the changing environment and climatic conditions. This capacity is defined in terms of local social and economic circumstances and institutional reality e.g., equality, income, access to resources and education (Cardona 2004). Furthermore, the community's previous experiences in coping with climatic stress, feasibility of the current livelihood strategies in the wake of new stressors, and

available opportunities for livelihood diversification determine the alterations in livelihood strategies (WISP 2010, p. 20). Therefore, it is important to assess also the prevailing circumstances under which the adaptation measures are brought into use.

The first chapter of my analysis will thus focus on local livelihood strategies, food security, and local asset base. On that basis the chapter discusses diversification as a resilience strategy. The second chapter will turn attention to the local institutions and their role in facilitating climate change adaptation measures while the third chapter emphasises the role of social relation. The analysis is based on 32 theme interviews and 24 livelihood asset surveys conducted in Makreri between the months April and May in 2016. In the analysis the households were divided into three categories, category A referring to one member households of elderly widows whereas categories B and C refer to the extended households where multiple generations share a single household, with category B referring to the older generation of extended household and category C to the younger generation. The term household was used to cover a family unit in which several generations could live together within a single household. In the village, the sizes of the households varied between 1 to 8 members, while the median size was 5.

5.1 Vanishing Livelihoods: Subsistence Farming and Food Security

> When the rains eventually came, they came with strength, and so came the verdancy. With a similar speed than the desert flowers were pushing through the barren land, the locals were rushing to their agricultural plots. Just like the plants had been hiding their colors through the long winter, someone had been hiding the male members of the society. Now, out of nowhere, they appeared with their oxen to saw their fields. Like the land absorbed the rainwater, the seed disappeared underground.
>
> Two weeks later, when the rains had withdrawn and the flowers withered, the village streets were empty again, like the failed rains had taken the men with them, and so they took the hope, too.
>
> Fieldnotes, 28th of April 2016

Subsistence crop production has traditionally been one of the key livelihood strategies in Makreri. According to the results of the livelihood asset survey, 18 out of 24 respondents relied upon gardening and subsistence farming in order to access stable cereals. Seven of the households reported about landholdings, while nine landless households depended on different kinds of sharecropping contracts through which they worked in the land of others and the landowner granted them 25–50 per cent of the products in return for the work they did in the fields. Eight households, after all, did not actively

participate in agriculture. A great majority of the Makreri farmers depend only on rainfed agriculture and were able to grow crops only during the Kharif season[4]. Most of the cultivated land in the area was used for growing Kharif maize and sorghum. Only one of the Makreri households had a permanent and operational irrigation system which allowed them to harvest the field twice per year, first in the monsoon season with the rain-fed maize and later in the dry season with irrigated wheat. For them, crop production was also a commercial activity and the main source of income. For the rest of the local farmers or landless agricultural laborers, crop production was a source of subsistence food.

The adaptive capacity of the local sharecroppers and small-scale subsistence farmers was restricted due to the limited access to water resources. For them, the nearby river represented the only source of irrigation during the dry winter season, Rabi[5]. The river, however, was likely to dry up as it was described by the male-head of household B01:

> *This year, there is no water in the river. It's not a surprise. This is drought. Everything is drying. But there was no water last year, or the year before. Before, we used it for irrigation. Our landlord, we work for him, his land is quite near the river. When I was younger, a boy, my family, we worked in the same field. We used the water [from the river] to irrigate our family plot. I was helping my father to carry the water. But now, there is no water. There is no food.*
>
> *Man, household B01*

In his narrative, the man from household B01 indicated how the lack of irrigation water was inevitable connected to failed harvests. Local food security closely tied to the subsistence production was therefore prone to be compromised due to rainfed Kharif crop[6] failures deriving from reduced monsoon rains. Furthermore, to complement subsistence crop production, all Makreri households grew pulses and fresh vegetables in their home gardens during the Kharif season. However, in a similar manner than the rain-fed crop production, rain-fed gardening activity was vulnerable to heat waves and drought stress. Several households reported that the decayed monsoon rains in the past have been insufficient to support their gardening activities and noted that the harvests have remained limited. A woman from household A04 indicated several challenges related to gardening activities that she practices on her home yard during the Kharif season:

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[4] Season for the south-west monsoon. Kharif crops are commonly sown in May or early June during the first rains of south-west monsoon and harvested close to September. Production of Kharif crops is rain-fed and not dependent on irrigation.

[5] Winter season. Rabi crops are sown in autumn and harvested in the spring. In Rajasthan, Rabi crops cannot be grown without irrigation.

[6] Rainfed crops that are grown during the season for Southwest monsoon.

The land here, it's not of good quality. It's sand and stones. I have soybeans, sometimes lentils here. Okra. But every year the land loses quality. -- I use goat manure as a fertilizer and I need to carry water from the well and use it for irrigation. Water is stored here in the sun. It stands here all day. It's not good for the plants to give them that. Sun heats the water. It's not fresh. This is not a good land to grow plants. -- Last year, it was dry. There was nothing left to store for the winter. I dried chillies and onions. All the beans failed.

Women, household A04

She pointed out that the poor-quality soil increased the need for fertilization and irrigation, while the water stored in the heat and warmed up by the sun was harmful for the vegetable. Last year these factors together with erratic rainfall resulted in failed harvest of soybeans. Due to the lack of irrigation water, all the households in Makreri reported consuming fresh vegetables only during the Kharif season, when rain-fed gardening activities provided the households with tomatoes, onions, and lentils. In the Rabi season the fresh vegetables such as tomatoes or okras were defined as "too expensive" or "something special for rare occasions or celebrations". During the Rabi season the food intake is limited to nutrient poor, basic foods, as it was described by a respondent from household B06:

I cook twice a day, first thing in the morning, and later in the afternoon. I prepare plain roti [a type of Indian bread prepared from maize flour] for my husband and children. For children I also serve milk. I don't have time to eat in the morning. Afternoon, we have roti with soup. I mix water, flour, and spices, chilli. -- I eat what is left when the children have finished. -- There is no vegetables during the Rabi but I go to the forest to collect tendu.

Woman, household C03

In response to crop failures and increasing dependency, respondents reported reductions in their food intake. According to the interviews, men and children consumed two meals per day, while the women tended to skip the first meal during the Rabi season and thus consumed only one meal per day and "probably some leftovers" after the other family had eaten. As it was indicated also in the narrative of the woman from household B06, in the Rabi season local food security depended on the collection of forest products such as fruits, seeds, and a variety of different plants. Fruits and leaves of East Indian ebony, or tendu, as the local referred to it in Bhil language, were an important source of food security and extra income for the Makreri households:

It's a tendu tree that keeps us alive in Rabi season. It's a miracle. When nothing else grows anymore, the tendu tree still gives us fruits.

Woman, household A05

With her narrative, the woman from the household A05 emphasized the importance of tendu fruits and underlined that it is the drought-resistant tendu fruit that keeps the Makreri population alive during the Rabi season. The East-Indian ebony was also a source of small cash for many women and elderly widows. A woman from household B07 explained how she is complementing the household livelihoods by drying and selling the tendu leaves for local shop keepers:

> *It's not only the fruits. We also collect the leaves. The season starts in three days [in the end of May]. They are used for beedi [a tribal cigarette]. You only have to collect the leaves, dry them in the sun for ten days and then you sell them to the shopkeeper. It's easy money. Sunshine here, it's free.*
>
> *Woman, household B07*

In addition to subsistence farming and collection of forest fruits, India's Public Distribution System was on important source of food security for most Makreri households. According to the results of livelihood assets survey, the public distribution system was the only source of staple cereals throughout the year for four out of the 24 Makreri households. Under the Antyodaya Anna Yolana sponsored scheme, the poorest of the poor families (e.g., those with the Scheduled Castes or Tribes status and the ones living below the poverty line) were entitled to receive a monthly allowance of 35 kilogrammes of staple cereals at a highly subsidised price.[7] A woman from household A10 explained how the distribution of subsidised stable cereals was organized in the area:

> *See, I'll show you my card. You have to carry it with you when you go to the government shop. It's a few kilometres from here to the west. You show the card and then you get the maize. You have to pay but it's not much anymore. Of course, the grains are not of good quality, sometimes there are small rocks. If you go to the market, it's different – the price is too much. I go there [to the government shop] every week. I have to walk. That's why I go there so often. I can't carry heavy bags anymore.*
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> *Woman, household A10*

The narrative of the woman from the household A10, was in line with the results of livelihood asset survey. According to the survey, food supply of elderly widows was strongly tied to the government's food allowances while for the rest, the sponsored scheme acted as a complementary – albeit indispensable – source of staple food grains.

[7] Rs. 3 for 1 kg of rice, Rs. 2 for 1 kg of maize Rs. 1 for 1 kg of coarse grains

5.2 Resilience through Diversification: Mixed Cash and Subsistence Economy

Among the Makreri population, diversification was commonly perceived as one of the most applicable ways to enhance resilience at household level. The local mixed cash and subsistence economy rested upon five different building blocks from wage employment to subsistence farming and herding of livestock. In Makreri cash income was collected from multiple – but somewhat minor – seasonally changing sources. The post monsoon period in the end of the dry winter season, Rabi, as the local referred to it, represents a significantly difficult period for the village as the availability of fresh vegetables is seasonally contingent and limited to the monsoon season. Respectively, the dry season limited the availability of feed and fodder and the goats were often dried of from milking in the end of Rabi between the months of April and May.

When discussing diversification, a common boundary is used to separate the different types of motivation for diversification, e.g., diversification as an investment to strengthen the asset base and to spread risk is certainly different from diversification out of immediate need. The spreading of risk can thus be considered as a pull factor for diversification while insufficient livelihoods, in turn, can be understood as a push factor for diversification (Hussein & Nelson 1998). Hussein and Nelson (1998) have indicated that rural subsistence producers are often pushed to diversify their livelihood strategies as agricultural production is often vulnerable to natural hazards and consequently subjected to price fluctuations and profit losses (Ibid., p. 16). Accordingly, the Makreri population was pushed to diversification by repetitive crop failures and general feeling of uncertainty and distrust over subsistence farming in the course of recurring droughts and seasonal dry periods. One of the respondents, a woman form household B06 reported about failed harvest in three successive years. After receiving a loan through the BRS Income Generation Programme, she discussed the household economics and livelihood alternatives with her husband. She was frustrated with the physically hard and time demanding work in the agricultural field which never resulted in improved family food security. However, she had noted that the women who were engaged in goat production had retained an access to milk even during the dry periods. That motivated her to look for alternatives for crop production:

> *We only grow kharif [rain-fed] maize, but we have lost the harvest in three years. I don't want to invest in crop production. I don't trust it anymore. We have put in all that time and we work hard but at the end of the harvest, there's nothing to store. When I received the BRS loan I told my husband we are not wasting the money with crop production. -- I saw other women with goats. They were better off. At least they had milk for their children. I told him I want to try that, and he agreed. It is a way to earn money, too.*

Woman, household B06

Several respondents indicated how their attitudes toward crop production have changed and they rather seek complementary activities for crop production to “lead the family over the drought events”. Repetitive crop failures had resulted in hopelessness regarding the crop production. That was easy to sense from the narrative of a woman from household B08:

> *I have seen drought after drought. What can I do? I go to the field, sow the seeds and wait for this year to be different? I have to feed the family. I have to try something else.*
>
> *Woman, household B08*

For many, diversification outside crop production has been inevitable, both to secure human survival and to build resilience for climate related stressors such as prolonged droughts and seasonal variations. One of the respondents explained how her family did not have any other choices but diversify their livelihoods after her husband’s ability to work was compromised in an accident at work. Crop production in drought prone area is often only a source of subsistence cereals, and a woman from the household B05 remined that a household also needs a source of cash income to cover school fees, electricity bills and loan repayments:

> *Crop production is not enough. We still need the government food subsidies. Sharecropping is only for home consumption and we also need cash. -- After my husband lost his fingers in an accident in the mines, it has been different. He can’t work like he worked before the accident. Sometimes there are work for him in the mines, but the salary is lower [than before the accident]. That’s not enough for all of us. But with only one hand, he can still help me with the goats.*
>
> *Woman, household B05*

Similarly, a woman from the household A10 described how she ended up in a situation where goat production seemed to be the only available and accessible livelihood strategy. After the death of her husband, as is usual in the area, she lost her right to use the land that before was the property of her husband. Because of her age – and weakening health conditions – neither she, nor the landlords considered her suitable for physical agricultural labour:

> *I only get grains from the government shop. My husband had a plot of land but after he died his brother inherited the land. I got nothing. He said it belongs to his family, his ancestors. And sharecropping, I’m too old. But I got to keep the goats. They are my property.*
>
> *Woman, household A10*

However, in her narrative the woman from the household A10 emphasised that the due to the goat production, she has retained access to milk and has a liquid store of wealth. Therefore, the

diversification of livelihoods before the death of her husband left her with at least a one applicable livelihood strategy.

Moench and Dixit (2004, p. i) have presented diversification as the key factor affecting the resilience of the local livelihoods in terms of drought, floods, or other natural hazards (Ibid., p. i). It is considered an attractive strategy to build resilience, particularly because it is a prerequisite to spread risk and reduce the dependency on one or only few climate vulnerable resources (Adger 1999). In this regard, diversification is considered most beneficial when it provides the household with alternative livelihood strategies outside climate vulnerable agricultural production. In Makreri, however, diversification of livelihoods often referred to diversification of agricultural production. Moench and Dixit (2004, p. iii, 163) however noted that that growing different types of crops or keeping different breeds of animals is often noted to provide the similar means to increase the climate resilience of the livelihoods. In Makreri, some of the community members were actively seeking climate resilience through diversification of agricultural production. After drought-related maize failures in three successive years the household B01 decided to shift from maize production to sorghum production. Because their sorghum harvest was successful, households B02 and B03 both followed their example and included sorghum in their crops.

To complement their climate sensitive agricultural production, the Makreri households also sought seasonal employment outside the village. For the Makreri community the mining industry was one of the rare livelihood activities not vulnerable to droughts. The great majority of working-age men in Makreri were employed in the local sandstone mines. However, the mines provided employment only during the dry season whereas the monsoon rains interrupted the work and filled the excavations with water. Wage employment was also commonly sought under the Mahatma Gandhi National Rural Employment Guarantee Act.[8] In the spring of 2016, the Makreri population was waiting to be provided employment at a road construction site.

While non-agricultural activities may tackle the problem of climate vulnerability, the alternative strategies often come with another set of risks and stressors. Employment opportunities are often prone to fluctuations determined by the changes in national and international trade patterns and in the case of mining industry, connected to a global demand and supply of minerals (Hussein and Nelson 1998, p. 16). Accordingly, the male head of household B01 explained how the monthly income of a sandstone miner was strongly tied not only to the quality of the stone but also to the value of the

[8] The Mahatma Gandhi National Rural Employment Act is an Indian labour law and social security measure that "aims at enhancing livelihood security in rural areas by providing at least 100 days of wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work". (Sivachithappa 2014, p. 336).

products determined in the global markets. Furthermore, the mining industry in the area was overshadowed by limited labour rights, minimal wages and severe health related problems deriving from incomplete safety regulations and breathing of stone dust. All the widow respondents indicated that their husbands had died either due to silicosis and tuberculosis – common occupational diseases of a sandstone miners – or because of fatal accidents in the mines. Additionally, while working in the mines the husbands from the households B01 and B05 had had accidents which compromised their ability to work in the future.

The choice of the livelihood strategy is essentially influenced by the person's ability to make use of different capital. Some livelihood strategies, for instance, require human capital, special skills or enough labour power. Commercial livelihoods require financial capital to start up as well as physical capital in the form of infrastructure and transportation links. To start agricultural production, there is a need for sufficient natural resources. Social capital, again, contributes to the creation of relationships and is considered an advantage when consolidating the corporate customer base (DFID 1999, p. 35).

Several characteristics of poverty can limit the household's resilience and furthermore, the ability to benefit from diversification. Chambers (1997) has identified five of them, with the characteristics being 1) poor asset base; 2) limited physical strength; 3) marginalization, either in terms of geographical location and/or due to the limited access to education or information; 4) scarce means to overcome contingencies; 5) powerlessness in the form of low social status, weak negotiation power, and for instance, narrow resources to compete in the job market. In this manner, not all livelihood strategies are accessible to everyone and some may not be able to diversify their livelihood portfolios (Chambers 1997). Hussein and Nelson (1998) have thus argued that diversification can mean a variety of different things, determined by the local context, available capital base and furthermore, by gender, age, social position and certainly one's personal aspirations and desires. All of these factors explain the strong tendency of the Makreri households to prefer goat production over other production strategies.

5.3 In goat We Trust: Livestock and New Livelihoods

> She approached me from the other side of the main road. There was no need to look left-right-left. A bus from Bijoliya to Satkundia passed by the village every once in a week, a miner's truck even more rarely. Well, the man selling sugar cane juice, he came with a bicycle.

The wind caught her pleated skirt, blowed it up and back down again, when she crossed the street with determined steps. Judging by the number of pleats, she was not from one of the wealthiest families. "Count your pleats", they say around this part of the world, referring to all the capital one needs to have to increase the number of pleats on her skirt.

She came straight to me, in a way that hardly any of the locals had approached me before. She put her hand in the little pocket that was attached to her skirt with a few loose stiches and then hidden somewhere under the waistband. She took a small glass bottle, vitamin A, as I came to learn later, from the pocket and shook it in the air: "This is what keeps our babies alive – and milk." And then she was gone.

Field notes, 5th of May 2016

Goat production in Makreri was generally considered as an attractive livelihood strategy and investment, particularly because of the multiple uses of goats. Goats provided the households with a liquid store of wealth and an important source of family food security through the supply of milk and meat. According to the respondents, the low input requirements of goat production were one of the key characteristics making the strategy seem so attractive. Goat production was accessible also for those who did not have education or any other sources of income. An elderly widow from the household A01 recalled the time when she came to Makreri after her marriage. Back then, the village streets were crowded with buffaloes:

I guess you haven't seen buffaloes here. Before it was common. I was a small girl when I came here. Imagine these small streets with a buffalo herds running around. It was a crowd sometimes. -- But it is a different time now, I have not seen a buffalo for weeks. You can get a dozen of goats for the price of one buffalo. -- You count your savings, and it is not a surprise we all have goats.

Women, household A01

With her narrative, the woman from the household A01 referred to the cost-effectiveness of goat production. With the same investment cost, a herd of goats, if compared to one or two buffalos, provided more value for the money. Goat production was considered cost-effective particularly in the environment where the livestock depended on open pastures and the access to feed and fodder was limited. A woman from the household A04 also emphasized the high maintenance cost related to cattle herding. Before she started her relatively successful goat production six years ago, she had attempted to sustain the family food security by herding a few cows:

But the cow, it was so skinny you could hold a hand around its ribs. Aye, a cow can eat a lot. I feed the cow but didn't afford to feed the family. The cow was so skinny. It didn't give us milk.

Woman, household A04

When compared to cattle productions, goat production was also based on the idea not to concentrate all of the family resources in one object to avoid the risk of losing everything. Low input requirements also minimized the risks related to animal losses. A woman from the household B01 compared the risks related to cattle herding, a strategy characterized with higher investment requirements:

A good cow can give a good amount of milk but that's expensive [to have cows]. To get a cow you need more money. One household, it's commonly one or two cows, maximum. Goats, I have eight, its more than two. If you lose a cow, then what? If I lose a goat, I still have seven more to go.

Woman, household B01

Besides the resource poor farmers, goats were also an accessible livelihood alternative for local women who were often tied to household chores such as childcare and searching and fetching water. For many, goat production provided an opportunity to simultaneously stay at home and earn income outside home. Therefore, goat production was considered suitable also for those who had compromised health conditions. Woman from the household B05 explained the advantages of goat production:

Goats are a good income for women. I can stay home and still work. I have to take care of the children, and the house, too. I have many things to do at home but with goats I can still earn money. I go grazing when the children are at school. With goats I can walk to the well and fetch water. They follow me where I go.

Woman, household B05

According to the respondents, it was possible to combine domestic work and goat production. Generally, the goats were grazed on the communal lands near the village. Three kilometres back and forth was considered to be the longest distance the animal can complete in a day. With small herd sized and steady availability of fodder and water, it was also possible to stay in the village during the Kharif season. The hot and dry Rabi season, in turn, increased the time consumed for grazing.

The respondents also emphasized that goat production was the first opportunity to earn personal income for many. Several cultural practises and the general feeling of distrust and danger often related to female-male communication limited the women's employment opportunities outside home. Furthermore, the mining industry was one of the very few providers of wage employment in the area.

A woman from the household B07 thus emphasized that income generation opportunities for women were mostly limited to goat production:

> *Mines are not for women. If there is a woman working in a mine, she is really in trouble. She must be really poor. It is not safe. It's only the men working in the mines. For the women, it's only the poorest of the really poor who go there and work.*
>
> *Woman, household B07*

A similar message was reiterated by a woman from the household C03. As she explained, the lack of income generation opportunities for women had resulted in a situated where she was mostly bored and felt useless:

> *Before, I was only waiting for the better times to come but they never came. Now I have these animals and I can send my children to school. I can feed my family. Everything is different.*
>
> *Woman, household C03*

The woman from the household C03 emphasized that the opportunity to earn personal income has improved the quality of her life. As it was noted also in her narrative, women usually used to their earnings to take care of school fees and to purchase food, medicine, and clothing. In terms of employment generation, the rearing of goats was the most dominant strategy amongst the Makreri women. According to the results of the livelihood asset survey, the value of goat sales and added stock accounted for the major share of gross returns[9] to households. The respondents received an income of Rs 4 500 to 12 000 per goat while the median income was Rs. 5 000 per goat. In female-headed households also the total income generated though goat production exceeded any other sources of income. A woman from the household C03 also explained that the milk and income that was generated through goat production around the year, provided the household with a certain level of economic security and financial balance while all the other sources of income (e.g., mining industry and agriculture) were contingent to seasonal variation:

> *Before we depended only on the income my husband earned. He works in the mines but it's only a part-time job. During the rains the mines are filled with water, there is no work in the Rabi season. Goats – we have them around the year. That's good – to have a source of income always available.*
>
> *Woman, from the household C03*

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[9] Gross returns refer to the calculated returns of an investment before any expenses have been deducted. Gross returns are calculated for a certain period of time.

The ability to contribute to the household expenses and take a lead to secure family resilience increased, not only the self-confidence of the local women, but also brought them into the core of family decision-making. A woman from the household B01 explained how the family decision making practices have changed after she started the goat production:

> *Now when I can also earn money, with my husband, we discuss the decisions together. What crops we grow? Do we need to fix the housing? How we use the money? I can have a say, and he listens to me. That's different.*
>
> *Women, household B01*

5.3.1 What Keeps our Babies Alive

In the local context, the availability of milk was often seen as the most important source of calories and critical to health and wellbeing. Most of the milk was consumed within the family, preferably by children who or elderly people who consumed the milk together with tea. Milk was an important source of quality protein particularly for the Makreri children and infant mortality was often linked to unavailability of milk, as the discussions with the local people confirmed.

One of the respondents, an elderly widow, introduced the living conditions of her and her sister and a few friends by simply stating that: "None of us have any goats, we all have lost a baby." Similarly, although from a different perspective, the elderly widow from the household A04 talked about a situation when her daughter-in-law gave birth to twins, a boy, and a girl, but due to her weak health conditions the insufficient amount of breast milk was only enough for one:

> *There. Do you see the children? They are my grandchildren. We live all here, my son and his family. It was a difficult time when they born. My daughter-in law, she was weak, sick for weeks. We were afraid she doesn't recover. She was so thin, shaking, shaking. She tried breast feeding, but there was no milk. It wasn't enough. It was the same years when I started with the goats. I only had a few. It was new. But now, this is the difference the goat made. Without the goats we would have ended up in a situation where we have to make a decision. Look at the children and decide which one is stronger. But see, we had milk, so she breastfed the other and then we also had the goat milk.*
>
> *Woman, household A04*

In the narrative, the woman from the household A04 emphasized the importance of additional source of milk in the families with infants and referred to the apparent difference that the goat production had in her family food security. However, due to the small herd sizes, the respondents emphasized that the daily milk yields remained insufficient. During a good period when there was enough feed,

fodder, and water for the animals, one goat provided approximately 0.4 – 0.6 litres of milk. The hot and dry Rabi season with the consequent lack of feed and fodder resulted in general weakness of the animals and reduced the milk supply to 0 – 0.4 litres. According to the livelihood asset survey, 14 out of 24 households reported that their goat has stopped producing milk during the drought in April–May 2016. Moreover, herd recovery after drought was reported to be slow. Excessive drought events affected the reproduction rates in the following year while drought related livestock mortality further restricted the milk yields. The women from the household C03 described her experiences during the previous Rabi season:

> *The drought, it is not only the Rabi season. It lasts forever. Goats, they got weak. There is not enough feed or water, and the animals are weak but during the Rabi, the water is far away. We walk further and further and sometimes it is dark when we come back. When they are weak, the goats can get sick. Diarrhoea is common. And pneumonia. -- First, they don't give milk anymore. In the Rabi, there is no milk. Sometimes the goats are so weak [because of the drought] that they are not kidding.*
>
> *Women, household C03*

According to the example of the woman from the household C03, the effects of drought are visible a long after the actual drought period has ended. Repetitive droughts can therefore strengthen the effects of drought and their intensity as the animals do not have enough time to recovered from the previous droughts.

Besides family food security, the availability of milk also determinate the household's social position. Milk was a mark of social status, and lack of milk – even more – was one of the central characteristics associated with the poor households. The elderly widow from the household A08 pointed out how they used to be extremely poor and could only afford to have a cup of "poor man's chai" – tea without milk – in the mornings. Similarly, the woman from the household B06 emphasized how she was desperate for milk if there were visitors coming to her home: "I used to walk from door to door, begging neighbours to donate milk. You serve [the visitor] with kali chai[10] and [if you had no milk] people would start the rumors and tell: 'She's so poor she drinks her tea without milk'". Particularly the older generation emphasized this cultural dimension connected to milk, whereas the younger population rarely considered milk as an important symbol of wealth. One explanation for this is that the social networks of the younger generations were still so insignificant that they did not host guests on a regular basis.

[10] Plain tea without milk

5.3.2 Goats as a Liquid Store of Wealth

Most of the goat owners in Makreri started goat production to generate cash income from the sale of meat and milk. In the beginning, the purpose of this research was to assess the local producer's access to markets. However, the Makreri farmers were relatively new to the production strategy and the herd sizes remained small. Rather than seeking marketing opportunities, the Makreri farmers sought to grow their herd sizes to secure steady and sufficient milk supply through reproduction. In this respect, the herds mainly consisted of does and the bucks were often sold at the age of 7 to 10 months to avoid unnecessary maintenance costs. The does, by contrast, were only sold in emergency situations.

The data indicated that for the local producers the selling of live animals acted as a coping mechanism – something that was not actively planned, but what after all secured the survival during the economic stress. A young woman from the household C03 reiterated the narratives of many others when she emphasized how she was not planning to sell any animals this year, but rather trying to grow the herd in number. She nevertheless stated that "we have to sell one or two to fix the roof". Her example indicates that she was aware of the strategies (e.g., reproduction of herd) that would support her resilience and increase the household's ability to respond to the social or natural hazards in the future. However, the magnitude of the stress and lack of alternative income opportunities exceeded her capacity to stick to her long-term strategy. Thus, selling goats acted as a source of emergency cash – a coping mechanism – which secured the-short term survival but simultaneously reduced long-term resilience. In a similar manner, a woman from the household A09 explained how she resorted to the sale of animals when her family faced an acute financial shock after the husband of her daughter died in an accident. Her example indicated that due to the steady demand of goat meat she was able to convert her live animals into cash resources in a short order. She described the situation as follows:

> *This year, it's been difficult. Terrible. I had to sell three goats when my daughter moved back here. It has been the most terrible day of my life when the husband of my daughter died in an accident. He didn't have unmarried brothers. No one to remarry my daughter. She had to move back here. I have to pay back the bridal price. I sold the goats to pay back a part of it but I still, I have to pay more. Now, I have to feed her, too. I have no income and I sold three goats. I have not enough milk, and I have two people to feed.*
>
> *Women, household A09*

However, her example also presented the flip side of emergency sales. The sale of animals had a negative impact on household's food security. While the multiple uses and benefits of goat production

were often the exact reasons why the activity seemed so attractive, strong dependency on milk, meat and income often generated several dilemmas. A young wife from the household C03 explained how the family's food security would be compromised if she sold her goat and lost her only source of milk. Simultaneously, the reproduction rate of her herd would slow. Then again, if she decided not to sell, there would be no education for her children. Hence, a herd of few goats could already enable short-term coping, but with small herd sizes and high dependency on goat related yields, households were not capable of building long-term resilience for drought events or other hazards.

6 Resilience through Institutions and Governance

David Satterthwaite (2013) has emphasized that one of the indirect sources of resilience is closely tied to functioning public institutions, social services and institutional safety nets provided for citizens. High quality social services, often ensure better access to education, healthcare and emergency services and may translate into reinforced ownership of local resources and relevant financial capital such as proper housing and storage of wealth – both often associated with a better quality of life also in Makreri (Satterthwaite 2013). Therefore, it is crucial to understand the complex linkages between the community and central institutions and the extent to which the communities, groups and individuals can trust and deploy the public institutions to secure their rights and livelihoods and contemplate the historical processes which have fostered the vulnerabilities of a given community (Adger & Kelly 1999).

The Makreri village was detached from the wider Indian society and central governance by its geographical location and cultural, institutional, and infrastructural dimensions. In Makreri, both *access to* and *distribution of* essential services and was hampered. The local population encountered a set of institutional vulnerabilities understood as features that are connected to the institutional context of the affected society (e.g., legislation, political situation, and available services) (Adger & Kelly 1999; Adger 1999). In order to assess the options for resilience, it is therefore important to recognise the common attachment of poverty to geographical, economic, and social marginalization through which the access to resources and the ability to mobilize entitlements is often obstructed (Cardona 2004). Hence, this chapter will focus on explaining how the local institutional structures affect the individual and collective resilience of the Makreri population.

6.1 The Struggle for Pastureland

In India, economic liberalisation in the 1990s resulted in rapid economic growth but simultaneously triggered increasing economic inequality, negligent use of natural resources and ignorance of human rights (IDRC 2015, p. 97–98). Poverty reduction has correspondingly been the slowest among the socially marginalized scheduled tribes, with the indigenous population rarely benefitting from economic development (IDRC 2015, p. 62). The present combination of unsustainable use of natural resources together with the changing climatic patterns have coupled the food security in the region (Rathore 2005, p. 27).

Increasing land tenure insecurity is one of the central institutional problems of most indigenous communities engaged in livestock production in open pastures. It is commonly acknowledged that the current vulnerability of pastoral livelihoods is often driven by policies and land reforms leaving available open pastures increasingly fragmented. Agricultural expansion and privatization of the commons have added pressure to pastoralist groups and resulted in limited access to open pastureland (Galvin 2009). Therefore, rather than being a characteristic feature of pastoralist production systems, vulnerability is often a product of constant marginalisation of the pastoralist population which is often established through political decision-making (Nassef et al. 2009).

In recent years, neoliberal administrations have been criticized for promoting large agricultural operators and mining. Policies supporting economic liberalization have accelerated the resource exploitation of vast land areas by powerful corporations and increased the dissatisfaction of smallholders and reinforced the potential of local conflicts over resources (Hollander 2013). Consequently, accelerating environmental degradation is rooted in the international market conditions and changing ecological, economic, and political processes implemented in the different levels of society (Robbins 2012, p. 99; Rocheleau & Thomas-Slayter et al. 1996, p. 291). My interviews demonstrated that small ruminant husbandry in Makreri is experiencing similar difficulties. The male head of the household B07 indicated that "the mines are coming closer and closer". With her notion, he referred to the previous land reforms which have narrowed communal land tenure rights and have made it easier for private operators to lease and purchase land either for large-scale agricultural purposes or mining.

Rangelands under a pastoral production system have traditionally been managed through complex systems of common and private property rights. Land degradation and desertification are often interrelated with weakening of traditional management institutions and the loss of key resources that the pastoralist system is dependent on. Both factors are often linked with the neglected tenure and

property rights of the indigenous communities (McGahey et al. 2008). The male head of the household B07 noted that land degradation and desertification are not the results of goat rearing but rather related to government driven land use strategies. The respondents were seemingly tired discuss the topics related to land management. The general feeling of exhaustion and lack of prospect were easy to recognise from the question of the male head of household B07 as he asked: "What is there to discuss about land management, if there's nothing left for us to manage anymore?".

Other interview findings further endorsed his notion that increased competition over land areas and limited access to open pastures coupled with rainfall deviation and land degradation have created a snowball effect, leaving local smallholders with vanishing livelihoods. The respondents, for instance, remarked that there is an abandoned limestone mine behind the village. It provided work for the local men for a short period of time, though the interviews indicated problems related to salary payment and working conditions. After the mine was closed, it left behind hectares of destroyed cultivable land, contaminated soil, and discarded tools and machinery in the area that used to be a communally managed pastureland. Respondents also pointed out that a new area on the southwestern slope of the village was already reserved for a multinational mining operator. The male head of household B01 also explained how they used to depend on a small river as their source of irrigation. In the past years the river, however, has been drying up faster. He also pointed out that the water has been contaminated due to the effluent from the industrial plant, and, as he remarked, is "not good for our health anymore".

Changes in land tenure have reduced the availability of grain left on the ground following the harvest. As he explained, there has been a common habit to let the livestock freely graze the crop residues after the Kharif harvest, as most of the land is left fallow during the Rabi season. "Now everything has an owner", as it was stated by a woman from the household C02. In a similar manner, a woman from the household C03 explained how the goat owners often bartered the permission to use their neighbour's crop residues. As an exchange, they donated milk and manure that was used as fertilizer to the owner of the field, as was described by the woman:

> *They [the owners of the plot] let me use the field for grazing during the wintertime. In kharif season, it's maize here everywhere but in rabi, nothing grows. I asked and they said I can use the land for free. The goats walk here everywhere. They keep the field free of weeds, and poop, it's fertilizer. -- They are nice people. As an exchange I give them milk every now and then.*
>
> *Woman, household C03*

Her narrative indicated that although some of the farmers kept their crop residues free for use, there was a common understanding that asking a permission and paying an allowance was a polite gesture

to maintain good neighbour relations. In addition to changes in land tenure rights, the respondents noted that its effects were strengthened by drought conditions. The remarked that after the past droughts thorny shrubs had overtaken the grass species instead of the vegetation returning to its post-drought state.

6.2 Distress Sales and Short-Time Coping

The effects of climate change were manifested also in the changing market conditions and reflected in local livestock prices. As a result of increased supply and poor condition of the animals, droughts were documented to induce drops in livestock prices and inversely, a modest upward pressure on livestock prices was recorded in the direct aftermath of droughts as farmers retain their animals for restocking purposes instead of selling them. Although the recorded price fluctuations are commonly considered marginal, dry periods are reducing the total value of livestock by deteriorating the general condition of the animals. According to the local experiences in Makreri, droughts, even seasonable dry periods, were often triggered distress sales[11] of livestock. The lack of fodder and water left smallholders with no other option but to sell some of their goats to either keep the rest alive or to cover other immediate expenses.

As it is characteristic to covariate shocks such as droughts, the whole community is simultaneously affected. When everybody was seeking to sell their livestock at the same time, the oversupply of live animals lowers the market value of goats. Therefore, the distress sale prices did not reflect the actual value. A woman from the household A01 reported about a situation when she had to sell one buck for half its actual value:

> *It was a difficult period. I only had four goats then, but one of them was a healthy buck. It was big as a goat can be. I know it was a good money. I know in the market those are sold with Rs. 8 000. But it was a drought year. We had to sell. There was no fodder and we wanted to keep the she-goats for milk. The middleman came here, and everybody was selling. He gave same price for everyone, Rs. 4 000. No negotiations.*
>
> *Woman, household A01*

As in her example, the distress sales often result in economic losses, and short-term survival but reduced resilience for the seller. Goats were usually sold to a local butcher through middlemen who visited the village monthly. The respondents expressed they had little or no bargaining power when compared to middlemen, either because of oversupply of animas, as was the case with the woman

[11] Sale of assets which were originally intended to keep.

from the household A01 or because they lacked information on market prices in local and national markets. A woman from the household A03, presented a situation in which she was selling a healthy buck to a middleman:

> *The middleman was here in the house. It was after the death of my husband. I was selling the buck. He was here and he said it is Rs. 3 000. I knew I must sell. I was accepting the price already, but my nephew saw me here with the middleman and he came in. He asked about the price and the middleman, he didn't like the situation. My nephew, he said Rs. 3 000 is not a price for a buck. He said it must be Rs. 6 000. We sold the buck with Rs. 5 000. Without him, I already said I accept the price. But Rs. 3 000. That is not enough. I didn't know.*
>
> *Woman, household A03*

Although the goats were commonly the property of the woman, it was generally the male head of households who were responsible for the sale of goats. Hence, the woman from the household A03 remarked she had entered the market without proper knowledge of current prices. Women from the households B05 and B06 also pointed out how the middlemen only accept sales by headcount and refused to weigh the animals. Although smallholders told me of exploitation by the middlemen, many of them were dependent on loans granted by these same middlemen. Due to the limited access to institutional finance and banking services, smallholders accepted credit from middlemen and guaranteed the loans with their goats. The activity kept them obliged to continue trade relations with middlemen instead of searching for better marketing opportunities.

6.3 Resilience through Reproduction

According to the CALPI's (2005) stakeholder review, Indian smallholders have insufficient capital resources to invest in their small ruminant businesses. That is, they cannot afford more profitable or drought resilient goat breeds, nutritious fodder or better health care and hence seek improved financial gains through larger flocks, consequently accelerating the environmental pressures on disappearing pastureland (CALPI 2005, 9). Similar challenges persisted in Makreri a decade later. The respondents emphasized reproduction and larger flocks as their only means to prepare for future disruptions. As a woman from the household C02 communicated larger herd sizes resulted in better milk yields:

> *I only sell the he-goats. They don't give milk. He-goats, they don't reproduce. It's too expensive to maintain them. Feed and fodder, they have a price. He-goats, we sell them at an early age. When they are strong enough, we sell them immediately. We only keep the she-goats. There is no mean to sell the she-goats. We are seeking to grow the herd.*

For that we need the she-goats – for milk and for reproduction. More goats mean more milk and better income.

Woman, household C02

There was a common habit to seek herd growth through the selling of only the bucks. They were considered as an unnecessary cost whereas the does contributed to milk availability and reproduction, and thus were worth to keep. Resilience through reproduction seemed attractive to the local smallholders mostly because of its cost effectiveness. A woman from the household C05 pointed out, reproduction was considered natural growth with no additional capital invested:

It is easy, natural growth. They [the goats] reproduce themselves. I don't have to buy new goats but still my business is growing. If everything goes well, the she-goats will make new goats, more and more. Right now, the milk is not enough. But when I have enough milk, I can start thinking about selling.

Woman, household C05

Similarly, respondents were aware that the Sirohi goat[12] – a native goat breed from the Aravalli hills – is more drought and disease resistant and provides better milk yield during the Rabi season than other breed alternatives. However, a woman from the household C06 noted how she still depends on the crossbreed goats to avoid major input requirements:

There are different breeds of goats, many. Rajasthan even, it has its own goat breed, Sirohi. It is good for the local environment. It is stronger. It gives milk through the rabi season. But there are only two or three Sirohi goats in the village, not many. It is because of the price. It's expensive. My goats, they are just what they are, village goats. It's not a breed, it's a mix of everything.

Woman, household C06

Furthermore, the woman from the household B07 explained that controlled mating is difficult to carry out in grazing situations where the goats are not constantly monitored:

The goats go around the village all day and you collect them in the evening. You can't keep an eye on them all the time. See, you look at one and the other disappears. Then comes the mating time. They go around and find each other, and you wait until the kids are here. Only then you see what comes from there, where it has been.

Woman, household B07

One of the main drivers of reproduction pursuits is the vulnerability of small ruminants to injuries, accidents, and diseases. 12 out of 24 livelihood asset survey respondents reported about goat losses,

[12] The Sirohi is an Indian breed of domestic goat originating from Rajasthan. It is considered a dual-purpose breed for meat and milk production. The breed is well-adapted for the dry and hot climate of Rajasthan.

which were a common concern among the Makreri goat owners. Limited access to veterinary services was defined as one of the main constraints to successful pastoral enterprises. Although veterinary service is available in Bijolia, situated 10 km away from Makreri village, it is often out of reach for the rural resource poor smallholder. Particularly during dry seasons and droughts, goats often succumb to common diseases or small injuries because of general weakness following nutritional stress. Excess rains, in turn, mixing ground water and surface water sources, and therefore causing diarrhoea and undernourishment of livestock.

Respondents used local remedies to cure diarrhoea and common skin infections in their goats. Modern medicine was normally used for deworming and vaccinating. Pneumonia, for instance, was reported to require medical treatment but as the male head of household B01 remarked, before visiting a veterinarian, they had to weigh the financial costs associated either with the loss of the animal on the one hand and the cost of accessing veterinary services on the other, including the potential risk of losing the animal in any case. Hence, as summarized in the CALPI's (2005) stakeholder analysis, the low productivity of the small ruminant sector should not be seen as a sign of unprofitability but rather understood as a sign of the low inputs of pastoralist production, self-sufficient orientation of rural smallholders, acute and long-term shortages of feed and fodder, poor veterinary services, narrow institutional support and limited access to markets and information (CALPI 2005).

7 Resilience through Social Capital

> Her blue plastic cup was scratching against the bottom of a wooden grain storage container. The last rays of setting sun found their way through the gaps between the boards, as if the only purpose of sunlight were to highlight the imminent lack of basic necessities in the area. The sloppy instalment of the upper boards revealed that whoever constructed the container, he for sure didn't have all that optimistic idea of the family's food security. Why to concentrate on upper boards if there's not enough grains to cover the bottom?
>
> There were no signs of reluctance on her face when she bent down trying to catch the last grains from the very bottom of the container. The loosely attached upper board was altering her movements as she held on to it to find balance. She seemed strong – determinate – but time leaves no one behind. Like a wind, the passage of time had caught her crimson red ghoonghat and pushed her posture down in a way that only the strongest of the trees respect the wind when bowing down their heads.
>
> She got up, shook her blue cup to separate the grains from the chaff, barely a handful of them, and poured them into an empty bucket in a way that the grains bounced up and down on its plastic bottom. The young girl nodded politely, took her bucket, and left

> the yard and disappeared behind the stone fence just as quickly as she had entered the field just a minute ago. Not many words were needed. It was the empty bucket that spoked for itself. To answer the questioning look on my face, though, the lady with a crimson red ghoonghat explained what the visit was all about. She gave her wooden box a gentle kick and said what was obvious already: “We all know the sound of an empty grain storage container”.
>
> Field notes, 28th of April 2016

De Haan (2001, p. 69) argues that different level governmental institutions, often overlapping with informal institutions, have been dysfunctional in ensuring sustained economic security in socially and culturally inclusive manner. Informal institutions and social networks, on the contrary, have provided direct and the most robust support for risk reduction and long-term financial balance (Ibid., p. 69). In the study area, social capital is inevitably embedded in goat production practices and manifested in community fellowship, reciprocal trust, mutual support, and family member’s input into various tasks related to goat rearing. Therefore, the next section will turn the attention to more informal, social institutions and explore their role in building resilience.

7.1 Social Capital and Access to Resources and Information

Rural women, often falling into the category of resource poor farmers, have narrow to no access to resources, either financial, natural, or technical in nature. Cooperation, however, can help the women to acquire alternative means to access resources outside their conventional selection pattern. By working together towards a common goal, women can gain access to the yet diminishing resources available (Villareal 1994) In Makreri, there was one legitimized, institutional women’s group in the village through which the Bal Rashmi Society allocated the Income Generation Loan and shared information regarding education, health care and other social services. The BRS women’s group was considered attractive mostly because of the microloan scheme available for the participants. However, the group seemed to have another, more indirect advantage. The group was an important way to get familiar with other women. When the respondents described their social networks in the village, they often noted they know each other “from the women’s group”. This was often the case with the informal grazing groups the women had formed to complete the daily activities.

To overcome the challenge to combine domestic work and the herding of goats, the Makreri women had created elaborate, rotating work schedules founded on daily changing responsibilities such as goat rearing, childcare, fetching water, etc., where a few members were appointed to take all the group’s goats for rearing while other members took care of affairs in the village. The group also got

together to cut firewood or collect fruits in the forest – activities commonly considered dangerous for women to complete while alone. In all its simplicity, the narrative of a woman from the household C03 pointed out that the grazing groups had been established for the basic need to get things done. While grazing a herd of over 20 goats, she explained that only five of the animals belong to her. She was responsible for grazing the goats while the other group members were taking care of children, cooking and fetching water in the village:

> *But we can't all go grazing all day. There would be no one in the village and there are things that must be done in there, too.*
>
> *Woman, household C03*

As it was pointed out in her narrative, the women must take care of the domestic work in the village, no matter if they have goats or not. Accordingly, a woman from the household C5 emphasized that the working groups were not based on friendship but rather on the outright need of help:

> *I don't have friends in this village. All my friends are in the village where I was born or married somewhere else. I don't like anyone here. I work with them only because I need help. We all live close to each other so it's easy.*
>
> *Woman, household C05*

As the example from the households C03 and C05 show, the young women appeared to use their social capital mostly to improve well-being. They had moved to the village only recently and seemed to apply their social capital in the village only to receive help, not to foster the existence of the working groups themselves. As it was easy to sense from the answer of the respondent from the household C05, the young women who moved to the village after marriage, often expressed feelings of loneliness and not belonging. It seemed that the young women were still navigating in the social space of Makreri. Their established social networks were all in their birth-village and they were looking for new people they can trust. Therefore, there was a remarkable difference among separate age groups and how they approached the cooperation. For younger generations, the working groups mostly worked as an authorized means to obtain resources, or as they said, "to get the job done", without recognition of the personal relationships within the group. This kind of thinking is parallel to Putnam's (2001) approach to social capital which explores the social networks created to only obtain resources rather than create cohesion. The elderly respondents, in contrast, emphasized the importance of emotional support and mutual acquaintances they shared in a certain group. Nevertheless, that does not necessarily exclude the possibility that those groups were initially based on a similar idea of getting things done but rather indicates that the years have got them to trust each other. A woman from the household A02 referred not only to the direct benefit of women's groups –

the strength in number – but she emphasized also the mutual trust and companionship that has been build over the years, as the explained how a group of women has decided to get together and demand the village panchayat to solve the issues related to unfunctional hand pump wells and limited water resources:

> *We have always been together. We have lived here for so long. I know I can trust them. We have decided to go to the panchayat and demand them to solve the water problem. They have to do it. We are so many. They can't lose our votes. The elections are soon. We go there all together and speak out. I trust them, they come.*
>
> *Woman, household A02*

Robert Putnam (2001) and James Samuel Coleman (1988) have both based their work on social capital on the notion that social connections require reciprocity and trustworthiness to persist. To benefit from group work, members have to share a common understanding of norms and values to entrust their animals, other resources or children to each other. This kind of reciprocity for mutual benefit is the premise of Putnam's and Coleman's understanding of social capital. Among the older generation, social capital seemed to be embedded in the networks established by the respondents over time and the members relied on each other. The groups can also facilitate access to information outside one's own social networks (De Haan 2001). The information channels in the village were mostly informal. To attain information, the respondents often relied on their own social networks. A woman from the household B03 applied her social capital when she was seeking other alternatives for drought-vulnerable maize. She received advice from one of the members of her working group who had tried sorghum last year. As she trusted her group member, together with her husband she, too, decided to try sorghum. As she noted, to access the seeds, she also relied on her social networks:

> *I didn't know so much about farming. We have always had kharif maize. But the sisters told me about sorghum. She [one of the sisters] tried it last year and it was good, so we decided to try it, too. I heard about it from her. She gave us advice. I didn't know how it is different from maize. I trust her, she is smart. She gave us the seeds, too. -- It's me and the sisters. I usually take all our goats for grazing. I am glad to be with them.*
>
> *Woman, household B03*

In Makreri, most of the information was heard either by the well or along the main road that crossed the village in the middle. Information regarding the tuberculosis outbreak that took place during my fieldwork in the neighbouring village was distributed from door to door. However, certain type of information such as market prices and weather forecasts were considered desirable resources which were shared only within one's close social networks. In some cases, obtained information could

provide a competitive advantage, for instance, when selling assets or preparing for changes in weather. This was explained by the male head of the household B07:

> *It's important to know when the rains will arrive. They come from the west. I have family in Jaipur, they call me when it is raining there and then I wait for four days. It is always four days, maybe three, and then it is raining here. -- In the beginning of Kharif season, everyone is doing the ploughing and for that you will need to rent an ox. It is not all so many around here. But if you don't know when the rains begin and you wait and everyone else is doing the ploughing already, you have to wait for the ox to be free. And to get it you also have to pay more. When everyone needs the ox anyway, they can ask whatever they want for price and you just have to pay. If you are the first one to rent, you save money. Or if you are fast, you can even get a tractor.*
>
> *Man, household B07*

According to De Haan (2001, p. 72), exclusionary practices in information distribution can work against community resilience and inherently leave some community members feeling dissatisfied, if not ignored. I found the same when interviewing households with no access to electricity. "We were left outside the electricity network. We are left outside of everything else, too", one of the respondents highlighted the interconnectedness of decision making, social networks and electricity network. In a similar manner, the young woman from the household C01, who had remained outside the electricity network expressed concerns over double vulnerabilities. As she had no established social networks in the village, she had to pay the neighbours for the electricity to charge her mobile phone, commonly "a higher price than what it actually costs". Thus, she had a more limited access to information such as weather forecasts, market prices, consultancy and support from her birth family often acquired through mobile phones.

Furthermore, Mark Granovetter (1985) has presented an idea of embeddedness, the notion that economic relations do not exist in an abstract, idealized market outside social reality but are rather embedded in prevailing social networks (Granovetter 1985). In Makreri, good social ties between tenants and landlords appeared to translate into better yields for the tenants. A woman from the household B01 emphasized her established social relations as she referred to her sharecropping contract:

> *We have worked with the same landlord for six years. He knows we are hard workers, he can trust us now, so last year my husband was able to negotiate a better contract with him. And my sister works with him, too. She got the same contract when she started last year. We said we will do it all together.*
>
> *Woman, household B01*

From the interview with the male head of the household B01, I game to learn that it was already his parents that had been working with the same landlord as he noted: “When I was younger, a boy, my family, we worked in the same field [where my family works now].” Similarly, beneficial social networks inevitably acted as a decisive factor determining both, the exchange terms in local barter system and with whom the goods and services were exchanged.

7.2 Local Barter System and Redistribution of Resources

In the community level, collective resilience is highly determined by the local ownership of resources and the nature of local relationships. In this regard, collective resilience has also a deeper dimension; the equality of resource distribution and the quality of social safety networks affect the relative resilience of the system as whole, but also frame the climate resiliency structures of a particular household in the area (Matarrita-Cascante and Trejos 2013). In Makreri, resources were redistributed through a local barter system where commonly the women exchanged good and services with each other.

In the village, goat production was relatively new livelihood strategy and the small herd sizes limited the availability of goat milk. Respondents commonly emphasized their original intention to produce milk for sale. However, they often noted that the current milk yields were enough only for home consumption. In her example, a woman from the household B06 also indicated that with her ten goats the available milk is mostly consumed by her three children:

> *No, I don’t sell milk. It’s not enough for selling. We need it all home. But yes, if someone comes and asks for milk, I usually give her some, if I only have any. I always give if there is something left. Then I can ask something in return. But no, that’s not selling. That’s different.*
>
> *Woman, household B06*

Her example, however, shows that the value of milk cannot be measured purely in economic terms, but the product had a central, somewhat hidden position in the local barter system. Its central position was pronounced in extended families where the young generation with their children lived together with an elderly widow – commonly the mother of the husband but in some cases also the mother of the wife. In the extended households, goats were generally owned by of the elderly widows, but most of the milk was consumed by the children. To receive milk, the young wives were expected to take care of the household chores also in the house of their mothers-in-law. A woman from the household C04 explained how in her extended family, both the mother-in law and her family had a separate

home in the same yard. Her mother-in-law was living in the main building and her family has a small house on the other corner of the field. In the same yard, they commonly completed many tasks together. She helped her mother-in-law with goat grazing, fetching water and household chores while her mother-in-law, for her part, let the children consume the milk.

> *We share everything. She [the mother-in-law] lives there in the main building. We always cook together. She is not so strong anymore, so I help her with fetching water. I also go to her house to clean. She has seven goats, but they are almost like mine, too. I usually go for grazing and if the children are home, she takes care of them. It's only the children who drink milk. She takes some for chai, if there is something left.*
>
> *Woman, household C04*

Similarly, an elderly widow from the household A09 explained how she received the BRS Income Generation Loan for goat production. At times, however, she was struggling with the repayment. She noted that her son who had a wage employment in the mines was occasionally helping her to cover the loan, as his family was also benefitting from the goats:

> *My oldest son, he helps me with the instalments. He works in the mines and the milk is for the children.*
>
> *Woman, household A09*

In some cases, also the more distant relatives were engaged in the goat production of the elderly widows. A woman from the household A03 explained how she was not entirely able-bodied and for that reason not able go to the forest and cut firewood herself. During her goat's lactating period she donated the milk to the family of her nephew who then delivered feed, fodder, and firewood to her on a weekly basis. She emphasized how she is receiving help from both, her sister and her nephew's family:

> *Also her son comes here and helps, sometimes it's his son, too. He brings me fodder and I give him milk and manure. We are to old to go to the forest. He comes once a week with a wheelbarrow. With the wheelbarrow he can bring more at once. He brings me the feed so that I don't have to go grazing. -- I collect the manure from the yard and they [her nephew's family] use it in their field.*
>
> *Woman, household A03*

Milk was not only shared inside the extended households but sometimes also for resources held by other members of the Makreri community. The young wife from household C02 reported that to ensure her lopping rights and the access to wood for fuel in the communal forests, her mother-in-law

commonly donates milk to the members of the panchayat, the local governing council. This type of activity

In Makreri, different households approached climate resilience from different starting points. After marriage, most women moved to the village of their husbands. However, in certain cases, for instance if the father of the newlywed wife had passed away and she had no male siblings, the couple settled down to live in an extended household with the bride's widowed mother. Hence, some of the female respondents had lived their entire lives in the village while some arrived upon after marriage, commonly at a young age. In the former households, the women inherited the established social relations from their mother, while the women moving from other birth villages had to build up their social networks from the bottom. This seemingly helped the former to access resources through their social relations:

> *I was there [collecting fodder and firewood] with them [four ladies from the village]. We have always known each other. I know everyone in this village. Everyone. They took care of me when I was a baby. That's how long we have been together. -- Me and my husband, we live together with my mother. He moved to my village. I like it that way. It's better. I am not alone.*
>
> *Woman, household C07*

In her narrative, the woman from the household C07 emphasized she already knows everyone in the village. She had a strong social network in the village, and therefore it was easy for her to ask help or join a group for different activities. In addition, she referred to the way how her strong social networks also affected the quality of her life. The newcomers, in turn, often expressed their concern for not having any type of social support in the village. They rather talked about isolation and being economically and socially dependent on their mothers-in-laws. A woman from the household C02 described her living conditions as follows:

> *I live here in the house of my mother-in-law. My husband is in the mines, he has been away for a month. He's mentally sick and when he is home, he drinks. It's only me and my mother-in-law. We have to do everything together. I have to help her, and she gives me milk for free. I don't like the situation. I have to sleep in the same room with the goats. I don't like the smell, they are dirty. But I need the milk so I can't complain.*
>
> *Woman, household C02*

In her narrative, the respondent remarked that even though she is not contented with the situation she must adapt to the situation as she depends on the milk her mother-in-law donates for her children and because she does not have any other social contact in the village. Some of the newcomers, however, were married to the same village that their sisters. In this way, the woman from household B02

emphasized the social support she received from her sister who was married to the same village few years before herself. In addition, she was able to apply the established social networks of her sister when her family was seeking contract for sharecropping.

> *I have my sister here, next door. She's older than me. She came earlier. I know I can always ask her advice. I can trust her, and she understands me. She gave me these flowers; they need a lot of water and then there are all these bees. I hate bees, but the flowers are beautiful. In the beginning she helped me a lot, and we also have the same landlord so we can work together. We do everything together.*
>
> *Woman, household B02*

In a similar manner, a woman from the household A03 gave prominence to the support she had received from her sister who was living in the same village. She emphasized the way how their close connection had lasted over the years:

> *We have always been together. She comes here every day, and we cook. I lost my husband but at least I have her. I can't see very well so she walks me to the well and back. It is difficult to walk when you can't see the rocks and roots on the trail. She's like my eyes. That's how important she is.*
>
> *Woman, household A03*

7.3 Credit and Donations from the Neighbours

In Makreri, informal credit seemed to be focal and the most inclusive source of social resilience. All the respondents of the livelihood asset survey had maintained access to credit and a great majority of the households reported about cash loans. Besides cash loans, In Makreri there seemed to be a complex network of social relations where informal credit was available in various forms, including milk and staple cereals, live animals, services such as ploughing and seeding, and agricultural or construction materials. Giving and taking a loan was a long-established social tradition in the village. Credit was not just for emergencies or investments, but it seemed to be a socially acceptable way to smooth daily consumption. A woman from the household A06 described the local tradition as follows:

> *That's how it goes here. You ask for some little milk from there and grains from there and the shopkeeper if you can pay later. And you give them whatever you can. When you see someone walking with an empty bucket you know she is walking from door to door and then maybe you give her the milk you just got from somewhere else. We have all done the same.*
>
> *Woman, household A06*

The common habit of taking loans had resulted in a situation where the respondents were serving multiple debts at a time. Commonly, the respondents reported about the debts they had acquired through the BRS Income Generation Programme for goat production. Also, school fees, housing costs, and even daily food expenditure were typical expenses covered with debts. Accordingly, a woman from the household A09 talked about a period when she was in trouble with her daily expenses and multiple debts she had acquired:

> *I got the BRS loan for the goats, but it was a difficult time. We needed the money for something else. But the BRS loans you have to report. They keep a book for everything you do with the money. So, I had to take another loan for the goats.*
>
> *Woman, household A09*

She remarked that the BRS Income Generation loans are indicated to certain purpose and the organization is monitoring who the money is used. She, however, needed to use the money for something else. For her, the only way to solve the issue was to take another loan. Accordingly, a woman from the household C05 indicated that her family is holding multiple debts at one time. She referred to her household finances by explaining how she should first pay back the debts taken for goat shelter and health related expenses that incurred after her husband had a minor accident in the mines. Only after that, she can start paying back the loans the household took to cover the school fees. To pay back the debts, she must sustain the household food consumption with "small cash and milk donations from family and distant relatives".

Considering the significant nature of credit as a source of short-term survival, the Makreri households prioritized the repayment of debts to guarantee their creditworthiness in the future. "The risk of losing face", as pointed out by a woman from the household C05, was considered as an adequate guarantee to ensure repayment. This was particularly true when the credit was granted by formal lenders or someone outside close family. In her answer, she noted that there is a distinct difference between the loans taken from close relatives and loans from more formal sources:

> *There is no one in the village I can ask for help. It is only my mother I can trust and ask for a loan, but she is far away, 50 kilometres from here and I can't go there all the time. I am on my own. -- Yes, there are people in the village I can loan money, but the difference is that those loans you have to pay back.*
>
> *Woman, household C05*

The risk of losing face, and consequently creditworthiness, too, came into play when the lender did not have personal relationship with the borrower, and thus was free to insult households unable to

pay back their debts. In unison, the respondents expressed how a good reputation was quickly tarnished by allegations of outstanding loans.

In such conditions were most of the households had little or no assets to guarantee the loans, it was the general reputation of a household which had a major role in accessing credit. To create and maintain such connections in the village, Makreri households were willing to compromise their own livelihoods, some even approached donations and loans for neighbours and family as a part of their monthly expenses. The elderly widow from household A06, for instance, emphasized how she was always advising her daughter-in-law to donate some little milk or grains to anyone who comes to ask, since the next day "it could be us walking from door to door".

The reputation of the family was also based on the property the household had acquired. Therefore, the goats were not just a source of family income but rather a key to access both formal credit and small loans in cash and kind in the village. This was mostly because the goats were commonly considered as a liquid store of wealth – easy to sell. Therefore, goat owners were generally perceived as a people with steady income and property. Furthermore, the male head of the household B07 explained how it is easier to obtain a loan if you have a few goats instead of a small plot of land: "No one will sell his land for the sake of a loan, but goats, it is easy to turn them into cash". With his example he noted that due to the rapid reproduction, selling of one goat will be complemented during the next kidding. Land, in turn is difficult to acquire back. It is something that stays in the family from generation to generation and therefore its value is not translated to the actual market price.

Besides credit and loans, In Makreri, there was a rear but somewhat established habit of the wealthier households to donate young goats to households new to the business. With the donations the better-off families helped, or in some cases enabled, others to begin with goat production. Household A04 was one of the few families with more than one hundred animals in their flock. The elderly widow of the household expressed that she has moral obligations to the community, since her business had grown relatively fast and, in the beginning, as she put it, "I depended on the help of others". However, as it was also with the loans, the implicit prerequisite for receiving donations was good reputation and established social relations with the family donating animals:

> *I think about the family and how they are doing. I want to know they can take care of the goat. I want to know it will survive. If you give something to someone, you want to know it doesn't go wasted. Like the family down there, I know the lady from the women's group. She already had three goats but it's not enough. I saw the goats and they were healthy, so I donated her one and see, now she has seven already.*
>
> *Woman, household A04*

As she pointed out, knowing the family's conditions was a major factor in decision-making for the households donating goats, as it indicated whether the receiving household would be able to start a business and make a good use of the goats. However, the woman from the household A04 also indicated that she did not only want to donate to the better-off families, but sometimes, if she knew a family was in trouble, she wanted to prioritize them, since they would benefit more from a goat:

> *If I know someone is really in trouble. If I know she is trying really hard then maybe I can give her a goat. If I think they need it more than anyone else, then I think I can really help. There was this woman, three of her goats died of illness and the last one was stolen. And before that a young woman moved here after marriage. She was so young, just like me a long time ago. She looked so sad, so I wanted to help her. But it is only two or three I can donate each year. I want to do it more, but we have to eat, too.*
>
> *Woman, household A04*

Only a few of the Makreri households were able to donate animals. Some of the households, however, sold their animals for friends and family members in the village. By accepting instalments, they enabled other people often, close to their own social circles, to begin with goat production. Knowing the family situation was even more important for the families who sold their animals in instalments. A woman from the household A05 had sold two goats in the village, one for her sister and one for her friend. With her words, she emphasised that she trusted them both in a way that she can be sure the pay her back:

> *I can't donate. I am not rich like that. But sometimes I sell in the village. I have sold two goats, does. One for my sister and for the lady, the one with a stone fence there, to start with goats. It's different in the village. They pay me when they can, little by little. I know they will.*
>
> *Woman, household A05*

A woman from the household B08, furthermore emphasised that unpaid loans would compromise their own household finances and therefore her husband applied his social networks in the village to check the background of the family she wanted to sell her goat. In her narrative, she noted that due to the good reputation the family had in the village her husband accepted the sale:

> *I knew her from the women's group. We go there together. She didn't get the loan this year, so I wanted to sell her a doe. I told my husband, and he went around asking about their situation. And then he said yes. We decided to sell.*
>
> *Woman, household B08*

In Makreri the acts of charity and common loan schemes between individual households constituted a significant safety net for the poorest households. However, global climate change and drought

related stressors are often shaking the entire communities and eroding the local risk sharing behaviour. At the community level, diminishing moral capital consequently affects the pooling of resources leaving the poorest of the poor with yet another risk (Adger 1999).

8 Conclusion

This research has been driven by an interest in exploring the development challenges related to climate change and its implications for rural livelihoods in arid and semi-arid drylands of Rajasthan. By inquiring into drivers and characteristics of climate resilience and examining the livelihood alternatives, the research aimed at understanding the motivation behind the tendency of Makreri households to prefer goat production over other production strategies when reshaping and diversifying their livelihood portfolios out of drought-sensitive subsistence farming. To gain a better understanding of possible measures for further adaptation, the research investigated the social networks and institutional realities of the case study area and sought to understand what types of social and institutional structures are central in ensuring and facilitating climate resilience in the future.

By increasing average mean temperatures, enhancing spatial and temporal unpredictability of monsoon season, and reinforcing the intensity of the rainfall events, climate change has left the natural resource dependent Bhil community in Makreri exceedingly vulnerable to climate change related losses of life and livelihoods. Due to repetitive and prolonged dry periods and increasing occurrence of droughts, the Makreri population is increasingly seeking new livelihood alternatives outside crop production vulnerable to climate change. The opportunities for livelihood diversification, however, remain considerably constrained in the area. Due to the socially and geographically isolated location of Makreri, the opportunities for wage employment are limited to unskilled seasonal work in the mines. Illiteracy and low levels of education further restrict the diversification opportunities.

In the local environment, rearing of small ruminants appears to be the most favourable and accessible alternative to crop production. Due to the multiple uses of livestock, rapid reproduction and easy transformation into cash resources, goat production has taken a central role in ensuring rural livelihoods and food security. For the rural poor, rearing of cattle and buffaloes is often not worthwhile due to the high investment cost and limited access to common property resources and open pastures. In the same operating environment goats, due to their digestive systems suitable for unimproved native pasture, high reproductive return and low inputs of capital and labour, have proven their potential to provide the rural poor with a route out of poverty.

Despite its advantages, goat production on open pastures is strongly dependent on natural resources. The households engaged in this activity remained vulnerable to drought-related stress and other climatic hazards affecting pastoralist production. The combination of prolonged droughts, failed rains, and limited availability of open pastures and quality feed and fodder has reduced opportunities for growth of the production system.

Commercial activities related to goat production remain limited in the case study area. Most of the Makreri households are still seeking to grow their herd sizes. Goats are only sold in times of scarcity and risk when the family encounters an acute need of liquid cash either to cover school fees, heath related expenses or for debt payment. Furthermore, milk production in the village persists mostly at subsistence level and is sufficient to yield milk returns only for home consumption. According to my research findings, households are not actively seeking marketing opportunities for their milk products and only a small minority of the respondents received any income from milk sales. Yet the animal has a central position in the local barter system where milk, feed, fodder, and even manure are often exchanged for goods and services.

Goat production, furthermore, is strongly embedded in the local system of social networks. Milk is not only the main source of quality protein in the area, but it is also considered as a symbol of wealth. Households with a herd of goats have created a habit of using milk donations to access resources and improve their social status in the community. These donations of milk and sometimes cereals maintain a cycle of resource distribution, and debts of gratitude through which different households support each other in times of scarcity or drought. Furthermore, owning a few goats often guarantees the owner with a steady access to cash loans, as the animal is easy to turn into liquid money and therefore confirms the solvency of the household. In a community where short-term coping is mostly ensured by taking informal loans in cash or kind, goat production can enhance the household's resilience through the hidden cultural meanings that enable a household to access resources and information.

However, to gain a better understanding of the avenues for future adaptation and resilience, both ends of the income generation chain related to goat production call for further research. On the one hand, there is a need for enhanced understanding of the opportunities for commercialization of small ruminant products to promote smallholders' income generation practices and improve their access to markets. On the other hand, pastoralist resilience in academic literature should not be reduced to its monetary value. The local, more informal systems of allocating and redistributing risks and resources should be understood as central elements in building resilience, particularly in socio-political contexts where formal institutions often fail to provide the pastoralist communities with key resources and services.

When the research results of my Makreri case study are assessed in relation to the previous literature on indigenous communities and pastoral livelihoods, it is evident that the experiences of the Bhil population in Makreri reflect similar structural realities of pastoral communities in the African drylands, Northern hemisphere, and highlands of Latin America. These communities must overcome both the climate related stressors connected to the current climate change and the more historical, socially and culturally constructed barriers to adaptation and resilience.

As the case study in Makreri indicated, the resilience of pastoralist communities is not reduced only by the effects of recent climatic stress. The pastoralist vulnerability to drought events is closely tied to negligent policies and land reforms promoting industrialization and privatization of the commons. As is often emphasized in the pastoralist literature, national policies and development endeavors have a long tradition of not fully comprehending indigenous ways of life and thus, the minor, if any, national pursuits to develop rural areas and support livestock production on open pastures in the past have contributed to the increasing levels of rural poverty today. Similarly, arguments regarding the link between pastoralist production and land erosion have framed the discussions of pastoralist production for decades. The Makreri case study highlights that land erosion and disappearing pastureland, rather than being a lineal result of over grazing or unsustainable herd growth, can be connected to a more structural-level problem of privatization of communal lands.

Much of the academic literature surrounding sustainable development and resilience of pastoralist production has pondered whether pastoralist production can offer sustainable livelihood prospects for future resilience or whether communities dependent on natural resources should diversify their livelihoods to achieve resilience. The results from Makreri case study, however, emphasize that rural resilience should not be approached as an either/or question, but rather, there is a strong need to address the institutional vulnerabilities hindering both livestock production and diversification to more climate resilient production strategies on the other. Rural communities often hold the capacity and necessary knowledge to build resilience against climatic stress. Yet institutional barriers – meaning no access to key resources or services and lack of voice in the political decision-making arenas – obstruct their adaptation endeavours. Therefore, the key to restoring the adaptive capacity of rural communities is to enhance local access to information, markets, secure financing, and veterinary services. Moreover, there is a strong need to establish community-driven sustainable natural resource management practices and to strengthen human capital through education and knowledge-sharing to ensure that rural communities relying on open pastures and other natural resources can make informed choices concerning their strategies of adaptation and change.

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Appendices

Appendix 1. Sample Interview Questions

Livelihood Strategies and Goat Production

What is your main source of income?
What motivated you to start goat production?
Who is taking care of the goats? Who is the owner?
Do you sell the milk of live animals?
Have you experienced any improvements in your family situation after you started goat production?
Have you experienced any problems or challenges related to goat production?
What kind of risks are related to goat production? How do you prepare for them?

Institutional Structures and Processes

What kind of institutions there is in the area that support goat production?
What kind of support is missing?
How is the goat trade organized? Who is responsible for it?
Are there veterinary services available in the area?
Have you lost any animals for disease or any other reason?
Where do you go for grazing?
Have you experienced any changes in the pasture?
Is there enough feed available?

Climate Change related Risks

Have you experienced changes in local climate?
What kind of risks are related to local climate?
How is the local climate affecting your livelihoods?
How do you prepare for droughts and monsoon season?

Social networks

How do you share the different tasks related to goat production?
Do you have friends in the village?
Is there someone you can trust and ask help?
Have you donated milk or other assets?
Have you received any donations?

Appendix 2. Household Statistics Based on the Livelihood Assets Survey

Household	A01	A02	A03	A04	A05	A06	A07
Status	Widow	Widow	Widow	Widow	Widow	Widow	Widow
Education	Illiterate	Illiterate	Illiterate	Illiterate	Illiterate	Illiterate	Illiterate
Number of children	4	1	Only son has passed away	2	2	3	3
Number of family members	5	6	1	8	5	5	6
Main source of income	Government subsidies	Daughter's husband works in the mines	Government Subsidies	goat + agriculture	Son works in the mines	Son works in the mines + agriculture	Government subsidies
Average monthly income of the household	₹ 300 + ₹ 20 000 x 1 this years (Dead of husband)	₹ 5 000	₹ 300 + occasional cash from sister	₹ 4 000	₹ 7 000	₹ 9 000	₹ 300 + occasional cash from her son
Number of Goats	8	7	5	120	15	15	4
Goat losses	No	No	6 for unknown disease	Several for various reasons	No	2 for weakness and diarrhoea	2 for disease
Years with goats	3	2	5	6	3	2	1
Income from selling goats	₹ 4 000 x 1 male per year	No	₹ 5 000 x 1 male every second year	₹ 6 000 x 6 male + ₹ 8 000 x 1 old buck per year + donating she-goats	₹ 5 000 x 1-2 male per year,	₹ 4 500	No
Milk for sale	Home consumption	Home consumption	Goats too weak to give milk	Exchange, donations	Occasional exchange and sale, donations	Occasional exchange, donations	Only exchange
Land for cultivation	No	No	No	5 a shared with the family of her husband's brother	No	6 a, inherited the land of her husband	No
Farming season	Gardening Kharif Okra and lentils	Gardening Kharif Okra and peas	No	Kharif maize and soybeans	No	Kharif maize and bajra	Gardening
BRS Loan	No	Yes	No	Twice, Housing + goats	Yes	Yes	No

Household	A08	A09	A10	A11
Status	Widow	Widow	Widow	Widow
Education	Illiterate	Illiterate	Illiterate	Illiterate
Number of children	3	4 Both sons have passed away	Only son had mental problems and disappeared	0 (3 children have died)
Number of family members	5	3	1	5 (together with sister and her family)
Main source of income	Government subsidies	Daughter's husband works in the mines	Government subsidies and food aid	Government subsidies
Average monthly income of the household	₹ 300 + cash from her son	₹ 4 000	₹ 300	₹ 300 + sharing everything with the extended family of her sister
Number of Goats	6	12	0	5
Goat losses	No	No	5 stolen	3 stolen
Years with goats	2	4	2	1
Income from selling goats	₹ 4 000 x 1 male per year	₹ 5 000 x 1 male per year	No	No
Milk for sale	Home consumption	Home consumption, Exchange	No	Home consumption
Land for cultivation	No	No	No, husband's brother inherited the land	No
Farming season	Gardening Kharif Okra and onios	Gardening Kharif Okra and peas	No	No
BRS Loan	Yes	Yes	No	Yes

Household	B01	B02	B03	B04	B05	B06	B07	B08
Status	Married	Married	Married	Married	Married	Married	Married	Married
Education	No	No	Illiterate	Illiterate 2 years	Illiterate	Illiterate	Illiterate	No
Number of children	0 (one was born dead)	3 alive (2 have passed away)	3	4	2	3	3 (one has passed away)	2
Number of family members	2	5	5	6	4	6	6	4
Main source of income	Husband worked in the mines, out of work because an accident	Husband works in the mines	Husband works in the mines	Agriculture + occasional work in the mines	Husband worked in the mines before recent accident	Agriculture + husband works in the mines	Irrigated agriculture + son works in the mines	Daughter's husband works in the mines
Average monthly income of the household	₹ 6 000	₹ 4 000	₹ 4 000	₹ 5 000	₹ 5 000 before the accident	₹ 8 000 (₹ 5 000 when mining cheaper stone)	₹ 6 000	₹ 5 000
Number of Goats	8	2	6	4	10	10	12	10
Goat losses	No	No	No	2 for disease + 3 stolen	1 got lost when grazing	2 for unknown diseases	No	2 got lost when grazing
Years with goats	2	less than 1 year	2	1	2	4	2	2
Income from selling goats	₹ 10 000 x 1 male per year, this year old buck	Not selling	₹ 6 000 x 1 male per year	₹ 6 000 x 1 male per year	₹ 6 000 x 1-2 male per year	₹ 6 000 x 1 male per year	₹ 7 000 x 1 male per year	₹ 6 000 x 2 male per years, selling in the village
Milk for sale	Home consumption	Home consumption	Occasional exchange	Home consumption	Occasional exchange	Exchange	Exchange	Exchange
BRS Loan	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Land for cultivation	Sharecropping	Share-cropping	Share-cropping	2 a	Share-cropping	5 a	8a	3 a
Farming season	Kharif bajra last year, before Kharif maize and Rabi wheat if water in the well	Kharif maize and Rabi wheat if water in the well	Changing from Kharif maize to Kharif Bajra this season	Kharif maize and Rabi wheat if water in the river	Kharif maize	Kharif maize and Rabi wheat if water in the river	Kharif and Rabi maize	Kharif maize, gardening

Household	C01	C02	C03	C04	C05
Status	Young wife	Young wife	Young wife	Young wife	Young wife
Education	Functional literacy, 4 years	Illiterate	Illiterate	Functional literacy, 3 years	Illiterate, 2 years
Number of children	0	3	3	2	1
Number of family members	4 (sister-in-law lost her husband in an accident and returned her birth home)	6	6	5	4
Main source of income	Husband works in the mines	Husband works in the mines	Husband works in the mines	Husband works in the mines	Husband works in the mines
Average monthly income of the household	₹ 4 000	₹ 4 000	₹ 4 500	₹ 4 000 - ₹ 5 000 + occasional cash from her birth family	₹ 3 000 + occasional cash from her mother
Number of Goats	Mother-in-law has 15	Mother-in-law has 15 goats	5	Mother-in-law has 7 goats	7 (5 donated by her mother)
Goat losses	2 for weakness and diarrhoea	No	No	No	2 for snake bite, 1 for weakness
Years with goats	2	4 years	10 months	2 years	Less than 2 years
Income from selling goats	₹ 4 500	₹ 6 000 x 1 male per year	Not selling yet	₹ 5 000 x 1 male per year	Not selling yet but have to sell to fix the roof
Milk for sale	Mother-in-law shares milk for the children	Home consumption (enough only for the children)	All the milk consumed by the goat kids	Home consumption (enough only for the children)	Too weak to give milk during the dry season
Land for cultivation	No (her husband did not inherit his father because of mental problems)	No	No	No	No
Farming season	No	Gardening Kharif pulses	Gardening Kharif okra and lentils	Mango and banana three in the garden	No
BRS Loan	No	No	Yes	No	No

Appendix 3. Livelihood Timeline