Pastoralism under Pressure:

Vulnerability of Pastoral Nomads to Multiple Socio-political and Climate Stresses – The Shahsevan of Northwest Iran

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akhcha	*1/6 portion of pasture or land*
alachiq	Shahsevan tent
anfal	Lands belong to Islamic government
aqakin	while cereal barley and wheat
aq-sagals	elder of tribal section or camp.
aq-tuk	white color, matured sheep and goats
araghach	grown lamb
ashair	nomads
boz-ay	March
chanbareh	wooden roof-ring of *alachiq*
charak	*1/4 of Istil*
chubekh	wooden structure of *alachiq*
demakin/daymi	dry-farming
dozalgeh	waiting places
dushalgeh	stopping places
elbey	paramount chief
el-yolu	traditional migration route
gu-akin	green crop, forage
hag	traditional wage for shepherds
iki-boneh	having two winter residences
imaji	cooperation form of association between the Shahsevan
istil	*1/4 of Akhcha*
jal-aghay	single shepherd
jangalbani	the forestry organization
khaliseh	crown land
kham	vegetation untouched
khankhanliq	time of independent khans.
kheir-o-shar	joy-and-sorrow form of social network
koda-gonshuluq	pasture partnership
kuda-poli	price of forage on rented pastures
kuma	smaller Shahsevan tent,
kurpa	weak and young lamb
oba	camp.
qalkhuji	disordered grazing system
qeshlaq	winter pasture
sar-poshki	sortition-rotational Grazing system by
suluakin/abi	irrigated lands
sut-guni	milk-day
taifeh	tribe.
tireh	sub-tribe .
yaylaq	summer pasture
yazlaq	spring grazing pasture

Acronyms

AHP	Analytic Hierarchy Process
APERI	Agricultural Planning Economic and Rural Development Research Institute
DFID	Department for International Development London
HDI	Human Development Index
IDE	Iranian Department of Environment
IPCC	Intergovernmental Panel on Climate Change
ISC	Iranian Statistics Center
MCLSW	Ministry of Cooperatives, Labor and Social Welfare in Iran
MEA	Millennium Ecosystem Assessment
NCADM	Iranian National Center for Agricultural Drought Management
NDVI	Normalized Difference Vegetation Index
NLBC	Iranian National Livestock Breeding Center
ONA	Organization of Nomadic Affairs
PDSI	Palmer Drought Severity Index
PDSPC	Iranian President Deputy for Strategic Planning and Control
RMP	Range Management Plans
SLF	Sustainable Livelihood Framework
SPI	Standard Precipitation Index
UNISDR	United Nations International Strategy for Disaster Reduction

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Abstract

Pastoral nomadism is a livelihood source for over 200,000 families in Iran. They rear over 24 million head of animals such as sheep and goats throughout cycles of seasonal migration and thereby utilize over 40% of the rangelands in the country (ISC 2012). They contribute to the national economy by producing over 200,000 tons of red meat, 470,000 tons of milk, and 21,000 tons of wool annually (Akbari 2004), among other agricultural products.

Their migratory lifestyle and economy, however, is increasingly under stress from contemporary socio-political and ecological changes. On the one hand, they are facing various socio-economic and political pressures, including state policies and interventions, population growth, land-use change and integration into a market economy. On the other hand, they are exposed to climate change and its impacts on their environment and life. So far there has no detailed study on the impacts of climate change and their interaction with socio- economic pressures on pastoral nomads. In fact, even our basic knowledge about their vulnerability to multiple stresses from socio-political process and climate variability changes is limited. This research addresses these knowledge gaps and furthers theoretical understanding of vulnerability using the case of the Shahsevan nomadic pastoralists in northwest Iran.

To explore the central question of how vulnerability to multiple socio-political and climate stressors varies within the Shahsevan community, I conceptualize vulnerability as a function of exposure as “external” pressure and sensitivity and adaptive capacity as “internal” determinants of their vulnerability. It begins with examining the nature of these stimuli and their interaction or combined impacts on the Shahsevan pastoral economy using the concept of “double exposure." The “internal” side of their vulnerability is examined by analyzing their adaptive capacity and broader sensitivity at the household level. In addition, I analyze the adaptation strategies employed by the Shahsevan in response to multiple socio-political and climate stresses and discuss their implications for the continuation and adaptation of their pastoral economy.

The research employed a combination of primary and secondary data to examine the underlying socio-political and economic processes contributing to vulnerability of the Shahsevan nomads. Their emic perception on climate variability and change as well as their adaptation and coping strategies were further evaluated by in-depth interviews and participant observation. Their views were then examined against meteorological data depicting the nature of climate stresses, including seasonality, temperature extremes, pastoral droughts as well as the long-term (35-40 years) trends in precipitation and temperature. A structured survey gathered quantitative data on specific livelihood strategies, sensitivities and adaptive capacities of 301 nomadic households in 43 winter camp sites.

Together, the results show that the Shahsevan perceived rise in frequencies and magnitude of climate stresses, were corroborated by statistically relevant trends found in temperature and precipitation series. It is further found that the extensive land-use change and extension of agriculture land to the best part of their pasture are pushing their production system to less productive pastures. The resulted "ecological marginalization" together with increasing dependence of their production system on the market fodder and economy were identified as the main socio-economic processes contributing to increasing exposure of the Shahsevan nomads to multiple socio-economic and climate stresses. However, the range of adaptive capacities and corresponding sensitivities of Shahsevan households, together with the flexibility of their livelihood strategies, create a very diverse and dynamic vulnerability landscape at the community level. Households practicing pasture partnership pastoralism was the most vulnerable group, mainly due to high sensitivity inherent to this livelihood strategy. The herdsman husbandry pastoralists, in contrast, have the highest adaptive capacity and were thus the least vulnerable group of the Shahsevan. Based on the vulnerability landscape examined in this study, I conclude that, without proper adaptation policies and interventions by external actors, particularly state organizations, the increasing exposure to multiple socio-political and climate stresses may lead to widening vulnerability gaps between Shahsevan employing different livelihood strategies. In light of the existing and future capacity for coping and adaptation, I develop three scenarios outlining conditions for the evolution of their pastoral life and economy.

Chapter one

Introduction

Pastoral nomadism is a livelihood source for over 20 million households around the world who are producing some 10% of the meat used for human consumption (Blench 2001). In Iran, there are over 200,000 households living on pastoral nomadism. They are rearing over 24 million head of animals, i.e. sheep and goats through seasonal migration and utilizing over 40% of rangelands in the country (ISC 2012). They contribute to the national economy by producing over 200,000 tons of red meat, 470,000 tons of milk, and 21,000 tons of wool annually (Akbari 2004).

Over 42% of the Iranian territory is covered by natural deserts[1] (Khosroshahi et al. 2008). Moreover, about 85% of the country consists of hyper-arid, arid and semi-arid environments (Badripour et al. 2006; IDE 2002; Tahmasebi 2009; White and Nackoney 2003). Climatic stresses are especially pronounced in these fragile environments. They manifest themselves in high climate variability and seasonality, in temperature extremes and in frequent droughts.

Adaptation to the resource patchiness resulting from high climate variability, unpredictability and seasonality is considered as a primary challenge to pastoral nomads and their migratory lifestyle (Salzman 1971). Their survival strategies for adaptation and coping with climate and resource variability and utilizing marginal resources has been studied by many scholars (notably (Barth 1961; Ehlers and Goodell 1975; Ehlers and Schetter 2001; Garthwaite 1983; Schweizer 1970; Tapper 1997).

Over the last decades, however, the pastoral nomads in Iran, like many pastoral groups around the world, have been facing two enormous pressures from socio-political and environmental changes. On the one hand, they have been facing various socio-economic and political stresses including state policies and interventions, population growth, land-use

[1] Climatology desert

change and development efforts. On the other hand, they were exposed to climate change and its impacts on the characteristic of their climate, environment and life. So far, however, there has been no detailed study on the impact of climate change and its interaction with socio-political and economic changes on pastoral nomads. In the case of the Shahsevan for instance, the latest detailed study on their socio-economic and political conditions dates back to Richard Tappers' research in 1965, when climate change and many contemporary socio-economic pressures were not a major challenge to their migratory economy and life.

This study, therefore, will use the case of the Shahsevan pastoral nomads in northwest Iran (map1-1) to contribute to the theoretical understanding of vulnerability of pastoral nomads to changing socio-economic, political and environmental conditions. It aims to address how vulnerability to multiple socio-political and climate stressors varies within the Shahsevan nomads? How they are drawing on their capacities and resources to cope with and manage the impacts of contemporary changes in their political, socio-economic and also natural environments. These questions will be in the centre of this case study on the Shahsevan nomads in the mountain areas of northwest Iran.

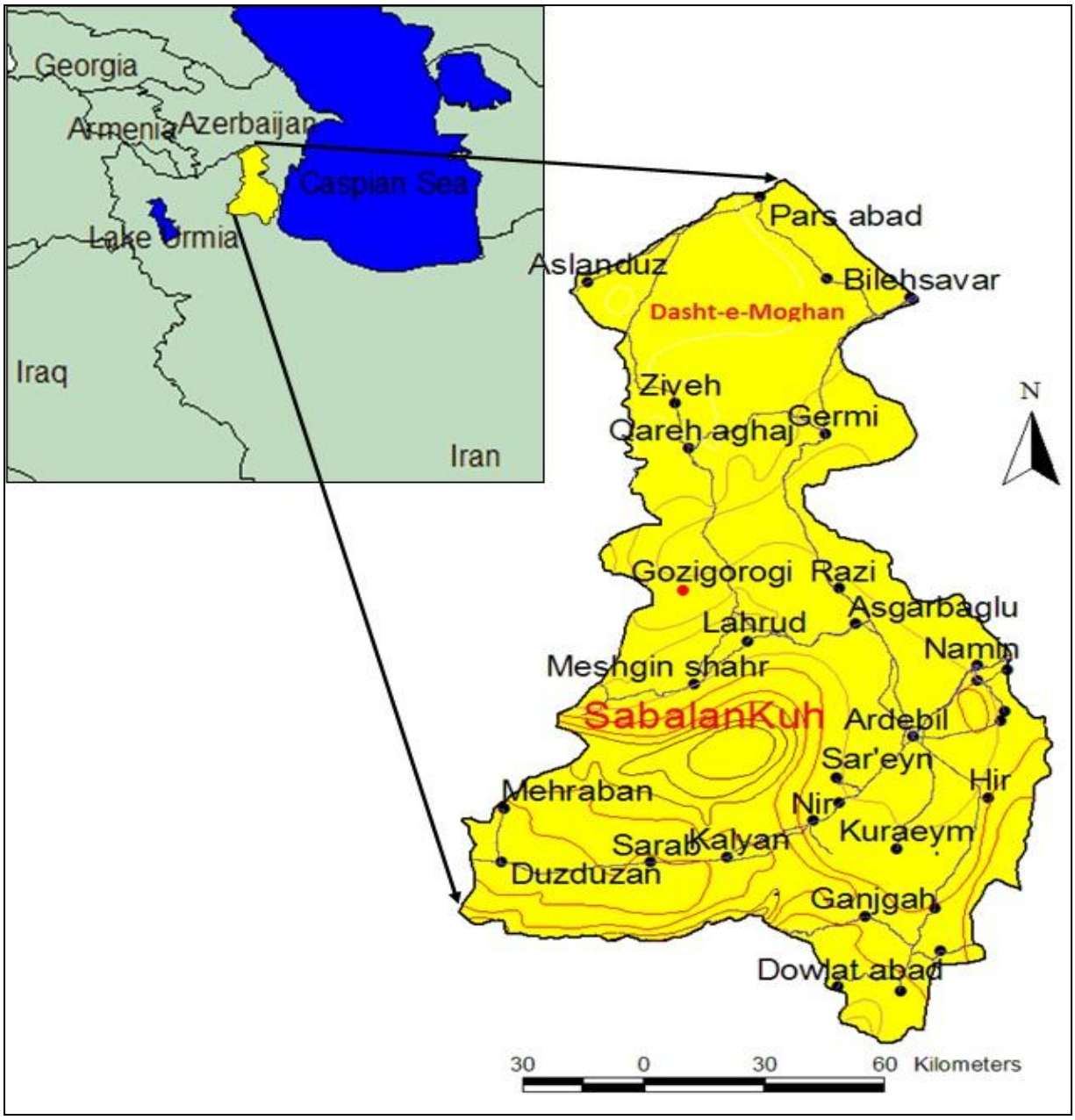
1.1 Pastoral nomadism and multiple socio-political and climate stresses

Now *our animals are not dying in drought conditions as it happened in the past, rather they are eating each other. We have to sell one half of our animals to buy forage and feed for the rest. Many nomads are forced to sell their productive and milking sheep with lambs at half price or less because there is no market for emaciated animals….*[2]

This statement, quoted from one of the Shahsevan nomads in our study area, points to an increasing dependence of their pastoral economy not only on the conditions of market

[2] Alhahshukur Irani , personal communication in Bogharsikh Dareshi *Qeshlaq* of Khalifelu (April 2010)

economies, but even more so their increasingly significant dependence on the obvious impacts of climate change.



Map 1-1 The study location, the territory of Shahsevan pastoral nomads in northwest Iran

Nomadism in general and pastoralism in particular have always been human activities that were and that are extremely exposed to and affected by both natural hazards and changing political or socio-economic conditions. In a very general way, one may well argue that rise and fall of nomadic lifestyles and economies are sensitive indicators of changes in their environments.

Scientific literature on nomadism and pastoralism is abundant. Without anticipating a somewhat closer look at their relevance for our own study (cf. chapter 2.4), it may suffice here to refer to two introductory observations by Khazanov (1984) and Chuluundorj (2006), both stressing the highly sensitive and fragile conditions of nomadic pastoralism in our modern world. They state that the subsistence-based economies of pastoral nomads are very fragile to market economy and can easily be over-stressed by competing with or adjusting to modern economies. Economic pressures and impacts, however, are only one cause of stress. These become even more important when political, social and/or environmental changes act simultaneously and contribute to the vulnerability of pastoral societies. Thus in a study on Mongolian pastoralists, Chuluundorj (2006) noted that the political change in the early 1990s together with transition to a free-market economy, totally transformed the pastoralist production system in Mongolia. It changed their economy from a state-supported collective farm system to an independent, subsistence-based herding structure, resulting in more conflicts over rangeland and water resources, poverty and inequality, insecurity and market failure. It goes without saying that all these impacts on pastoral economies and societies are additionally influenced and heavily aggravated by unforeseeable and unexpected natural hazards. Very often, these are the triggers of fundamental, sometimes even irrevocable transformation of their traditional lifestyles.

A very recently published book on pastoral practices in High and Central Asia analyzes a great number of these conflicts (Kreutzmann 2012). Almost all case studies describe similar patterns of conflict, embedded in the triangle of political change, economic pressures and environmental changes. These constraints are increasingly restricting their mobility and

flexibility and consequently add to their vulnerability. But not only in High and Central Asia traditional pastoral practices are under stress. It seems to be a phenomenon for all those regions where migratory pastoralism is executed. To name just a few: Tache's (2008) study on Borana pastoralists in southern Ethiopia, for instance, demonstrated that conversions of rangelands to farmlands have not reduced the risk of poverty of pastoral nomads; it rather made their livestock-based economy more vulnerable to periodic droughts. Similarly, Kahsaye (2007) found that growing human and livestock population pressures on pastoral rangelands in eastern and northwestern Eritrea are increasingly hampering the effectiveness of nomads' traditional adaptation strategies for coping with drought conditions.

It would go far beyond the purpose and scope of this study and its introductory remarks to scrutinize the immense literature on present day's problems of nomadism and pastoralism. Much more important to survey are, however, the specific new challenges that climate and environmental changes are exerting. This holds true especially in view of the fact that intensity and frequency of climate-related stresses, particularly in arid and semi arid areas, are obviously increasing. According to the recent summary of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), the years 2005 and 1998 were the warmest years ever recorded. Eleven of the last 12 years (1995 to 2006) ranked among the 12 warmest years since 1850. This report further indicates a remarkable increase in magnitude, duration and spatial distribution of droughts due to increased temperature and evapo-transpiration and simultaneously decreased precipitation over the last three decades. The 1999-2003 drought in southwest Asia ,for instance, was the worst drought over the last 50 years and covered many part of the region including Iran, Iraq, Pakistan, Afghanistan, Turkmenistan, Tajikistan, Kyrgyzstan and Uzbekistan (Trenberth et al. 2007). Consequently the impact of climate change on vulnerability of pastoral nomads is increasingly being acknowledged by many scholars e.g. Galvin (2009), Birch and Grahn (2007). And these consequences are likewise experienced in the high pasture regions of our study area, as will be shown in the analysis of the Shahsevan economy of northwestern Iran.

1.2 Conceptualization of pastoral vulnerability

The current study is concerned with vulnerability of Shahsevan pastoral nomads, and their migratory livestock based economy to multiple socio-political and climate stresses. In this context, climate stresses refers to extreme events including seasonality temperature extremes and pastoral droughts. They are mostly characterized by the local climate variability and long-term climate change. The pastoral drought, however, is a major exception and influenced both by socio-economic and climate conditions (see figure 2-4). A variety of definitions have been suggested for pastoral drought (see Jupp et al. 1998 and FAO 2011 for instance). They all share the core idea of forage shortage for feeding the animal due to rainfall deficit. In the FAO (2011) pastoral drought management tools, for instance, it is defined as "*lack of forage availability as a result of a particular sequence of meteorological drought*". As I argue in chapter 3.3.3, this definition underestimates the role of socio-economic factors contributing to pastoral drought. In this study therefore, pastoral drought is defined as to lack of forage availability resulting from combination of meteorological and socio-economic drought.

The interaction between socio-political and climate stresses, is not limited to the pastoral drought. Rather they simultaneously affect on the resources available for the nomads, their adaptive capacities and vulnerabilities. Therefore, the impacts of both short term climate variability and long-term climate change on their livelihoods and economies have to be analyzed and evaluated in broader settings and in interaction with other socio-political and economic changes. As it has been asserted by Wisner and colleagues (2003) "No single element, particularly the technical (and seemingly a political) determinants of people's vulnerability, should be taken in isolation from the entire range of factors and processes that constitute this situation" (Wisner et al. 2003: p. 56).

For proper conceptualizing pastoral vulnerability, one should bear in mind that the above mentioned changes are not always and necessarily harmful to the pastoral systems.

Alternatively the adaptive capacity of affected communities is challenged again and again and may determine its negative or positive impacts (Galvin 2009). In a study on high mountain pastoralism in northern Pakistan, for instance, Ehlers and Kreutzmann (2000) found that the gradual transition from subsistence-based to market-oriented economy is increasing the importance of "share-tending" range management practice in favour of major stockholders and consequently increasing the differences between small and big shareholders. Research on pastoral nomads in Tibet by Næss (2003) showed that the market demand for cashmere wool provided new opportunities for livelihood diversification and thus reducing their vulnerability .

Therefore, it can be concluded that pastoral nomads are not only passive "victims" of these changes. They rather demonstrate significant capabilities to be constantly flexible and responsive to changing environments (Bohle 2007). In other words: they are using their assets and capacities to cope with and manage the consequence of these changes on their livelihood. As suggested by Bohle (2001), vulnerability is being shaped by a complex and interactive system of "external" and "internal" contributing factors. The external part is related to exposures to changes and stresses, while the internal side consists the inability of individuals or communities to cope with stresses. Consequently a detailed analysis of contemporary external changes and their interactions with adaptive capacities of pastoral nomads will be crucially important for conceptualizing pastoral vulnerability.

In the context of human vulnerability to environmental change, the notion of vulnerability has been used by scholars from different disciplines and has been conceptualized in very different ways, such as entitlements failure, susceptibility to damage and exposure to hazard (Füssel 2007; Hassan 2008). A comprehensive analysis of "vulnerability" is summarized in the recently edited book by J. Birkmann (2006). Here, special emphasis should be made to K. Thywissen's compilation of core terminologies. The term "vulnerability" alone is represented by 29 different definitions an indicator of the great diversity and also potential indifference of this core term in present global change research.

Nevertheless, there are three dominant perspectives in conceptualizing vulnerability. The first school of thought considers vulnerability as a function of physical characteristics hazardous extreme events such as probability, magnitude and frequency. The extent of exposure of the system and its sensitivity to hazards has been termed as "biophysical" vulnerability (Brooks 2003). It is dominant in natural hazard and environmental change literature and largely emphasizes the distribution of hazard conditions and the exposure of human systems to hazards. However, it has been argued that the role of human systems is underestimated in biophysical vulnerability and needs appropriate consideration (Ford and Smit 2004).

The second viewpoint - social vulnerability - considers vulnerability as the inherited characteristic of a system that is mostly shaped by the social, economic and cultural structure of a society. It includes variables such as poverty and inequality, marginalization, food entitlements, access to insurances, and housing quality (Brooks 2003; Ford and Smit 2004)). This approach has emerged from the fact that disasters are not results of hazardous events alone, but also significantly influenced by socio-political, economic and cultural settings which are influencing the ability of individuals and communities to cope with and manage the external pressures (Ford and Smit 2004). In the context of climate change many scholars (e.g. Wisner et al 2003; Bohle et al. 1994) applied this approach to explore socio-economic processes mediating the entitlements of individual and communities on resources and thus their capacity to cope with and manage the impact of external pressures. Without anticipating a later and more fundamental discussion of the vulnerability concept, especially in regard to our case study (see chapter 2.3), it may suffice here to point to Bohle's well-known conceptual model of vulnerability.

As shown in figure 1-1, it covers not only the afore mentioned aspects of external and internal vulnerabilities, but also their embeddedness in theoretical and practical approaches to deal with them (Bohle 2001; see also Brklacich and Bohle 2006 and their further development of the earlier concept).

Finally, the third approach has been proposed by scholars (notably Cutter et al. 1996; Turner et al. 2003) to integrate biophysical and social vulnerability to explore the interactions between nature and society in shaping vulnerability of specific geographic locations and coupled human-environment systems respectively. In the same school of thought the IPCC definition of vulnerability incorporates the external causes of vulnerability with internal socio economic factors by integrating exposures of a system to climate variability with its sensitivity and adaptive capacity to external pressures (Füssel and Klein 2006).

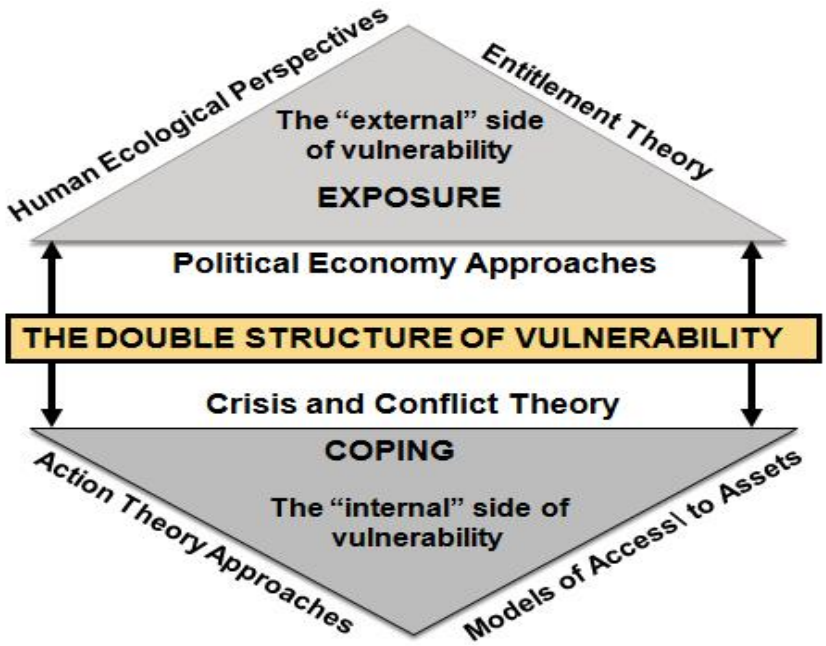


Figure 1-1 Bohle's conceptual framework for vulnerability analysis
source: Bohle, H.G. (2001)

After what has been said before, it is clear that external socio-political and economic processes will be included in the analysis. The integration of social and biophysical vulnerability is necessary to evaluate the overall vulnerability of pastoral nomads to climate stresses. They are significantly affecting the nomads' access and control over resources,

challenge their adaptive capacity to climate stresses and will therefore be an integral part of the study. For these introductory remarks, vulnerability is conceptualized as a function of adaptive capacity, sensitivity and exposure. It builds on the definition suggested by the IPCC in their Fourth Assessment Report where vulnerability is defined as "*the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and the variation to which a system is exposed, its sensitivity and its adaptive capacity*"(Parry et al. 2007: p. 883).

1.3 Pastoralism and nomadism: a working definition

So far, the terms "nomads", "pastoralists", "nomadic pastoralism" and "nomadic pastoralists" have been used in a very colloquial, imprecise way. However, they are technical term and need clear definitions. And these go far beyond the attempts of e.g. Johnson (1969, pp. 166-176) or Hütteroth (1973), who differentiate predominantly on the basis of migrational patterns in combination with agricultural and pastoral activities.

It has been argued that pastoral nomads as active agents are continuously adapting to external pressures. The process of adaptation may influence many aspects of their lifestyles including mobility, income sources, social relations etc. Galvin (2009) went even further and suggests that many contemporary changes such as production systems, land use changes, tenure systems should be included into the analysis of adaptive measures, since they are parts of more or less dynamic responses and resilience patterns. For the purpose of analyzing vulnerability, therefore, the term "pastoral nomadism" should include every households who are engaging in pastoral lifestyles in order to capture the entire possible adaptation strategies. Thus, the term "pastoral nomads" will be broadly used to refer to all households that depend on their livestock husbandry through migratory lifestyle (Dyson-Hudson and Dyson-Hudson 1980). Salzman and Sadala (1980) define nomadism as a "movement of the

household during the annual round of productive activities". In this way, they limit "nomadism" to families rather than to individuals engaging in migration with the purpose of productive animal husbandry. A somewhat broader approach is pursued by Khazanov (1984). He defined "nomadic pastoralism" from an economic perspective. He calls it a food-producing economy based on extensive pastoralism and migratory lifestyle where the majority of its population gets involved in seasonal migration. He delineates five major characteristics for nomadic pastoralism:

(1) Pastoralism is the predominant form of economic activity. (2) Its extensive character connected with the maintenance of herds all year round on a system of free-range grazing without stables. (3) Periodic mobility in accordance with the demands of pastoral economy within the boundaries of specific grazing territories (as opposed to migrations). (4) The participation in pastoral mobility of all or the majority of the population (as opposed, for example, to the management of herds on distant pastures by specialist herdsmen, into which only a minority is involved in pastoral migrations). (5) The orientation of production towards the requirements of subsistence (as opposed to the capitalistic ranch or dairy farming of today (Khazanov 1984 : p.16).

These characteristics provide useful criteria in distinguishing nomadism from sedentary-based production systems. Nevertheless, there are a great number of hybrids between these two distinct production systems, which are particularly important for analyzing vulnerability and adaptation processes among herders and pastoralists. The dynamics of the production system of contemporary pastoral nomads in Iran have significantly changed over the last decades. This has been described by different researchers on Iranian mountain nomads, including the Shahsevan (Amanolahi 2003; Ehlers 2000; Ehlers and Schetter 2001; Mizban 2004; Tapper 1979, 1997). Today nomads share many similarities with sedentary neighbors in regard to dwelling, rangeland management, and production systems. Therefore, the concept of "pastoral nomads" in the context of this study will cover all households that have the following qualifications and characteristics:

- an association with one of Shahsevan social organizations, namely *tireh*, *taifeh* and *oba*;
- a focus on rearing livestock through seasonal migration regardless of the number of animals or the share of livestock production on their income and consumption; and
- participation in seasonal migrations regardless of the portion of households participating in migration.

With such a framework it is ensured that not only the few traditional nomads of the Shahsevan are covered, but the overwhelming majority of households in the transition to partly or full sedentarization.

1.4 Aim and objectives of the study

This research use the case of Shahsevan nomads in northwest Iran to contribute to the theoretical understanding of vulnerability of pastoral nomads to changing socio-economic, political and environmental conditions.

It aims to address how the interaction between the socio-political and climate stresses influence on their vulnerability? How they are drawing on their capacities and resources to make their livelihood strategies and how it influences on their vulnerability? What are their strategies for coping with and adaptation to multiple socio-political and climate stresses and how they contribute in continuation of their pastoral economies and lives?

In addressing these questions, the research explores the close interactions of internal and external factors of vulnerabilities of their economy and lifestyles. It analyzes the root causes of their vulnerability, the basic constraints of nomadic existence and the nomads' strategies to adapt to and cope with those internal and external sides of their vulnerability.

By doing so, the study will strive for including aspects of conflicts, of approaches of political economy as well as specific insights into the ecology of Shahsevan nomadism. In order to achieve these goals, different spatial dimensions - global, regional and, above all, local - will be pursued.

At macro level the research employs the notion of "double exposure" (see figure 2-4) to examine the impacts of external socio-political and climatic changes on their access to and control over resources and thus the framework conditions of their adaptive capacity and sensitivity. These data refer specifically to the global and regional levels into which the economy of the Shahsevan like that of all local activities is incorporated. The micro level, i.e. the household level, explores the adjustment of the Shahsevan livelihood strategies to external impacts on their livelihoods. In this context, the term "livelihood" refers to Chambers et al.'s (1992) definition where livelihood is conceived as a set of capabilities, assets (stores, resources, claims and access) and activities required for a means of living. Therefore, the research investigates the ways in which pastoral nomads use their resources and capabilities to cope with and manage the impacts of contemporary changes on their vulnerability to climate stresses.

In line with this overall objective, the study pursues the following specific objectives:

I. to evaluate the impacts of contemporary changing socio-political, economic and climate conditions on vulnerability of pastoral nomads;
II. to investigate the root causes of vulnerability of Shahsevan pastoral nomads in regard to multiple socio-political and climate stresses
III. to assess livelihood strategies used by different categories of Shahsevan households and linkages with their vulnerability;
IV. to analyze their coping and adaptation strategies in response to multiple socio-political and climate stresses and their implication for continuation of their pastoral life and economy

It is argued that, in spite of the vast amount of literature on pastoral nomadism both in Iran and on a global scale, the specific approach of this study is unique and innovative. To the best of the author's knowledge, there is no in-depth study on the impacts of climate and global environmental change on nomadic lifestyles so far. While it is beyond doubt that there are a number of case studies in which the interrelationships of climate change and pastoral

lifestyles are discussed (see e.g. H. Kreutzmann, ed., 2012), a focused in-depth study like this one is missing so far. Aim and objectives of this study are therefore not only an analysis of the Shahsevan, but also a contribution to the more general question of global change impacts on the pastoral livelihoods on fragile ecosystems of the mountains in the arid and semi-arid regions of Western and Central Asia.

1.5 Research context: pastoral nomadism in Iran and the Shahsevan

Pastoral nomadism has always had significant economic, military and political importance in Iran over the last centuries (Salzman 1971). They had major influence in political power and almost all dynasties ruling the country since the eleventh century - e.g. Qajars, Zands, Afshars, Safavids, Seljuqs - had an internal tribal base (Garthwaite 1983). One may well argue that their military advantages where a major source for their political power and influence. In 1909, for instance the Shahsevan pillaged the city of Ardabil and gained control over the region until they were defeated and disarmed by the troops of Reza Khan in 1923 (Tapper 1979).

According to Salzman (1971), however, not politics but the adjustment to biophysical variabilities was the prime objective of pastoral mobility, while the political and military importance has emerged as a consequence from the nomads' arrangement with ecological adaptation. He argues that their migratory lifestyle enabled them to sustain utilizing the marginal lands which otherwise would have remained unprofitable (Salzman 1971). Their political organizations therefore, were emerged from the requirements of their migratory lifestyle and the necessities of cooperation in herding practices, protection and regulation of territorial rights and of an appropriate organization of human and animal populations (Ehlers and Kreutzmann 2000; Tapper 1979). This holds true not only for the inter-tribal laws and rules, but also for the intra-tribal regulations of grazing grounds, campsites and migratory routes and their temporal sequences.

While nomads have lost their political and military functions over the last decades, they are still playing an important economic role in the country. According to the latest socio-economic survey of pastoral nomads in 2008, there are some 1,200,000 pastoral nomads (212,000 households) in the country who are keeping more than 8.million 5 productive sheep, 5,138,000 productive goats and approximately 140,000 productive cattle(ISC 2012). Roughly estimating a 20% infertility, twinning and lost rate and the annual average of 20, 10, and 70 kilograms of meat produced per head of sheep, goat and cattle respectively, they are producing almost 180,000 tons of red meat for the country. The nomads' contribution to the national economy in terms of meat production might be even higher in reality, because they usually avoid declaring the accurate size of their herds and the number of their animals in fear of being fined for overstocking. They are officially allowed to keep only the number of animals that is stated in their grazing license, based on the estimated carrying capacity of their pastures. The impact of pastoral nomads in national economy should, however, not be limited to their contributions to the national meat production. The provision of milk and milk products is also important, not to speak of wool and - especially in the past - their role in carpet manufacturing.

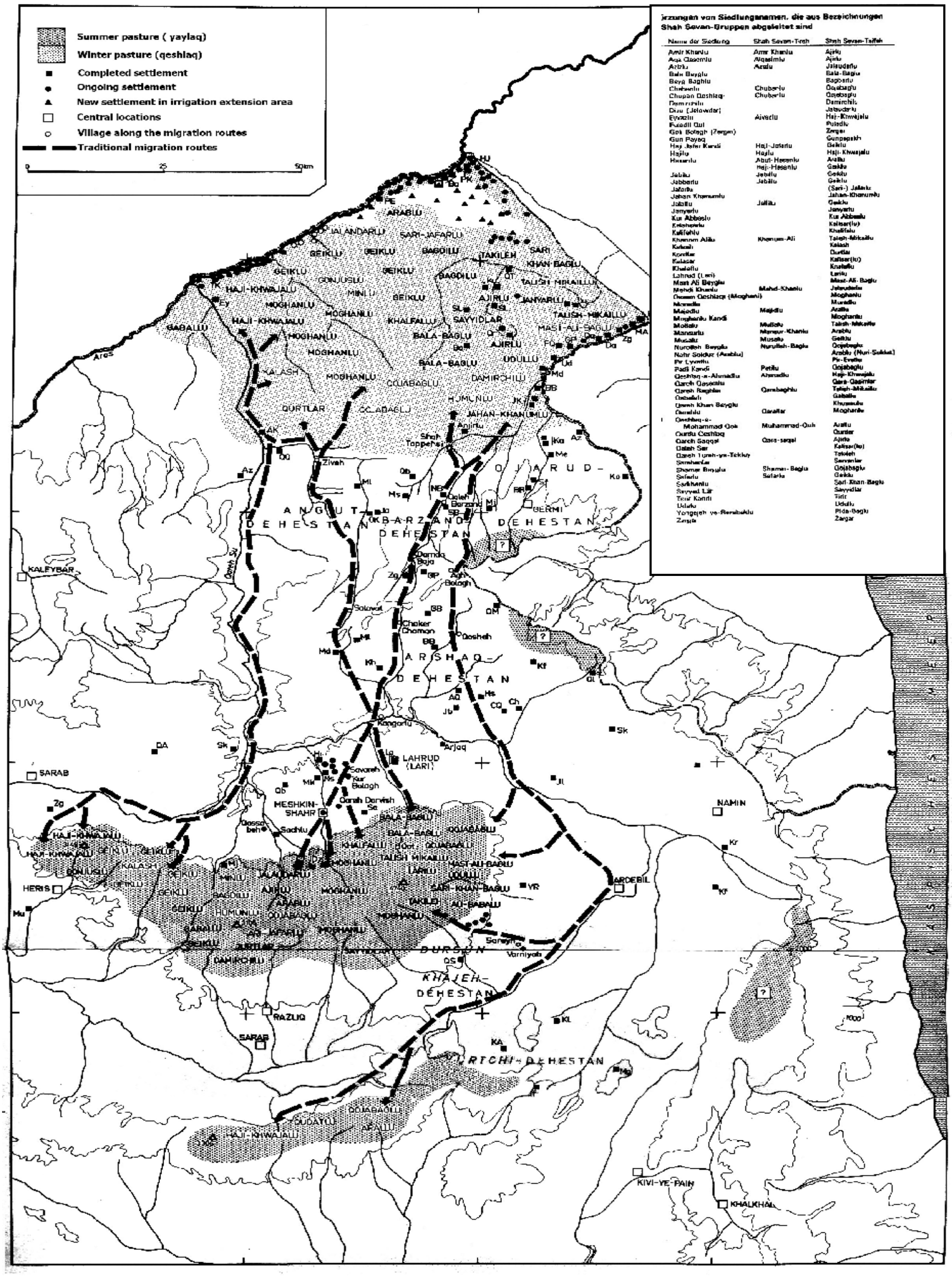
The seemingly precise numbers of pastoral nomads should be seen equally carefully. A rapidly increasing number of nomads have closely linked their pastoral life to urban centers and established partial residence of their families in nearby cities in order to provide access to basic services such as schooling, health centers and to create further benefits from alternative income sources. This process will be discussed in the next chapters, since these developments are responses to political, socio-economic and ecological changes in their traditional environments. It is important to note here that many surveys or data collections on pastoral nomads include those family members and households that are based in cities but come to the summer pastures to be registered as nomads. Several Shahsevan confirmed that, after the announcement of government for conducting the 2008 survey, many people returned from nearby cities and camped in their traditional *yaylaq*s for a few days and left after the

survey. Those people mostly have shared property and herds with their fathers and brothers or animals entrusted to their close kin and relatives or just a traditional grazing right without keeping animals. Therefore, they do not want to lose their inherited grazing rights and other privileges connected with their status as *ashair* (nomads).

Shahsevan pastoral nomads: The Shahsevan are Azari-Turkish speaking pastoral nomads in Northwest Iran. The name of Shahsevan ("those who love Shah") probably originated from the Safavid period (1587-1629) where Shah Abas the Great formed a tribe with special loyalty to the Shah and the Safavid dynasty against the threats of the powerful Qizilbash tribes (Tapper 1979).

Their territory covers an area of almost 9,000 km^2. It is marked by the frontiers of Azerbaijan in the north and east, and the mountain ranges of Baghrow, Bozqush and Qaradagh in the south and west. It consists of two summer and winter grazing areas and migration routes that connect these two rangelands. Their summer pastures with nearly 640,000 hectares are located in the upper regions of the Sabalan Koh mountains with heights up to 4,811 meters, while their winter grazing areas are located in the lowlands of Dasht-e-Moghan in Ardabil province. In spite of its peripheral location within Iran, the traditional winter and summer pastures of the Shahsevan are a typical example of the tremendous pressures and interferences under which Iranian nomads have been existing over the last decades, especially since the 1960ies: Irrigation schemes and the expansion of rural farming, the spread and growth of urban areas, road constructions etc. have had severe impacts on the Shahsevan traditional way of life. According to Tapper (1979), over two-third of the 300,000 hectares of Iranian Moghan were used as winter pasture in the 1960ies. In the northern corner some 30,000 hectares were set aside for a government-sponsored irrigation scheme, which was initiated in 1951 and had been functioning since 1960 (Schweizer 1970, 1973). Until today this figure has been extended to about 100,000 hectares of their winter rangelands by developing irrigation schemes and by the construction of new dams.

The traditional migrational pattern of the Shahsevan is comparable to that of other Iranian tribes, although adapted to the local ecological conditions of the Sabalan Koh and northwestern Iran. As shown in map 1-2 the Shahsevan tribes used to share four traditional routes (*el-yolu*) for their seasonal migration. Today, these pathways are mainly occupied by rural farmlands or individual pastures. Therefore, the nomads who follow their traditional migration have to pay for using their former rangelands and *el-yolu*. They usually start their spring migration 60 days after Nowruz (20 May) before the summer heat. However, the Shahsevan migrational patterns are subject to many factors. The first influencing issue is the availability of spring grazing pasture (*yazlaq*). Those who have their own *yazlaq* or who can afford to rent one, usually prefer to use trucks for migration and transport of their animals. It will cost about 1.5 Euro per head of animal for transportation from and to the winter grazing ground (*qeshlaq*).



Jerzungen von Siedlungsnamen, die aus Bezeichnungen Shah Sevan-Gruppen abgeleitet sind

Name der Siedlung	Shah Sevan-Tirah	Shah Sevan-Taifeh
Amir Khanlu	Amir Khanlu	Ajirlu
Aqa Qasemlu	Aqasimlu	Ajirlu
Arzilu	Arzilu	Jalayerlu
Bala Bayglu		Bala-Baglu
Bayg Baghlu		Bagbanlu
Chahanlu	Chuberlu	Qajabaglu
Chupan Qeshlaq	Chuberlu	Qajabaglu
Demirchilu		Demirchilu
Dizu (Jelovdar)		Jalayerlu
Eywazlu	Aivazlu	Haji-Khwajalu
Fuladli Gol		Puladlu
Gol Bolagh (Zergar)		Zargar
Gun Payeg		Gunpayakh
Haj Jafar Kandi	Haji-Jafarlu	Geiklu
Hajilu	Hajilu	Haji-Khwajalu
Hasanlu	Abdul-Hasanlu	Arablu
	Haji-Hasanlu	Geiklu
Jabilu	Jabilu	Geiklu
Jabberlu	Jabilu	Geiklu
Jafarlu		(Sari-) Jalalu
Jahan Khanumlu		Jahan-Khanumlu
Jalalu	Jalilu	Geiklu
Jamyarlu		Jamyarlu
Kul Abbaslu		Kul Abbaslu
Kalkhoranlu		Kaisar(lu)
Kalifehlu		Khalifalu
Khanum Alilu	Khanum-Ali	Talish-Mikailu
Kalash		Kalash
Kordlar		Qurtlar
Kulajar		Kaisar(lu)
Khalalilu		Khalalilu
Lahrud (Lari)		Larilu
Mast Ali Bayglu		Mast-Ali-Baglu
Mehdi Khanlu	Mahd-Khanlu	Jalayerlu
Ocean Qeshlaq (Moghani)		Moghanlu
Moradlu		Muradlu
Majidlu	Majidlu	Arablu
Moghanlu Kandi		Moghanlu
Mollalu	Mullalu	Talish-Mikailu
Mansurlu	Mansur-Khanlu	Arablu
Musalu	Musalu	Geiklu
Nurollah Bayglu	Nurullah-Baglu	Qajabaglu
Nohr Soldur (Arablu)		Arablu (Nuri-Sukkat)
Pir Lyavlu		Pir-Evatlu
Padi Kandi	Petilu	Qajabaglu
Qeshlaq-e-Ahmadlu	Ahmadlu	Haji-Khwajalu
Qarch Qasemlu		Qara-Qasimlar
Qarah Baghlar	Qarabaghlu	Talish-Mikailu
Qabalalu		Gabalilu
Qarah Khan Bayglu		Khamsalu
Qaradalu	Qaradar	Moghanlu
Qeshlaq-e-Mohammad Qoli	Muhammad-Quli	Arablu
Qurdu Qeshlaq		Qurdar
Qarch Saqqal	Qara-saqal	Ajirlu
Qalah Sar		Kaisar(lu)
Qaqah Tapeh-ye-Tekkuy		Tatoleh
Samhanlu		Sarvanlar
Shamsa Bayglu	Shamsi-Baglu	Qajabaglu
Safarlu	Safarlu	Geiklu
Sadkhanlu		Sari-Khan-Baglu
Sayyad Lar		Sayyidlar
Tatar Kandi		Tirlr
Udulu		Udullu
Yengejeh ye-Renabadlu		Pida-Baglu
Zargar		Zargar

Map 1-2 The Shahsevan traditional migration routes, *yaylaq* and *qeshlaq*
Source: (Schweizer 1970).The migration routes are mainly blocked by extension of farmlands and individual pastures. Significant decline in their winter pasture is further found due to extensive land use change and conversion to irrigated and dry-farming (see maps 3-1 and 3-2)

Transportation by trucks has - except for the financial burden - a number of advantages. It avoids tedious and dangerous migrations of animals and people along highways and roads, where bridges and river crossings cause permanent problems and where accidents and loss of animals are very common. It avoids conflicts with farmers and local populations because of unavoidable trespassing of farmlands and private properties. And it also avoids trouble within the pastoral groups over campsites and grazing areas during the migration.

Another important influence is the maturity of the vegetation in their summer rangelands (*yaylaq*). Especially during winter droughts, which may force the nomads to leave their *qeshlaq* at a time when their summer rangelands (*yaylaq*) are not yet matured, many nomads try to delay their arrival to *yaylaq* by extending their traditional migration. Likewise, the return date from summer pastures is also determined by the availability of forage and climate conditions. In summer droughts most of the pastures along the migration routes are also in very poor conditions so that many herders again prefer to use trucks for the return journey. Finally, also cold weather and driving snow can force the nomads to load everything on trucks and return to *qeshlaq* in early autumn.

According to the latest socio-economic survey of pastoral nomads in 2008, there are still 67,093 Shahsevan pastoral nomads forming 12,980 households. Thus, by the very size of the Shahsevan pastoral population (cf. also table 1-1) but also by the claimed representativeness of their manifold problems of a vanishing lifestyle, the study argues that this research on the impacts of climate change on nomadic societies and economies can be considered as a transferable and - in its results - also policy-relevant evaluation of present-day Iranian nomadism and its chances in the future. Or to put it in the words of H. Kreutzmann (2012, chapter 17): “Pastoralism - a way forward or back?”

Table1-1 shows the human and animal population of main tribal confederations in Iran based on the latest census in 2008. These figures however, excluded the individual tribes and sub-tribes over the country totaling up to 48% of nomadic population. It can be seen from the data in this table that, the Shahsevan are the third pastoral group in size of human population

after Bakhtiari and Ghashghaii tribes. Accordingly, the number of 1,329,000 head of small animals i.e. sheep, lamb, goat and kid, indicates their significant role in meat and dairy production in the country. This study however, argues that their animal number is considerably higher than this figure (see chapter three).

Table 1-1 Population of major tribal confederations in Iran
Source (ISC 2012)

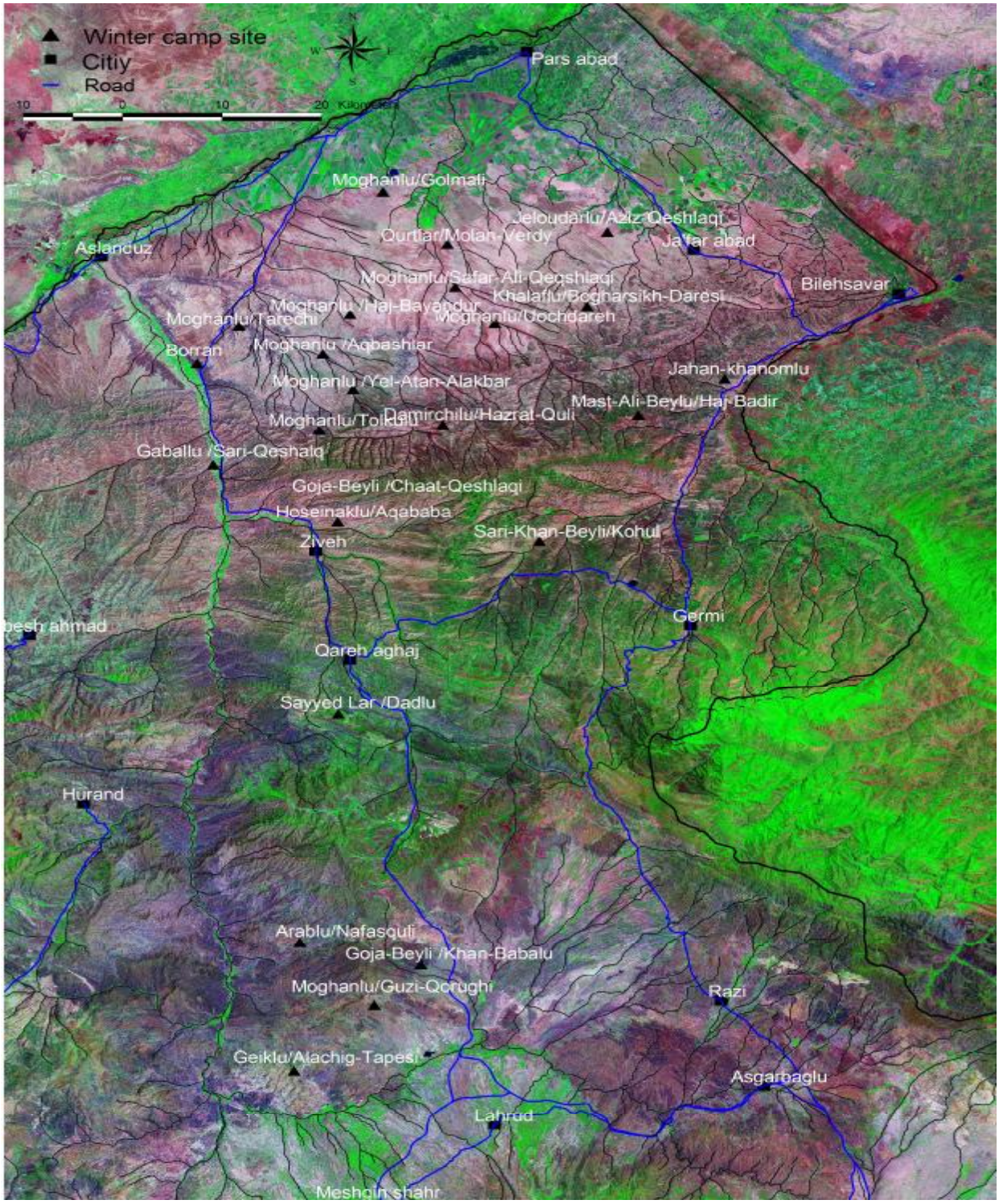
Confederation of tribes	Tribe	Households	Population	Animal number(Sheep, lamb, goat and kid)	Geographical location (Main province)
Bakhtiari	59	23,094	140,342	1,658,025	Khuzestan, Fars, Esfahan
Ghashghaii	6	17,971	96,339	1,967,988	Fars, Bushehr, Khuzestan
Shahsevan	42	12,985	67,093	1,329,639	Ardabil
Khamse	4	7,461	38,036	973,872	Fars
Gharehdagh-Arasbaran	6	6,852	36,682	631,269	East Azerbaijan
Miond	6	4,186	24,291	347,654	Lorestan, Khuzestan
Boyerahmas-sofla	33	3,843	23,653	272,908	Kohgiluyeh and Boyer-Ahmad
Gholkhani	20	3,953	23,235	307,375	Kermanshah
Harki	4	2,447	17,318	211,894	West Azerbaijan
Jalili	10	2,736	15,789	324,923	West Azerbaijan
Bahmaii	31	2,465	15,782	181,305	Khuzestan, Kohgiluyeh and Boyer-Ahmad
Mamasani	4	2,478	15,377	175,449	Fars,Kohgiluyeh and Boyer-Ahmad
Milan	9	2,596	14,995	291,099	West Azerbaijan
Balooch	21	2,975	14,670	240,837	Kerman,Baluchistan
Kalhor	6	2,579	14,613	295,999	Kermanshah
Kord	37	2,186	13,829	282,994	Ilam
Boyerahmas-olya	21	1,872	11,994	163,386	Fars,Kohgiluyeh and Boyer-Ahmad
Zelki	23	1,918	10,667	110,947	Khuzestan,lorestan
Tibi	17	1,524	9,903	95,836	Khuzestan, Kohgiluyeh and Boyer-Ahmad
Afshar	23	1,330	6,675	132,554	Kerman
Total	382	107,451	611,283	9,995,953	

1.6 Fieldwork, data problems and outline of thesis

The fieldwork was undertaken from May 2009 to June 2010 and covered an annual cycle of the Shahsevan pastoral life. The festival of nomadic pastoral life, held on May 10th 2009 in the Jafarabad district of Moghan (map 1-3), was used as an entry point to be introduced to some of the Shahsevan pastoral nomads. It also provided the possibility to be connected to the provincial organizations dealing with nomadic affairs and to establish contacts. However and not surprisingly, the nomads hesitated to give accurate information to the people coming from state organizations. Therefore, the individual PhD student identity was very helpful in a trust-building process, which took several weeks to be established. After that, a number of qualitative and quantitative research tools were employed for collecting data over almost a whole year and to engage into participant observation during the summer and winter grazing periods and the migrations.

Participant observation: The participant observation method was used to understand the daily life and adaptation strategies of nomadic households. In this regard, two families from Reza-quli and one from Gareh-vali sub-tribes of Moghanlu tribe served as impeccable informants, offered hospitality and gave valuable insights into their decision-making processes. These experiences were especially important since the members of the powerful Moghanlu tribe are famous for their comprehensive knowledge of pastoral nomadism because the majority of them are still practicing a migratory lifestyle.

The first time that I was received by host family in their *qeshlaq*, they had suffered a lot from a severe drought in their winter rangelands in the Dasht-e-Moghan. The price of forage had almost doubled and many nomads were forced to either sell part of their herds to buy forage, or borrow money at a high interest rate, or buy the forage by installments at a much higher price. Joining them in such a condition provided the opportunity to evaluate the diverse impacts of drought on their pastoral economy and get intimate insights into their coping and adaptation strategies.



Map 1-3 The Shahsevan winter camp sites on the satellite map of Dasht-e-Moghan.
Due to intense concentration of their winter camp sites in central part of Dasht-e-Moghan, only those *qeshlaq* mentions in the text are shown in the map. The map further shows the extension of agricultural land to their winter pasture in the north part.

Furthermore, taking part in their daily activities like herding, milking, taking the animals to local bazaars, buying necessary household items and etc. were very useful to get detailed information on these issues. Besides, it was also somehow essential because the majorities of men do not stay in camp during daytime and have to look after the herds or other issues.

In-depth interviews and focus group discussions: The rapid integration into some of the nomadic households and the simultaneous building of mutual trust and understanding enabled me to examine the impacts of contemporary changes on their livelihood. Several informal discussions and twenty in-depth interviews were conducted with nomad elders, mainly over 50 years old. For each interview the main points raised by the interviewee were written down immediately. Wherever the interviewee felt comfortable with recording, the interviews where taped and listened afterward to avoid missing important information. The outcomes of these interviews were further used for formulating the framework of the field survey questionnaire.

Survey sampling: The qualitative data were collected in the whole territory of the Shahsevan in their winter rangelands (*qeshlaq*) and spring pastures (*yazlaq*) and summer pastures (*yaylaq*) while the survey sampling was done in their *qeshlaq* territory from Parsabad and Moghan to around Meshkin-Shahr.

Main focus of the survey sampling has been to collect quantitative data on nomadic livelihood strategies, on their access to and control over resources and the impact 2008-9 pastoral drought on their economy. The questionnaire was structured in four main sections, namely: 1) demography and household characteristics, 2) access to different resources and capitals e.g. natural, financial, physical, human and social 3) livelihood sources and strategies including the herding system and migration, farming and off-farm activities 4) the impact of the 2008-9 drought on their pastoral economy.

Due to the lack of a reliable sampling framework, the cluster sampling method was employed in this survey. Initially 30 winter habitats (*qeshlaq*) were selected out of a total of 277. In each *qeshlaq* (cluster) 13 households were selected to ensure a 95% confidence level and a 5%

precision level. Pretesting the questionnaire indicated already a high level of homogeneity within the clusters (*qeshlaq*). Therefore, due to the geographical distribution of *qeshlaq*s and the time- and resource-demanding nature of the survey, the confidence level was reduced to 90%. Therefore, it was planned to take 43 *qeshlaqs* and seven samples per cluster to have 301 interviews in total. In practice however the number of *qeshlaq*s were reached to 54 on two reasons. First, in many winter camp sites, there were nomads from other tribes and *qeshlaqs*, working as shepherd for other nomads or having their own herd but on rented pasture. Considering the importance of both groups for this study therefore, they were given the same chance to be involved in the survey but their original *qeshlaqs* and tribes were recorded in the questionnaire. The inadequate pastoral households in some *qeshlaqs,* e.g. Hosein-*Qeshlaq*i of Goja-Beyli, Aziz-*Qeshlaq*i of Jeloudarlu, Nafasquli of Arablu, was the second ground for increasing the cluster numbers. Where the number of inhabitants was less than seven households, the remaining interviews were collected from the new randomly selected *qeshlaq*s. As shown in table 1-2 therefore, a total of 301 household heads or financially knowledgeable members of their f amily (son or brother) were interviewed from 21 tribes and 54 *qeshlaq*s (see map 1-3).

Fieldwork challenges: It is probably easy to understand that fieldwork in general and detailed data collection in particular is hard to exercise in a nomadic society under stress. This is not only due to the strict rules of conduct within the nomadic society itself, but also - and maybe even more so - under the existing political, social and economic framework conditions under which they exist. Thus, it is not surprising that there were a number of difficulties in carrying out this kind of research. It started with seemingly trivial experiences. Although having a tent of my own beside the host family in the summer pasture the preparation of own food was considered as an insult to the host family. Therefore, the food was provided by the host families. Since they hesitated, however, to be paid for it, the compensation was made mainly through payment for research assistance. It granted a unique opportunity for informal discussions and learning from their own conversations when the family members joined for lunch and dinner, discuss the main issues and problems at stake.

Table 1-2 The names of participants' tribes and *qeshlaq*s

No.	Tribe	Qeshlaq	no. of interviewee	No	Tribe	*Qeshlaq*	no. of interviewee
1	Ajirlu	Qareh-Dareh-Fuman	1	28	Jeloudarlu	Aziz-*Qeshlaq*i	2
2	Khalaflu	Bogharsikh-Daresi	7	29	Kalash	Kalash	5
3	Arablu	Nafasquli	5	30	Khalaflu	Bogharsikh-Daresi	7
4	Damirchilu	Hazrat-Quli	6	31	Kor-Abbaslu	Asad-*Qeshlaq*i	7
5	Gaballu	Agh-Dagh	7	32	Mast-Ali-Beylu	Haj-Badir/khorozlu	7
6	Gaballu	Sari-*Qeshlaq*	6	33	Moghanlu	Agh-Dagh	6
7	Geiklu	Alachig-Tapesi	6	34	Moghanlu	Aqbashlar	7
8	Moghanlu	Gum	6	35	Moghanlu	Golmali	5
9	Geiklu	Haj-Fatali	6	36	Moghanlu	Gum	6
10	Geiklu	Jalillu	7	37	Moghanlu	Guzi-Qorughi	7
11	Geiklu	Qurichai/omranabad	5	38	Moghanlu	Haj-Bayandur	6
12	Goja-Beyli	Chaat-*Qeshlaq*i	7	39	Moghanlu	Haj-Heidar	7
13	Goja-Beyli	Hosein-*Qeshlaq*i	4	40	Moghanlu	Haj-Mamad-Babalu	6
14	Goja-Beyli	Khan-Babalu	7	41	Moghanlu	Ojagh	7
15	Moghanlu	Safar-Ali-Qeqshlaqi	6	42	Moghanlu	Palaz	7
16	Haji-Khwajalu	Dalik-Yargan	7	43	Moghanlu	Safar-Ali-Qeqshlaqi	7
17	Haji-Khwajalu	Gedailu	5	44	Moghanlu	Tarechi	7
18	Haji-Khwajalu	Ieri-Dareh	2	45	Moghanlu	Tolkulu	7
19	Haji-Khwajalu	Qareh-Qabaq	7	46	Moghanlu	Uochdareh	7
20	Haji-Khwajalu	Qareh-Tikanli	6	47	Moghanlu	Yel-Atan/Alakbar	7
21	Haji-Khwajalu	Qurichai/omranabad	3	48	Qarajalu	Chirtiglu	5
22	Hosein-Hajilu	Iman-Quyusi	4	49	Qarajalu	Kara-*Qeshlaq*i	7
23	Hosein-Hajilu	Tak-Guie	6	50	Qurtlar	Molan-Verdy	9
24	Hoseinaklu	Aqababa	6	51	Sari-Khan-Beyli	Kohul	6
25	Hoseinaklu	Ebad-*Qeshlaq*i	6	52	Sari-Khan-Beyli	Tarechi	2
26	Humunlu	Takechi	1	53	Sayyed Lar	Dadlu	3
27	Jahan-khanomlu	Jahan-khanum	1	54	Sayyed Lar	Seidlar	3
Total number of interviewees							301

Nevertheless, the main problem was the nomads' deep distrust of researchers and experts coming from outside. Therefore, the process of trust building was very difficult and time consuming. However, renting a car from their own community (a pickup, which is popular car among nomads and hardly used by state organizations) and always having one of the nomads as research assistant was a helpful strategy to overcome initial mistrust and fear. In every place the assistants started introducing themselves and explaining the aim of the research. Due to familiar relationship and/or other intimate knowledge of each other, the trust building process succeeded in most cases. It was supported by the fact that direct questions about herd size, annual income, etc. were avoided and the required information was obtained indirectly from their expenditure for herding and livestock raising or payment for transportation.

Another problem in conducting the survey sampling was the fact that many of the household heads were not present during daytime as they were looking after their herds. Therefore, it was necessary to return at milking and lunchtime as well as late in the evening when the nomads brought their herds back to the camps. All this and many other unexpected obstacles made a reliable fieldwork campaign a sometimes difficult and time-consuming exercise. It could only be compensated by the comparatively long time span of almost 14 months available for the fieldwork.

Outline of thesis: Apart from this introductory section, the thesis is organized into four more chapters. Chapter two deals with the elaboration of the conceptual framework employed in this study to explore the vulnerability of the Shahsevan nomads to climate stresses under the given political, social and economic changes. It starts with reviewing some of the relevant ` holarly studies on vulnerability assessment and evaluates their approaches and conceptual frameworks. Then the framework conditions applied in this research are explained. This provides the context and basis for the following analytical chapters. It should be noted already here that chapter two will develop a theoretical approach based on the existing scientific literature on vulnerability, but specifically enlarged and adopted to the realities of pastoral systems in high mountain environments.

Chapter three adopts a macro-level approach to examine the external causes of their vulnerability. It evaluates the impacts of contemporary changes including state policies and interventions on rangelands and pastoralism, aspects of population growth and sedentarizaton schemes, socio-economic developments and access to basic services, and climate change. Chapter four presents the assessment of relative vulnerability at household level and its relationship with their individual livelihood strategies. It starts with an evaluation of their adaptive capacities, sensitivities and exposure. Then, vulnerability is presented as aggregation of standardized figures from those three components.

Chapter five examines the continuation of Shahsevan pastoral nomadism based on their coping and adaptation strategies in response to climate stresses and external anthropogenic changes. A distinction has been made between coping strategies as immediate response to climate shocks such as drought and adaptation strategies as long-term adjustment of livelihood to generally increasing pressure and changes. The concluding section of this chapter presents three scenarios. It will briefly discuss aspects of our findings and their transferability to other nomadic groups in Iran. But it will also strive for a short outlook on Iranian mountain nomadism in comparison with that of other mountain pastoralists and their survival strategies under the conditions of environmental and climatic stresses.

Chapter two

Conceptual Frameworks

2.1 General remarks

There has been a considerable increase in the number of natural disasters over the last decades. According to the latest report of Munich Re on nature catastrophes, the years 2007 and 2010 had the highest number of natural disasters since 1980. The number of 960 natural disasters documented in 2010 was distinctly higher than its average in the past ten years, i.e. 750 events. Especially the number of climate-related hazards showed a significant increase(W. Schenk and Glaser 1995; Trenberth et al. 2007). The year 2010, for instance, was recorded among the hottest years since 1850, and many regions of the world, particularly Greenland and the eastern half of Canada, North Africa, and southwest Asia, experienced widespread warm anomalies of more than 3°C (MunichRe 2010), thus also affecting our own research area.

Attempts to understand and to explain these events, many of which are experienced as natural disasters without human interferences, are manifold. Several and often repeated explanations are those of an enhanced media coverage and reporting system of increasing degradation of ecosystems and climate change. It must be noted, however, that the obvious increase of what is being called “natural disaster” is not only a function of natural events and changes, but also - as already indicated above - a consequence of changing societal framework conditions. Not only economic growth over the last decades and its impacts on land use and land cover changes (cf. MEA 2005), but also increasing pressures on human habitats, growing inequities between rich and poor or political marginalizations are contributing factors (UNDP 2004).

As a consequence, it is not surprising that from the 1980ies onwards research on the close interactions between nature and society and their interrelationships has increased (Winfried Schenk 2005). As emphasized by Bohle - Brklacich (2006) approaches have been changing

rapidly from a unilinear natural impact on societies to more complex and integrating patterns of mutual dependencies between nature and societies. As a result, one can argue that there are nowadays a great number of vulnerability paradigms. Birkmann (2006) has edited a comprehensive survey of not only measuring vulnerability to natural hazards, but also to human-induced stresses and problems. Already in 1994 Bohle et al. have applied the concept of vulnerability to various natural and anthropogenic phenomena such as flood, famine, droughts or epidemics to explore the social aspect of disasters, their causes and consequences. In 2001 Bohle coined the term of the "double structure of vulnerability", differentiating between the "external" sides of vulnerability (= exposure) and their "internal" sides, i.e. the coping strategies of individuals and societies. Similarly, Adger (1999, 2006), Wisner et al. (2003) or Cutter et al. (2003) have focused on the double-headed nature of human-environment systems vulnerabilities. Other authors, notably Cannon (2000) warn that in many hazardous contexts like a flood, landslide and drought, vulnerability of the individual or of a social group cannot be exclusively explained by socio-economic processes. Cannon puts special emphasis on the role of hazards. He argues that the intimate linkage and mutual interaction of hazards and vulnerability requires integration of hazards in conceptualizing vulnerability. On the one hand, peoples' vulnerability may contribute to the increase of the characteristic of hazards by overexploitation and mismanagement of resources. On the other hand, the hazards influence the livelihoods of affected people, quality and quantity of the resource and thus on their adaptation capacity.

It is in line with these general discussions that also the following study should be seen. As mentioned before, aims and objectives of our own research will be focused on the internal and external factors of pastoral vulnerability of their economies and lifestyles (chapter 1.4). This will include the analysis of the root causes of their vulnerability and their strategies to cope with them. It goes without further saying, that the location of this study, the Koh-e-Sabalan and its forelands, provides an additional challenge: the impacts of climatic changes in a high mountain environment. Thus, aspects of natural and social vulnerabilities may prove to be of equal importance.

Before going into the details of our case study, i.e. the Shahsevan of northwestern Iran, it is necessary to discuss the sometimes confusingly different definitions of terminologies closely associated with vulnerability research and to describe and justify our own choice. Besides, also the existing vulnerability concepts need a critical review in regard to our own conceptual considerations.

2.2 Definitions: choices and applications of relevant concepts

The concept of vulnerability provides an appropriate and valuable analytical tool for exploring the underlying root-causes of both natural disasters and human-induced risks and hazards and for developing sound disaster reduction policies. It has been increasingly applied to various fields such as disaster and risk management, to the effects of environmental changes and development studies over the last decades. The growing body of literature on vulnerability shares several common terminologies such as risk, hazard, vulnerability, adaptive capacity, coping capacity, sensitivity, exposure. However, there is no consensus on the meaning, the application and the interrelationships of these concepts among scholars. Several authors, e.g. Cutter (1996), Brooks (2003), Birkmann (2006) or Füssel (2007) are deeply concerned about the almost volatile usage of these terms and suggest generally applicable definitions to enhance the understanding of the concepts of vulnerability in different disciplines. In the following, the theoretical definitions for some of the relevant concepts, and their application in the context of our own research will be presented. In doing so, the author refers to K. Thywissen's valuable compilation of definitions of vulnerability's core terminologies (Thywissen 2006).

Vulnerability: Vulnerability in very general terms, refers to the "potential for loss" (Cutter 1996). However, conceptualization of vulnerability varies significantly among scholars from different disciplines and even within the same research fields (K. Thywissen 2006, pp. 478-484 with 29 differing definitions!). Wisner, Blaikie and others (2003) for instance define it as "the characteristics of a person or group and their situation that influence their capacity to

anticipate, cope with, resist and recover from the impact of a natural hazard, an extreme natural event or process". In contrast, Turner and others (2003) extend their definition to a coupled human-environment system and define vulnerability as "the degree to which a system, sub-system, or system component is likely to experience harm due to exposure to a hazard, either a perturbation, or stress/stressor."

According to Cutter (1996), many of the disagreements on the concept of vulnerability arise from different conceptual and methodological approaches applied by scholars from various schools of thought. Brooks (2003) argues that applying the notion of vulnerability to too many socio-political and hazard settings and including too many dimensions (social, economic, physical, environmental and institutional) is leading almost necessarily to a divergence in the concepts (Brooks 2003). In UNDP' Reducing Disaster Risk program, for instance, the concept of vulnerability focuses on the likelihood and the impact of hazards and refers to "a condition or process resulting from physical and environmental factors, which determines the likelihood and scale of damage from the impact of a given hazard". In the context of climate change, Adger (2006) defines vulnerability as "the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt", thus again and explicitly combining both physical and social stress factors.

According to Birkmann (2006), most approaches on vulnerability share the central idea of conceiving vulnerability as the internal characteristic of the system at risk or the "internal side of risk". Their differences are resulting from widening the concept by adding an increasing number of aspects of vulnerabilities until they represent an all-embracing and complex system of interactions and mutually dependent features (Figure 2-1).

It would go beyond the purpose and scope of this study to discuss the epistemology of the different vulnerability definitions (for details see Birkmann, ed., 2006). Instead, we do need a definition that covers the specific purposes of our study. It needs to be a definition which not only covers the aspects of climate change and its impacts on the biophysical situation of the nomads' summer and winter pastures, but - equally important! - the pressures on the

Shahsevan migratory cycles under the impacts of political constraints, economic changes and social transformations. Vulnerability of the Shahsevan nomads thus becomes a multi-faceted phenomenon in which each of the indicated components can trigger a cascade of adverse consequences to the nomadic way of life.

In line with Léon's sectoral approach to vulnerability assessment (León 2006) and Füssel's conceptual framework for climate change research (Füssel 2007) the notion of vulnerability in this study will be understood as a geographical-spatial (local to national), a sectoral-infrastructural (housing to financial) and a components dimension, "related to the various components that are included within the context of vulnerability" (Léon 2006, p. 306), i.e. structural, functional, economic, administrative etc. (Léon, ibid.): Applying these criteria and extending their validity towards the construction of a "vulnerable system", embracing a specific population group, an economic sector, a coupled human-environment system and/or a geographic region (Füssel 2007).

Applying these criteria to this study, vulnerability of the Shahsevan nomads is understand as a function of internal socio-economic and ecological factors in interaction with external ones. In this context, climate change and its consequences are part of the external biophysical factors incorporated in this research. Similarly, the external socio-economic impacts reflect the influences of state policies on pastoral nomadism, of population growth or the impacts of market economy on the nomadic households. The internal socio-

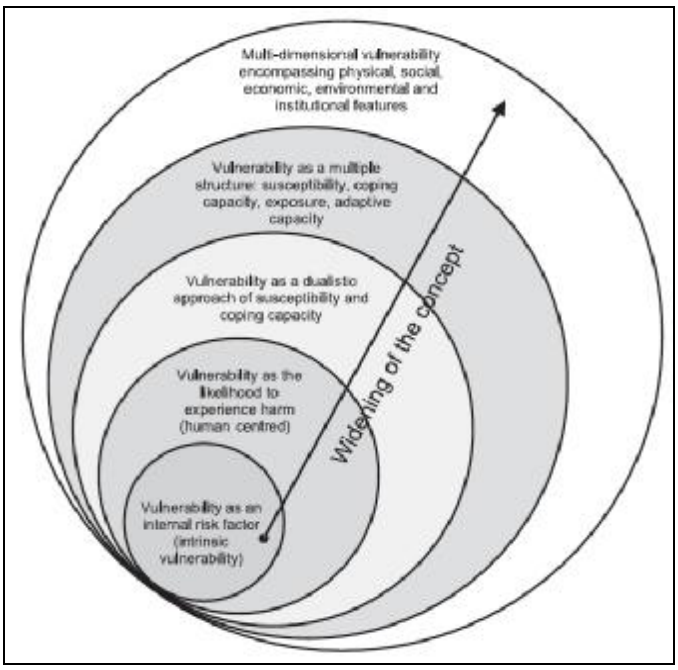


Figure 2-1 Key spheres of the concept of vulnerability
Source: (Birkmann 2006)

economic factors, on the other hand, include the sensitivity and adaptation capacity of the Shahsevan to multiple socio-political and climate stresses.

This approach is very close to the conceptualization of vulnerability as a function of exposure, sensitivity and adaptive capacity by IPCC's Third Report (2007). Therefore, the IPCC definition of vulnerability, given in chapter one of this paper, is applied to this research and will be used as a guideline for our own study. As mentioned before (chapter 1), this definition of vulnerability reads as follows:

"*the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and the variation to which a system is exposed, its sensitivity and its adaptive capacity*" (Parry et al. 2007: p.883).

However, as discussed earlier, the concepts of exposure, sensitivity and member of pastoral adaptive capacity are equally volatile as that of vulnerability. They have been defined and used by several writers in different ways and therefore need further clarification, especially in view of the fact that they are central to the concept of vulnerability.

Exposure: The majority of the vulnerability literature shares the notion that vulnerability is determined by the sensitivity of a system to hazards, the level of exposure and its capacity to cope, adapt or recover from the impact of these hazardous conditions (Adger 2006; Smit and Wandel 2006). In this context, hazard is understood as a natural event which "within a specific period of time in a given area" as a "potentially damaging natural phenomenon" (Cardona 2003), especially endangering human lives and properties. However, some scholars perceive vulnerability independent from exposure. Gallopín (2006), for instance, argues that vulnerability is a predominant function of societal sensitivity and capacity. In contrast, Smit and Wandel (2006) view exposure and sensitivity as inseparable characteristics of the exposed system (community). They conceive exposure of the system to environmental stresses, e.g. drought, as the likelihood of the system experiencing and coping with the

hazardous conditions. In contrast, exposure in Watts' and Bohle's conceptual framework refers to external socio-economic and socio-political conditions influencing people's access to resources and their settlement in hazardous places (Watts and Bohle 1993). In the same school of thought Wisner et al. (2003) perceive exposure as a socially constructed phenomenon, resulting from internal properties of people such as class, gender, and ethnicity. Finally, out of the many approaches, O'Brien and Leichenko (2000) may be referred to. They propose the notion of "double exposure" as crucial on the ground that the exposed systems (individuals, communities or ecosystems) usually face simultaneous stresses from climate change and economic globalization. Their impacts may hinder or accelerate each other. Consequently, the people may be affected negatively or positively by one or both processes. Therefore, they suggest considering exposure to both processes as a basic notion of vulnerability of any affected system.

Transferring this notion to the case of the Shahsevan, it means that exposure refers to the nature and degree to which the nomads experience multiple socio-political and climate stresses. In the other words, the exposure to climate variability and changes are examined in interaction with socio-political and economic stresses. Therefore, the notion of "double-exposure" is used to explore the interplay and synergetic impacts these stresses on the Shahsevan pastoral economy and life. These interactions are best exemplified in the case of pastoral droughts and its characteristics i.e. magnitude, frequency and duration experienced by different pastoral groups (see figure 2-4 and also chapter 3.3.3).

Sensitivity: Sensitivity is, of course, closely connected with exposure and is applicable as a reaction to both natural and anthropogenic phenomena. However, similar to other terms of a comprehensive vulnerability approach, also sensitivity is defined and used in very different ways. Adger (2006) defines sensitivity as the degree to which a system is modified or affected by perturbations. In contrast, Smit and Wandel (2006) consider sensitivity inseparable from the exposure of the system and define it as *"the likelihood of the system experiencing the particular conditions and the occupancy and livelihood characteristics of the system which*

influence its sensitivity to such exposure". In contrast, Luers (2005) defines sensitivity as *"the degree to which a system will respond to an external disturbing force".* In his perspective, sensitivity is determined by the ability of the system to resist change and to return to the prior situation after the elimination of the hazard.

Parry et al. (2007) in the glossary of IPCC's Fourth assessment report define sensitivity as "the degree to which a system is affected, either adversely or beneficially, by climate variability or changes. The effect may be direct (e.g. a change in crop yield in response to a change in the mean range or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea-level rise" (Parry et al. 2007). The working definition of sensitivity in this research refers to the characteristics of the Shahsevan livelihood system which make it susceptible to be affected by the impacts of socio-political and climate stresses and their interactions.

Adaptive capacity: In the glossary of IPCC's Fourth Assessment Report, Parry et al. define adaptive capacity as the "ability of a system to adjust to climate change, including climate variability and extremes, to moderate potential damages, to take advantage of opportunities, or to cope with the consequences" (Parry et al. 2007). This definition includes both short-term reactions to the impacts of hazard and long-term adjustments in the system, while some authors treat them separately. According to Brooks et al. (2005) the more or less synonymous term of "coping capacity" refers to the ability of natural or human systems to cope with short-run impacts of hazards. "Adaptive capacity" includes the ability to employ long-term adaptation strategies (Brooks et al. 2005). Watts and Bohle (1993) propose "adaptability" and "potentiality" as terms for addressing short-term and long-term reaction capacities respectively. While there is no doubt that the adaptive capacities of both natural and human systems are an integral part of any comprehensive vulnerability concept and thus are subject to different interpretations, we will follow throughout this paper the term adaptive capacity in line with the above quoted IPCC definition, which includes both short-range coping and long-lasting response capacities of systems to react.

2.3 Vulnerability: theoretical concepts and practical applications

Vulnerability of individuals, groups or societies as a result of multiple socio-political and climate changes is, especially in a social science perspective, a complex and closely interconnected web of causes and consequences, of challenges and responses. As such, it is accompanied by a wide range of stressors and an equally wide range of coping strategies and adaptive measures. Efforts to synthesize these partly juxtaposed approaches into a coherent theoretical concept are manifold - and they are often tailored to the demands and necessities of specific cases and vulnerability situations.

Nevertheless, several writers, e.g. Cutter (1996), Brooks (2003) and Füssel (2007) have tried to classify the theoretical approach to vulnerability analysis in three main categories namely: the "risk-hazard" approach, the "people-oriented" perspective and the integrative approach. The "hazard-oriented" approach conceives vulnerability as pre-existing conditions subject to geographical distribution of hazardous events. By contrast, the "people-oriented" perspective focus on social construction of vulnerability and the role of political, economic and social context in shaping vulnerability. The integration approach incorporates both social and biophysical root causes of vulnerability.

Risk-Hazard approach: The "hazard-oriented" perceive vulnerability system as function of proximity to hazardous location and the characteristics hazard events. It conceives vulnerability as a pre-existing condition and the system e.g. community inherit it by occupy the hazardous zones (Cutter 1996). It approach explains the causality of vulnerability by potential exposure to hazards and the nature of hazards, namely magnitude, duration, likelihood of occurrence and also sensitivity and exposure to the system of impacts of trigger events (Brooks 2003; Weichselgartner 2001). As such it is concerned with the ultimate damage of hazardous events and mostly applied by scholars from physical and natural science, engineering and hazard economists (Brooks 2003). According to Füssel (2007), the risk-hazard approach is primarily applicable to physical systems and deals with internal

biophysical vulnerability factors. Therefore, it is hardly applicable to environmentally induced causes of people's vulnerability, which is highly determined by their socio-economic situation and their individual or collective behaviour .

The people-oriented approch: The second approach to conceptualizing vulnerability emphasizes the social dimensions and views vulnerability as an internal condition of people before a trigger event (Brooks 2003; Cannon 2000). Therefore, this approach has also been interpreted as the result of a social construction of vulnerability with a special focus on social, political and/or economic root causes. Thus, it may not be surprising that the people-oriented approach has also been termed differently by several scholars: e.g. "political economy" by Füssel (2007), "human ecology" by Adger (2006), "social response" by Cutter (1996) or "social vulnerability" by Brooks (2003). In this tradition, "social vulnerability" refers to all internal attributes of the system, independent of hazard, which mediate the impact of trigger events (Brooks 2003). In all perspectives, vulnerability is viewed as the inability of people to cope with and adapt to external stress (Adger and Kelly 1999). Therefore, exploring the socio-economic and political factors checking the people's capacity is central to this approach.

Integrated approach: Several efforts have been made by scholars, i.e. Cutter (1996), Turner et al. (2003) to combine the socio-economic dimensions of vulnerability with their exposure to external hazards. In order to achieve an integration of both natural and social vulnerabilities, Cutter (1996) proposes a "hazard of place" model, which takes geographic areas as units of analysis (an equivalent to the "vulnerable system" of Füssel, 2007). She argues that potential impacts of hazard in any location are filtered by both socio-economic settings, e.g. people's experience with hazards and their response capacity, and geographical contexts such as the proximity to hazards. Therefore, vulnerability of any place and its people is conceptualized as a function of social vulnerability in interaction with biophysical stresses (Cutter 1996). However, it can be argued that the internal interactions of social and biophysical factors are somehow downplayed in this model. In fact, the biophysical and social

vulnerabilities are perceived independent of each other and can be evaluated in parallel processes or individually.

In contrast, Turner et al. (2003) suggest a model in which vulnerability is understood as a "coupled human-environment" system exposed to hazards and conceptualized as a function of exposure, sensitivity and resilience, as outlined earlier by Cutter (1996). The model integrates the social and biophysical conditions and processes affecting the vulnerability of the coupled system at different scales. The exposure of the system, for instance, includes internal features of both the ecosystems (soil, water, flora etc.) and the society, e.g. political organization, economic activities vis-à-vis ethnicity. It is the simplicity of this approach, which nevertheless covers the complexity of natural and social phenomena and their interactions in regard to the development of vulnerabilities, that makes it attractive for our own theoretical and conceptual considerations. Arguing from a predominantly geographical perspective, Turner et al. (1995) give it a specific focus by adding spatial dimensions of analyses (households, landscapes, regions).

In view of the fact that many integrative approaches to vulnerability assessments have ended up with a "catch-all" concept, trying to include almost every possible dimension and aspect, several scholars raise concerns over a declining practical implication of the concept. Thus, Wisner et al. (2003), for instance, assert that "*the term vulnerability (and its associate, vulnerability analysis) has been appropriated for use in such a wide range of situations that (like 'sustainability') it is in danger of losing its significance in relation to people and hazards. If 'vulnerability' becomes a catch-all term for any aspect of conditions related to disasters, then it will lose its analytical capacity (Wisner et al. 2003: p. 55)*". Therefore, they suggest applying the concept of vulnerability exclusively to the people and use "unsafe", "fragile" and "hazardous" as characteristic terms for the vulnerabilities of their economy, environment, buildings and location. It is in line with these considerations that our own conceptual framework for the study "Pastoralism under Pressure. Nomadic vulnerability to multiple climate stresses and socio-economic changes" will be based upon (chapter 2.4). Referring

especially to Turner et al. (1995, 2003) and to Wisner et al. (2003) and Bohle (2001) this research try to modify existing theoretical considerations and develop a conceptual framework that meets the specific challenges, demands and problems of the Shahsevan nomads.

2.4 Vulnerability in nomadic high mountain environments

As has been discussed so far, numerous conceptual frameworks have been developed in the past to capture various aspects of vulnerability. This research builds on the existing conceptual framework, however, adapting it to the specific needs of our study. These are, among others, that our research is concerned with the vulnerability of Shahsevan pastoral nomads and their livelihoods. To the best of the author's knowledge there are hardly any in-depth studies on nomads, based on recent data of regionally measured climate data and on field research with a focus on the nomads' perception of climate variations and their reactions to potential changes. It is this combination of change of the natural conditions and obvious political and socio-economic pressures that constitutes the very essence of this study. Consequently, the research adopts an integrative approach with a special emphasis on social vulnerability. The research further recognizes the importance of analyzing historical root causes of nomadic vulnerability and in formulating sound policies and measures for enhancing the adaptive capacity for coping with and adaptation to climate stresses and shocks in the future. Thus, it will include a strong historical component.

Finally, the research views pastoral nomads as active agents who demonstrate significant flexibility in response to external socio-economic and environmental pressures. Therefore, the "internal" and "external" sides of their vulnerability will be discussed on the basis of our theoretical and conceptual approach as outlined in figures 2-4.

Starting point of this research's deliberations on a theoretical and conceptual approach are two models that are closely related and have been suggested by Wisner et al. (2003). The

Pressure and Release (PAR) model, as represented in figure 2-2 would be a possible option to conceptualize the interacting nature of socio-political and climate stresses in shaping the vulnerability of pastoral nomads. It is an intriguing approach in so far as it represents a progressive sequence of causes that finally lead to such a degree of vulnerability that only slight causes can trigger irrevocable processes, a potential disaster or collapse of the systems under review. The attempt to fill the initial three steps of progressive vulnerability - the root causes, the dynamic pressures and the unsafe conditions - with Shahsevan-related experiences exposed to a triggering event, figure 2-2 shows the potential validity of the PAR model for our own study.

Central to the PAR model is the notion that individuals or societies are being increasingly

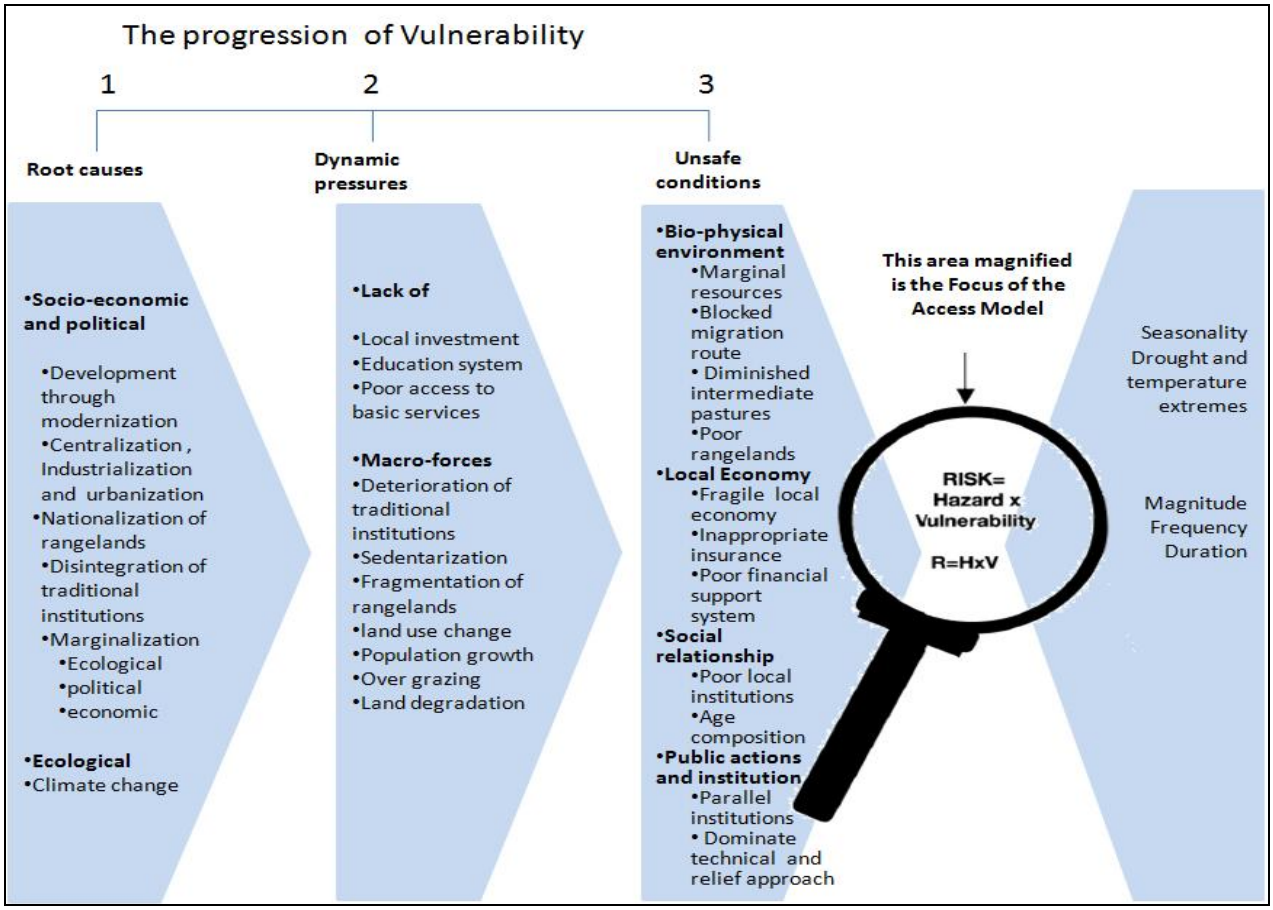


Figure 2-2 PAR model and its applicability to the situation of Shahsevan pastoral nomads
Source: (Wisner et al. 2003)

under pressure by two opposing forces: the processes shaping vulnerability of people on one side and the impacts of hazard events on their life on the other side, in our case e.g. an unexpected hazard like a drought or temperature extremes, aggravated by frequency or duration (figure 2-2). In such a case, the disaster reduction policies have to focus on releasing this pressure by reducing vulnerability. The model demonstrates the vulnerability process starting from generic "root causes" influencing the political and economic system and leading to the "dynamic process" which are contemporary manifestations of root cause which in turn channel the root cause into a hazard-specific "unsafe condition".

The Access model, on the other hand, amplifies the interaction of the growing vulnerability process with the impact of hazards at the household level (figure 2-3). The center of this model, as shown in figure 2-3, is the households livelihoods (Box 1) which on the one hand, is exposed to unsafe conditions (Box 2) resulting from the progression of vulnerability. On the other hand, it is exposed to trigger events such as drought conditions (Box5). The political economy shapes the household's social relationships at different levels (1a and 1b). The trigger events will influence both the households and their social relationship (Box 6). Based on available resources and capacities the household will make necessary decisions in form of reaction, coping, adaptation (Box 7) and will prepare itself for the next disaster (Box 8).

The combinations of these two models brilliantly demonstrate the role of two opposing socio-economic pressures and trigger events in shaping the vulnerability of individual households. However, there is a major shortcoming in these models for capturing the whole complexity of vulnerability of pastoral nomads to multiple socio-political and climate changes. The models in fact, treat the hazardous events entirely independent from the socio-political setting and underplay the influence of society on the nature of climate hazards. The characteristics of pastoral drought, for instance, as discussed earlier are shaped by three main factors namely the meteorological drought, market failure and socio-economic drought and finally the management of rangeland resources and its impact on quality and quantity of available land and water resources.

On the other hand, the changing environmental and climate change conditions are further changing the nature of climate stresses including climate extremes and drought which are insufficiently reflected in these models.

The research therefore, intends to follow Wisner et al.'s (2003) designs in analyzing the Shahsevan vulnerability to both societal and natural stresses and suggest to reorganize and to restructure the components of both the PAR and the Access models. In doing so, it further takes in to account Turner et al.'s caution in regard to the PAR model because of its insufficient comprehensiveness "for the broader concerns of sustainability science" (2003, p. 8074) and taking into account a potentially much broader approach to vulnerability analysis (ibid., pp. 8075).

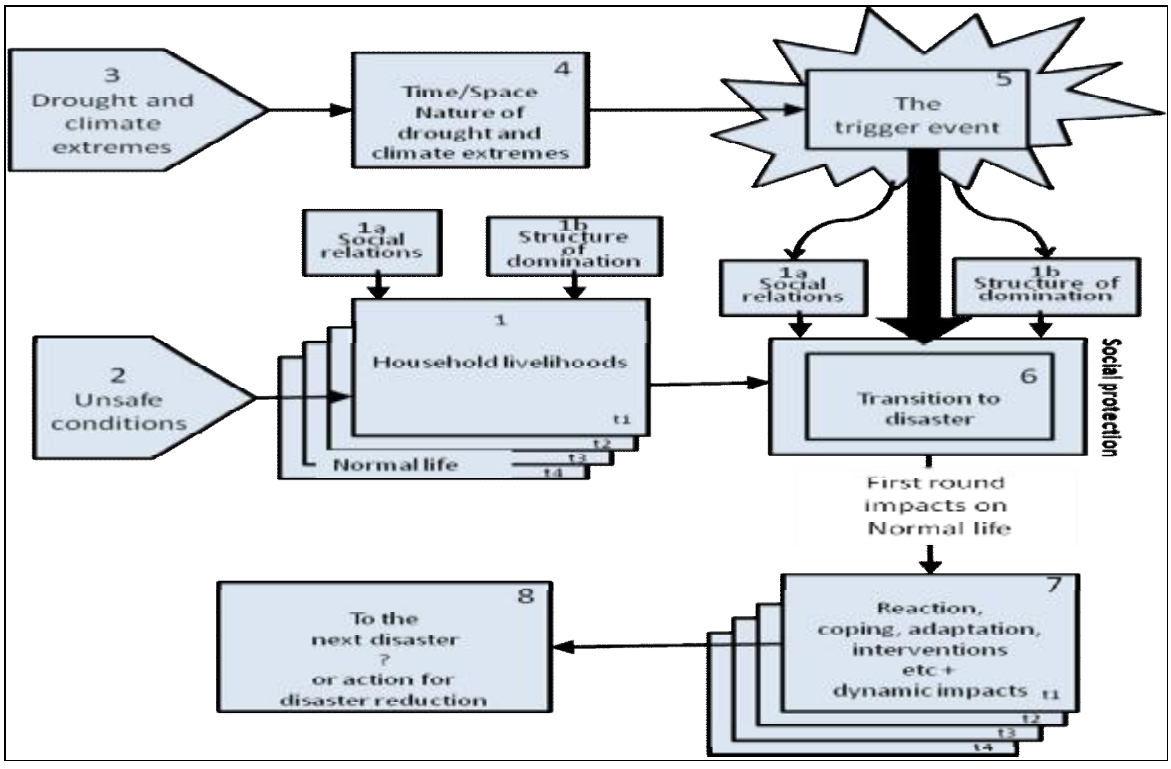


Figure 2-3 The access model amplifies the interaction of the growing vulnerability process and the impact of hazards at the household level
Sources (Wisner et al. 2003)

While this restructuring is surely not to be understood as a new theory, it is still a new methodological conceptualization. The differentiation of the external and internal sides of vulnerability, the juxtaposition of socio-economic and political stressors within the external side and that of sensitivities and adaptive capacities as expressions of the Shahsevan coping and adaptation strategies and the close interactions of all these factors: those are the intentions of our methodological conceptualization of the study.

Figure 2-4 gives an outline of these considerations. The exposures to the socio-economic pressures of an increasingly globalizing world and the impacts of political changes date back well into the 20th century and are summarized under the heading "Legacies from the past". They are accompanied and aggravated by the "dynamic pressures" of national and international pressures on pastoral economies (see also Kreutzmann, ed., 2012) and nomadic lifestyles. Past and present exposures to these pressures are negatively counterbalanced by the obvious effects of dramatic climate changes, that are especially efficacious in the ecologically fragile environments of the mountainous areas of the Near and Middle East. An in-depth analysis of these double exposures of the Shahsevan is the focus of the following chapter 3 of this study.

In contrast to these external expressions of vulnerability the nomads' sensitivities and proven adaptive capacities represent the internal "reactions" to the dangers of vulnerability. They are based on a wide range of socio-economic and social resources, but also on the nomads' proven expertise to use natural and physical resources as means of their survival strategies. Of course, sensitivity and adaptive capacities are closely interwoven and dependent on each other. But they are also directly or indirectly connected with the nomads' long-standing experiences of political and other pressures that have been part of their lives for centuries. These intricate interactions will be dealt with in detail in chapter 4 (cf. fig. 2-4).

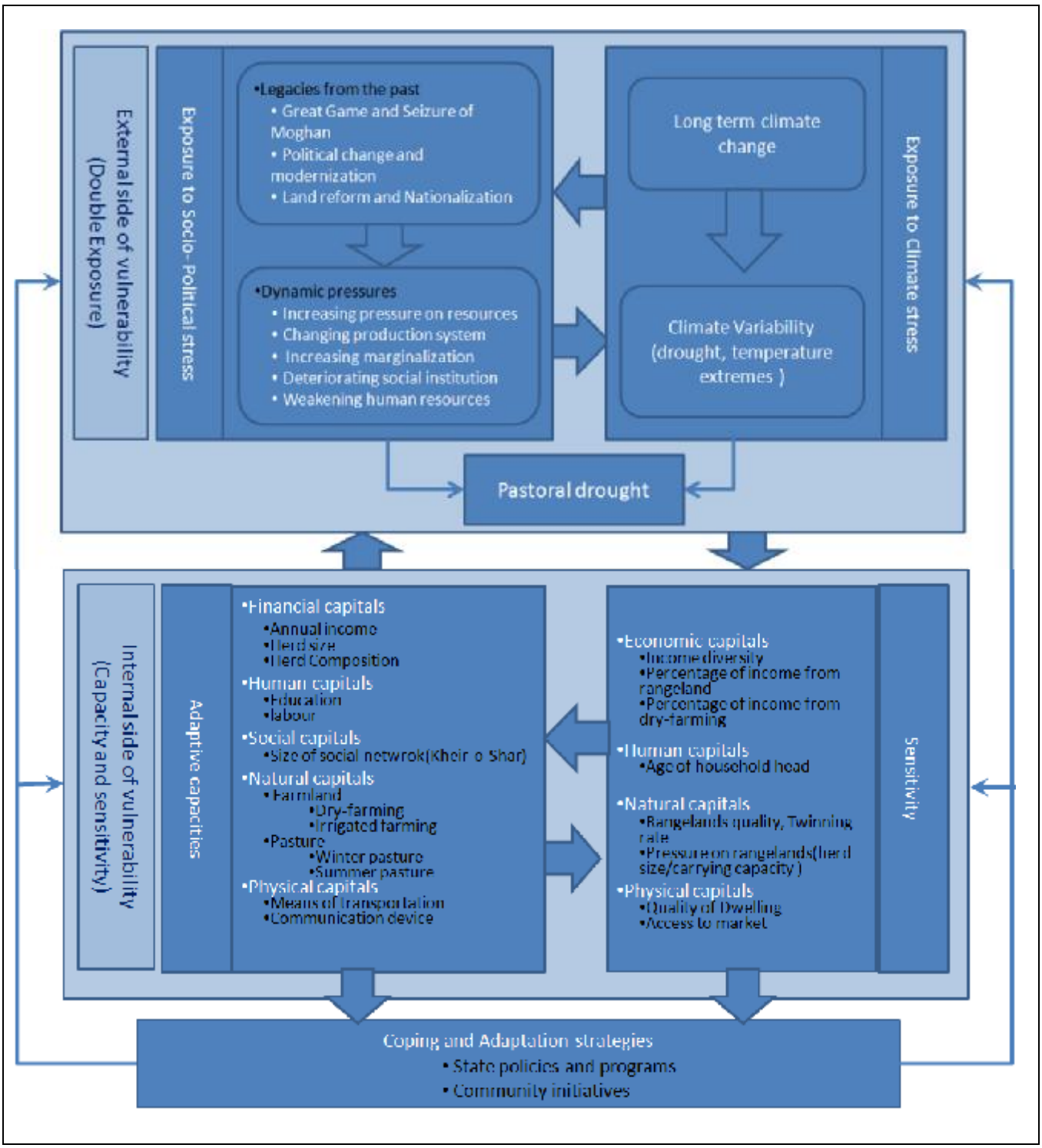


Figure 2-4 Conceptualization of vulnerability of Shahsevan pastoral nomads to multiple socio-political and climate stresses

Turner et al. (2003) have stressed that vulnerability analysis for sustainability does have to develop new tools for decision-making and formulate malleable guidelines for response options (Turner et al., p. 8078). Although it may be difficult to achieve such goals in a general and broadly applicable way, the final chapter of current study will focus on these recommended actions. Taking into account the very recent publication edited by H. Kreutzmann (2012), an attempt will be made to transfer the results of Shahsevan study into a broader perspective. There are two foci of such an attempt: First, a comparison of the Shahsevan's experiences with those of other nomadic tribes in Iran. Although existing data may be scanty, nevertheless it should be worthwhile to try such an approach. Second, to embed Iranian high-mountain nomadism into the broader perspective of pastoral practices in Central and High Asia, knowing that such a broadening, widening and deepening comparison may be questionable for a number of reasons.

Chapter Three

Double exposure to socio-political and climate stresses

3.1 Introduction

The impacts of political and socio-economic changes on pastoral nomadism have been examined by several scholars in different cultural contexts and with different foci of problems. Apart from the recent collection of articles on Central and High Asia (Kreutzmann, ed., 2012) one may point additionally to the study by Ning and Richard (1999), who explored the influence of the rangeland privatization process on the pastoral dynamics in the Hindu Kush area of Afghanistan; the impacts of governance on poverty of pastoral nomads were studied by Tache (2008) in Borana of southern Ethiopia. Other authors, e.g. Næss (2003), Chuluundorj (2006), Ordini et al. (2007) studied the impacts of climate stresses on pastoral livelihoods in Tibet, Mongolia, and Kenya. However, only a few studies have addressed the simultaneous exposure of pastoral nomads to both socio-political and climate-related stressors. In other words, our knowledge of the combined impacts of climate stresses and socio-economic and political pressures on pastoral nomads is very limited. This study, therefore, will focus on the concept of "double-exposure" as proposed by O'Brien and Leichenko (2000), who - on their part - rely on a number of earlier studies as outlined in the chapters 1 and 2 of our own study. Thus the following examination of the nomadic exposure to both political and socio-economic stressors, on the one hand, and to the impacts of climatic variations in a high-mountain environment, on the other, is to be seen as an innovative attempt to examine the close interactions between nature and society under extreme conditions.

From a societal perspective, there are two aspects of special importance: the slow but permanent deterioration of nomadic power and economy by political interferences and by the consequences of social change, a development originating in the late 19th and early 20th

centuries. These negative trends, valid for all Iranian nomads and for pastoral societies in general, are exposed to additional stressors as a result of the globally observable climatic changes during the last decades, as amply illustrated and discussed by the recent reports of IPCC and other international studies.

3.2 Exposure to political and socio-economic stresses

The political and economic power of pastoral nomads in Iran has faced a significant decline over the last two centuries. In former times, their military and economic advantages over sedentary life were used as the foundation stone of several dynasties e.g. Safavid (1502-1736), Afshar (1736-96) or the early Qajar (1796-1925). The tax collected from nomads on livestock and pasture was a major source of government income. Armed tribesmen shaped the main body of state military forces. In fact, the socio-political institutions of several tribal confederations, e.g. the Shahsevan of Azaraijan or the Khamseh of Fars region, have been formed for defense and security purposes (Tapper 1997). The nomads, on the other hand, had significant military power and political authority to negotiate with regional and central governments and to influence their decisions. However, a combination of historical processes and contemporary pressures has been significantly restricting their access to power structures and resources; loss of political influence and decrease of military power are almost ubiquitously decisive factors for the slow decline of nomadism and their predominantly pastoral economy.

3.2.1 Legacies from the past and underlying root causes

The historical landscape of the Shahsevan political and social life has been brilliantly portrayed by Richard Tapper (1997) in his book entitled “The frontier nomads of Iran.” In the following, the historical root causes of their vulnerability will be presented, mainly based on the interpretation of Tapper’s work as well as on the basis of his earlier study “Pasture and Politics” (1979). While these historical reconstructions, covering the years until 1965, have to

rely on the existing scientific literature, the more recent problems of the Shahsevan, such as increasing pressure on their resources, competition over land and grazing rights, shifting production systems and increasing economic marginalization, will be elaborated on the basis of primary and secondary data collected in this research.

3.2.1.1 The Great Game and the seizure of Moghan pastures by Russia

The Shahsevan socio-political institutions have been drastically influenced by the rivalry between British and Russian empires for supremacy over Iran. The Russians had always been eager to extend their territory to the Caucasus region. In 1804, their troops occupied the Khanat Ganjeh and marched to Erevan. The Qajar rulers were very furious not only about the territorial losses, but also about cruelties being committed among Iranians in the occupied regions. Several religious leaders, i.e. Mola Mirza Khoie, declared jihad for recapturing the lost areas. Nearly 20,000 fighters, including Shahsevan, joined the Iranian army for the first Iran-Russia war. However, the Iranian troops were very poorly trained and technologically backwards in comparison to their Russian opponents. The government, therefore, relied on military advisors initially from France and then from Britain. These friendship treaties, however, did not last long, and both the French and the British stopped their military assistance to Iran soon after their coalition with Russia in 1807 and 1812 respectively. Thus the Iranian forces were defeated in the Asladoz battle in 1812 while the government faced simultaneously several internal rebellions from Turcoman tribes in Khorassan. Weakened by military defeat in the Caucasus and by nomadic uprisings within Persia the peace treaty of Golestan was signed in 1813. Persia had to cede Georgia, Darband, Baku, Shirvan, Ganjeh as well as the Karabagh part of Talesh and Moghan to Russia. Only Erevan and Nekhchevan remained under Persian rule, but only to be annexed by Russia in the Turkmanchay treaty of 1828 as a result of the renewed warfare with the southward expanding Russian Empire. For the Shahsevan it meant the loss of great parts of their traditional winter grazing grounds, altogether an area of almost 300,000 hectares. Although the Shahsevan showed strong

resistance against the losses of their grazing rights inherited by their ancestors and exercised for several centuries, the majority of them were transferred to Iranian territory. Initially permitted to cross the new frontier and to utilize some parts of their former grazing lands in Russian territory, the tribe as a whole had to be reorganized in order to meet the challenges of reduced grazing grounds, of new migrational patterns and the development of new neighbourhoods with the population of the Koh-e-Sabalan region and their political and administrative institutions. The fact that nearly two thirds of the Shahsevan had been camping in Russian domain in the mid-nineteenth century and the necessity of their reorganization in spatial terms became one of the main reasons of additional mistrust between the Shahsevan and the central government. Their contributions to the state military force, for instance, declined rapidly. Vice versa, the government policy in regard to Shahsevan changed. Instead of unifying them under one dominant *Elbey*, the Qajar government started to recognize and support every individual tribe, taking advantage of their mutual rivalries and intrigues. In the meanwhile, the colonization process of the newly gained steppe region was accelerated by the Russians, which led to growing conflicts and bloodshed between Shahsevan and the new colonists. By increasing pressure from Russian administrations, several efforts were made by local and national authorities in the 1860s and 1870s to stop Shahsevan migration to the Dasht-e-Moghan and to force them to settle down. Finally, in 1884, the frontier was closed and those who crossed the border were returned violently. Their properties and herds were seized, several nomads were killed by Russian officials. Similarly, the disobedient tribes, such as Polatlu and Qoja-Beyli, were strictly punished by the local governors, i.e. by Mostafa-qoli Khan, Mir Panj and Asadollah Khan Vakil al-Molk, nominated and appointed by the Russians. Their chiefs were killed and several notable Shahsevan were imprisoned on charges of accusations of robbery and raiding.

By the closure of the Russian boarder to Shahsevan, the nomads totally lost access to their traditional pastures in the northern Dasht-e-Moghan. They were compelled to squeeze their large flocks, estimated at 1.5 to 2 million sheep and goats and nearly 100,000 head of larger animals, into the comparatively small part of the Iranian Dasht-e-Moghan (cf. also Schweizer

1970). The Shahsevan therefore faced severe economic crises due to forage and water scarcity, and their animal production declined significantly. Their herds suffered from insufficient forage and nutrition and lost strength so that a large number of animals perished during the heavy winter months and drought periods, e.g. in 1888-9. Furthermore, the number of their larger animals (camels, horses and cattle) dropped significantly due to the poor pasture conditions on clay soils and the rocky hills of Khoroslu and the southern Moghan (see Schweizer 1970, map 3). Another serious consequence of the closure of the border was the loss of the Shahsevan access to Russian markets in Salyan and Lenkoran for selling their livestock production and products as well as buying various merchandise like grains, firearms and ammunitions.

The movement of Shahsevan tribes to southern Moghan had different economic impacts on individual tribes and thus provided the ground for further socio-political changes of the Shahsevan nomads as a whole. Especially the new delineations of their winter pastures after the closure of the border and the problems of new access rights to alternative resources such as farmland caused internal unrest. The majority of Ardabil tribes, for instance, had their winter pastures on the Russian side of Moghan and owned farmlands around Ardabil. Therefore, most of the Ardabil nomads settled in their villages. The Meshkin tribes, in contrast, had most of their winter pastures in Iranian Moghan and held very few agricultural lands. Thus, they decided to continue their migratory lifestyle. Meshkin *khans*, however, were mostly settled down in this process with the consequence that they lost their control over their tribes. The tribesman, therefore, followed new leaders who could guarantee their access to pastures and protect them from invaders and other competitors over their newly assigned territorial resources.

These internal struggles over the increasingly scarce resources like forage and water, particularly in heavy winters or drought periods, caused, for instance, continuous struggles between the Hajji-Khojalu and Qoja-Beyli tribes. Main reason for these animosities was the reduction of the Hajii-Khjalu's extensive pasture in Aslanduz in favour of the Qoja-Beyli tribes.

The seizure of most of the Moghan pastures by Russia contributed, however, not only to nomadic unrest and in-fighting between different Shahsevan tribes over their remaining pastures and territories. It also stirred cross-border conflicts. The Russians took advantage of the Shahsevan riots for justifying the occupation of Iranian territory and forcing the government to sedentarize the nomads. Therefore, they apparently supported the Shahsevan uprisings by supplying them with arms, offering them refuge when pursued or negotiating for their release whenever they were captured or imprisoned. By the acceptance of the increasing influence of Russians in the region, the Iranian government on its side adopted the divide-and-rule-policy on Shahsevan to prevent their unified revolt by recognizing the distrust and disunion of the Shahsevan tribes and allowing them mutual plundering and robbery as well as internal fights over land, water and even over family affairs. Consequently, the Shahsevan historically based and genealogically founded hierarchical traditions and the delineated authority of their *khans* have been gradually replaced by new structures. Instead of noble descent, historical traditions and genealogical inheritance, new forms of leadership developed. Known as *Khankhanliq,* these new forms were derived above all from command and control over pastures, wealth and martial advantages and political and territorial coalitions with other tribes (for details see Tapper 1979). In retrospective one must state that this era was characterized by permanent Shahsevan rebellions throughout the region and continued until the early twentieth century when the nomads were disarmed and "pacified" by Reza Khan.

In regard to our specific topic: It is obvious that the outcomes of the Great Game between Czarist Russia and the British Empire had enormous consequences in political and socio-economic terms for the Shahsevan society. Its territorial rights were diminished. Tribal unity - if it ever existed - was in turmoil not only in regard to its political and military power, bur even more so over land and water. The control over these basic resources of any nomadic society and economy was in disarray. New and generally accepted forms of unity and cohabitation could not develop. This situation at the turn from the 19th to the 20th century therefore, must

surely be seen as one of the preconditions and root causes of the Shahsevan social and economic vulnerability.

3.2.1.2 Political change and modernization

The political change in the early twentieth century and the replacement of the Qajar dynasty by Reza Khan and the establishment of the Pahlavi regime had radical influence on pastoral nomadism in Iran. The nomads exercised a relatively autonomous life due to a comparatively loose and indirect control by the Qajar dynasty. Reason for this lack of control was the dilapidated state of the Qajar government, which had problems not only with the maintenance of national law and order, but which was also more or less penetrated by advisors and controllers of foreign powers (Shuster 1912). As long as taxes were paid and soldiers detached to the governmental army, nomads in Iran in the beginning of the 20th century were more or less unmolested by the central government.

This situation changed with the fall of the Qajar dynasty by Reza Khan, commander of a Cosack brigade in Tehran. Reza Khan became war minister in 1921, deposed the last Qajar ruler in 1925 and established the Pahlavi dynasty in 1926. His aim was to unify Iran and to create a modern independent country. In this context he regarded the military and political power of pastoral nomads as a major threat for the unity of the country. Besides their traditional lifestyle, customs and culture were considered as backward, a barrier for modernization of the country and needed to be replaced by modern values. Furthermore, the discovery of oil as a new source of national income reduced the government's reliance on taxes paid by nomads. In line with his modernization policy and convinced that nomadism is not only an outdated way of life, but also an obstacle to the social and economic development of Persia, Reza Khan was decided to eliminate nomadism in the country completely. He undertook two main programs to achieve these goals: the "pacification" of all nomads and their "forced sedentarization".

Scientific literature on the sedentarization processes of Iranian nomads is plenty. And it reveals the very often brutal execution of this settlement policy (see e.g. Garthwaite 1983 on the Bakhtiari; Black - Michaud on Luristan tribes; or Oberling 1974 on the Qashqai, to name just a few) . But also the sedentarization of the Shahsevan and its consequences have received detailed attention by the studies of Tapper (1979, 1997). In the first phase of Reza Khan's oppression of nomadic power and lifestyle, the rebellious Shahsevan were heavily suppressed and disarmed. Their chiefs were imprisoned or executed. An army officer was appointed for establishing political security and order among the Shahsevan tribes. These measures, however, had initially and surprisingly positive impacts on the Shahsevan pastoral economy. The region experienced an enormous boost in security, and both animal production and crop cultivation flourished for nearly one decade. Although the inherited tribal hierarchal organizations were eliminated and although many chiefs lost authority over their *taifeh* and *tireh*, those *khans* that cooperated with government officials continued to serve as mediators between tribe and Tehran. It was them that retained control over their properties and thus produced considerable revenue.

The compulsory sedentarization process, however, had more drastic influence on the Shahsevan. It started after the occupation of the Peacock throne, the proclamation of kingship and the establishment of the Pahlavi rule in 1926. Nomads were forced to abandon their migration, to quit traditional lifestyles and to adapt to agricultural life. As a consequence, there was a drastic decline in animal husbandry, so that after a few years only one or two persons from each family were allowed to accompany the herds as shepherds and to take sheep and goats for grazing in the *yaylaqs*. Nonetheless, the majority of their daily activities such as milking and dairy production required contribution of all family members. Altogether, one has to state that the sedentarization policy of Reza Shah (1926-1942) was neither carefully planned nor economically and socially feasible under the given circumstances. Its brutal enforcement was not only connected with losses of human life, but also with severe setbacks for pastoral production and productivity. Thus, it is not surprising

that the enforced settlement scheme was considered as a failure and the Shahsevan restarted their migratory lifestyle after Reza Shah's abdication.

As a result of the Reza Khan/Reza Shah era, one has to state that the first half of the 20th century provided another series of catastrophic events for the Shahsevan nomads. Like for all other Iranian nomadic tribes, sedentarization, loss of traditional pastures, enforced agricultural activities and intentional disruptions of their traditional social order mark a second mortgage or root cause that the Shahsevan as a predominantly nomadic society have never been able to cope with.

3.2.1.3 Land reform and nationalization of rangelands

The Land reform and nationalization of forests and rangelands were part of the Shah's White Revolution program launched in 1962. It limited the ownership of farmlands to the maximum of one village or parts of several villages equal to the arable lands in one village. The landlords, therefore, were obliged to sell their remaining lands to the government to be transferred to the peasants. Although the reform led to a redistribution of farmlands and ownership of millions of landless peasants, it caused a drastic decline in livestock and agricultural production. The land-owning classes, including the tribal chiefs, merchants and government officials who used to invest their surplus in farming or animal rearing, transferred their capital to the cities, investing in urban properties such as building plots, urban housing and speculative urban infrastructure and services. Both rural and pastoral economy declined severely (Hojat 2006).

By the nationalization law of rangelands, on the other hand, all forests and rangelands, nearly 85% of the country, including those owned by pastoral nomads, were considered as state properties. Nomads who had bought Crown land (*khaliseh*) mostly at the end of the nineteenth century, lost their property rights and their ownership of pastures. Instead, the tenants and shepherds were recognized as the new legal holders, and grazing licenses were

issued on their names. Landowners who faced difficulties in retaining their properties, tried to transfer their rights either to family members or to other nomads, preferably of their own tribe. This in turn caused serious conflicts between the old landlords, shepherds or tenants and the new title-holders. Both land reform and nationalization of Iran's rangelands caused unprecedented turmoil not only in legal terms, but also in form of social unrest, protests, local and regional uproars and even bloody conflicts. While the whole amount of these disputes was never discussed publicly under the Shah's rule, its whole magnitude became evident after the Islamic Revolution of 1979. By 1991 there were more than twenty million court cases. They forced the authorities of the government of the Islamic Republic to invalidate all grazing permits granted since the nationalization of rangelands in 1963 (Shahbazi 2008).

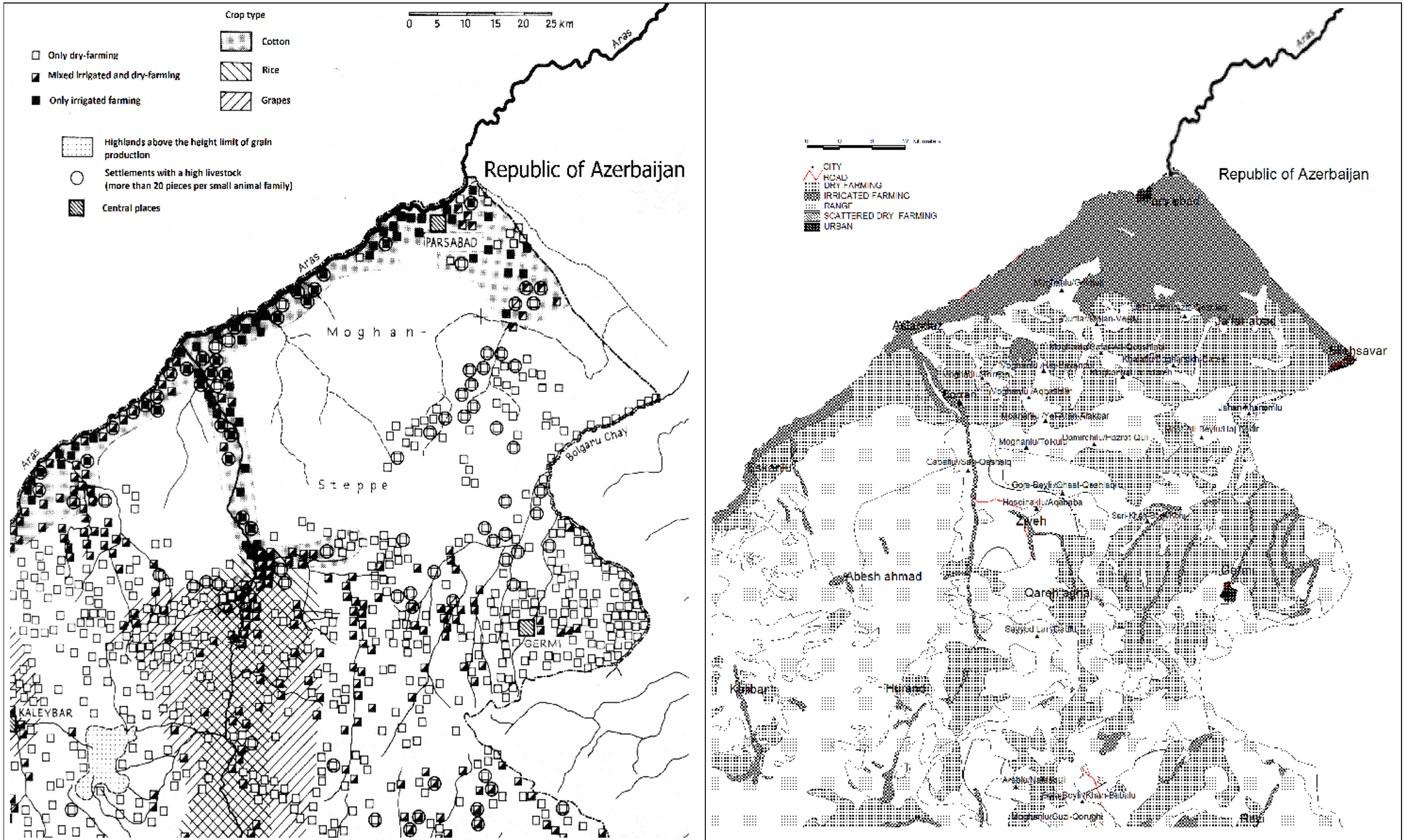
The nationalization process not only caused bureaucratic and administrative chaos. It also led to a degradation of rangelands on several grounds. First, the nomadic traditional ownership and management system, in which the landlords or tribal chiefs were carefully monitoring the number of animals and grazing periods, was destroyed and replaced by bureaucratic and centralized administrations. The forestry organization (*Jangalbani*) was established for the implementation of the nationalization law. Its tasks should include the supervision of a sustainable exploitation of rangelands by issuing grazing permits according to the ecological carrying capacity of the pastures. The grazing licenses and the number of animals allowed to graze on each pasture were supposed to be revised annually. However, the *Jangalbani* organization lacked the capacity, resources and skills to fulfill such a demanding and challenging task, which, by the way, could not have been done without the intimate knowledge of the nomads anyway.

Besides, by the nationalization of the rangelands, thousands hectares of pastoral lands were converted into agricultural lands and handed over to cooperative or private companies. In the Dasht-e-Moghan alone, nearly 90,000 hectares of the Shahsevan best winter pastures were converted to farmlands. Over the last five decease, nearly 30-35 thousand hectares of these

lands were allocated for sedentarizing the nomads and the rest was transferred to agro-industrial companies (Fakhraee 2000). Schweizer (1970) has documented these processes in their early stages in great detail and given - at the same time - interesting insights into the settlement and sedentarization process of the Shahsevan and the consequences for their traditional social structure.

Map 3-1 is presenting two comparative land use maps of Dasht-e-Moghan in 1970 and 2003. The first map is taken from the study of Schweizer on Shahsevan pastoral nomads in 1970. The second map is produced from the synthesis of studies on Integrated agricultural Development Plan of Ardabil province by the Agricultural Planning Economic and Rural Development Research Institute (APERI) of Iran in 2003. Although the first map lacks the detailed information on the area of each land use type, the comparison provides revealing insight into the decline in the amount of Shahsevan winter pastures as results of agriculture extensions. As can be seen from these maps the irrigated farming has been expanded vastly in the northern part of Dasht-e-Moghan while the expansion of dry-farming can been seen almost everywhere.

Transfer of pastoral lands into agriculturally productive areas in turn increased the stocking rate and grazing pressure of livestock on the remaining roughly 150,000 hectares of winter pastures (Gasemi 1998). Furthermore, since farmlands were considered as private properties and as they were exempt from the nationalization law, the only option for securing their rights on traditional pastures was to change most of their remaining pastures into farmland too. Despite the limited farming potential of their rangelands, many Shahsevan converted the best parts of their pastures into dry-farming, hoping that they could get their land be registered on their name. From the *Jangalbani* perspective, however, land-use changes were strictly prohibited, and trespassers could be prosecuted by the law.



Map 3-1 Comparative land use maps of Dasht-e-Moghan in 1970 and 2003.
The map on the left side is taken from Schweizer study on Shahsevan in 1970. The second map on the right side is produced from the results of APERI(2003) study on Integrated agricultural development plan of Ardabil province.

Finally, the land reform and related nationalization law of 1962 aggravated the negative trends of the pre-World War II period in regard to a rapidly deteriorating situation for the Shahsevan in political and social terms. The tribal chiefs lost their remaining authority over grazing rights and farmlands owned in the villages. Consequently, their traditional rights, for instance for the management of rangelands, for migration or for decisions concerning extent and timing of grazing periods etc., were totally undermined and replaced by competition and rivalry of individuals over access to and utilization of rangelands.

In our methodological conceptualization we argued that the vulnerability of nomadic groups in general, of the Shahsevan in particular, is influenced by a number of internal and external factors. Among the latter ones, exposures to political and socio-economic changes are of special importance. And they are not only exposures to present-day stressors, as will be seen in the following chapter, but they do have deep roots in any society's past. This holds also true for the Shahsevan.

In summarizing our admittedly rough survey of the historical root causes of the Shahsevan present-day vulnerability, we have tried to show that there were three decisive historical developments and their impacts that have contributed to a steady destruction of the Shahsevan social and economic structures since the late 19th century:

- The outcomes of the Russian-Persian wars affected the tribal economy of the Shahsevan in a very dramatic way in so far as large tracts of their traditional grazing lands were ceded to Russia and were lost for the Shahsevan nomads. Thus, the new and increasingly impermeable borders between Russia and Persia not only diminished the economic basis of the nomads, i.e. their vital grazing grounds, but also their social coherence by breaking up familiar and tribal orders through the new frontiers (cf. Tapper 1997).

- While the Shahsevan managed to reorganize their social and economic orders at least in part, the fall of the Qajar dynasty and the ascension to the throne of Reza Shah/Reza Khan from 1925 onwards caused a second and equally serious blow to the nomads. Its main

consequences were brutally enforced sedentarization processes and a politically intentional weakening of their political and military power. The governmental encroachment on the Shahsevan became especially felt by its interference with the inherited political and social order of the nomads: executions, imprisonment and arbitrary inaction of new leaders and hierarchies added to the growing insecurity of the tribe.

- Hardly recovered - at least in part - from the pre-World War II impacts on their traditional lifestyles, the nomads of Iran suffered a new dramatic setback by the consequences of the so-called "White Revolution", i.e. the land reform measures of 1962 onwards and their associate nationalization of rangelands. Again, it hit the Shahsevan - like all nomadic tribes of Iran - hard: additional losses of natural pastures in the Dasht-e-Moghan, renewed sedentarization measures and other consequences that are part of the present situation of the Shahsevan.

Our review of the historical root causes of the Shahsevan exposure to external aspects of their present-day vulnerability shows an increasingly felt burden of the past. An objective assessment of the three most important interferences by the state - not to speak of the many minor ones - has to conclude that none of them stands alone for itself. On the contrary: the burdens and legacies from the past have steadily accumulated their negative consequences for the Shahsevan society and economy and thus set the frame for today's situation. The contemporary dynamic pressures, under which the nomads live and exist today and which will be analyzed in more detail in the following chapter, are heavily due to a severe burden of the past.

3.2.2 Contemporary dynamic pressures

The negative impacts of the past, i.e. the permanent and accumulating pressures on the Shahsevan, their social order and their traditional economy have created a very low baseline of vulnerability. Each additional stressor, be it contemporary political interferences into the fragile remaining order of the nomads, be it physical impacts like unexpected natural hazards, can therefore contribute to a potential collapse of the nomadic system as a whole.

There is no doubt that the present framework conditions for nomads are tough and severe. The legacy of the past is a negative one and is a decisive reason for the increasing vulnerability of the nomads. These impacts, however, may differ significantly from one nomadic community to another based on their socio-economic and environmental conditions. In other words, the detailed analysis of the contemporary dynamic pressures and their impacts on pastoral life can provide new "windows of opportunities" for addressing vulnerability and potential solutions for minimizing its impacts on the remaining nomadic groups. In the following therefore, the main dynamic processes influencing the Shahsevan vulnerabilities will be discussed. There are altogether five pressures, closely interconnected, that are threatening present-day Shahsevan animal husbandry and their survival strategies.

1. Increasing pressure on resources: The process of diminishing rangelands, as discussed in previous section, together with increasing human and animal population and change in the nomadic lifestyles, are putting the available pastures under increasing pressures. According to the 2008 nation-wide census on pastoral nomads, there were 61,316 Shahsevan nomads living in 11,938 households. The results of this census further show a nearly 7% increase in the number of small animals since 1998. According to this data there were 784,982 head of matured (one year and more) sheep and goats in all *qeshlaqs* of Ardabil province in 2008. Dividing this figure by the total number of nomadic households in the province as well as by the number of Shahsevan households, this will result in average numbers of 61 respectively 66 head of animals per household. However, based on our own survey, 85% of the Shahsevan

had more than 65 head of matured (*aq-tuk*) sheep and goats, and 50% had even more than 120 head. Accordingly, the number of 11950 Shahsevan households, will roughly have 1,434,000 head of matured sheep and goats which shows over 80% increase over the last decade. The precision of this figure is subject to the accuracy of the official data on the number of Shahsevan household. Nonetheless, due to change in their lifestyle and increasing expenditure on many services and facilities, such as education, electricity, phones, home appliances and etc., significant increase in the number of their animals are reasonable. The results of the 2008 census for instance, show that, nearly 70% of the Shahsevan households had landlines in *qeshlaq* and about 50% had mobile phones which are considered as new sources of cost for their pastoral lifestyle.

As the livestock number is increasing, it is obvious that the spatially restricted pastures and rangelands of the Shahsevan are under likewise increasing stress and danger of overgrazing. This holds true particularly for the winter campsites in the Dasht-e-Moghan that are rapidly declining by the extensive land-use change and the pressure of the increasing livestock which has shifted to the remaining pastures. By the sedentarization of Shahsevan in Dasht-e-Moghan (Schweizer 1979), their summer pastures were supposed to be granted for migrating Shahsevan. However, quite a few of the settled nomads continued to hold their rights to their traditional summer pastures. In doing so, many of the settled nomads sold their livestock and leased their summer pastures to other nomads. Another option was and is that they buy some lambs early in spring of each year and entrust them to other tribal members or shepherds to utilize their pasture while further retaining ownership of it. Accordingly, more than 50% of the Shahsevan are nowadays renting summer pastures from other nomads, mostly settled people. The price of forage on rented pastures is called *kuda-poli*. It was around 12,000 Touman[3] per head of animal for nearly four months of summer pasture (*yaylaq*) in June to September 2010. Compared with the price of their livestock in 2010, they

[3] One USD in Iranian currency was 7.57 Touman in 1965 and around 1100 Touman during my field work in 2009-2010. At this time one EUR was equal to roughly 1270 Iranian Touman.

have to give nearly 9 head of wether (30 kg weight) for grazing 100 head of sheep and goat. The comparison of our own findings with those of Tapper 45 years ago shows the dramatic consequences of the increasing pressure on the limited resources of the nomads. In 1965 it used to cost 2-3 Touman per head of animal and roughly 1 head of the same wether for 100 head of animals (Tapper 1979). Even if the value of one Touman in 1965 was much higher than nowadays the increase in the prices is testimony to the new pressures and the rising vulnerability of the Shahsevan of today.

2. Changing production system: In response to the increasing economic pressures as a result of the growing livestock population and shrinking rangelands, many Shahsevan have gradually abandoned their traditional migratory pastoral system and changed it to stall-fed animal husbandry. The increasing dependence of their production system on supplementary forage, particularly in their winter campsites (*qeshlaq*), has radically increased their production cost and made them highly susceptible to price fluctuations, particularly in drought periods. According to Tapper (1979) the Shahsevan used to spend nearly 10 Touman per head of adult sheep and goats for winter fodder when their animals were sold for 6-10 Touman per kilogram in 1966. Comparative figures today are nearly 30,000 Touman for October 2009 to May 2010 including the use of stubble pastures in the fall, while their livestock was sold for approximately 4,000 Touman/kg. Therefore, the winter forage of 100 head of animals cost 20 head of wether (weighing 33 kg) in 2009 as compared to 3 wethers in 1966. However, this figure can easily be doubled today under the influence of declining rangeland productivity and increasing fodder prices in drought conditions, which will be discussed in detail in the next sections.

The individual changes in their production system have advantages as well. As in the past, the flocks of sheep and goats mainly relied on available forage on rangelands and the wethers were mostly sold in the second spring weighing between 15-30 kg (Tapper 1979). Today, the lambs are gaining a weight of 35-40 kg by the first summer and can reach a weight of up to 50-60 kg by the second spring if they are well nourished. Unfortunately, the majority of

Shahsevan lack the adequate resources and facilities to return their animals for further fattening in the Dasht-e-Moghan. Therefore, nearly 90% of them are selling their livestock in midsummer before losing the weight. This in turn is making them highly susceptible to falling market prices due to oversupply in this period, causing additional financial burden for the nomadic households.

Another consequence of the enforced changes of the Shahsevan production system is a profound change in their means of migration. According to our survey results, more than 82% of the households have used trucks for transporting their animals during spring migration in 2008. Motor transport roughly costs 1000 Touman per head of animal. In the autumn migration, however, around 45% of the herd-owners returned their animals by traditional migration, while families and the camping equipment were transported by car and pick-up. Apart from transportation costs the mechanized migration has shortened their two to four weeks of traditional migration to a few hours. Consequently, the herds are reaching their summer pastures at a time when the vegetation is still immature. In the meanwhile, the increasing heat in Moghan dries up the vegetation, and the livestock will lose weight by increasing temperature and declining forage. On the other hand, the *Jangalbani* prevents the nomads from early migration. Trespassers will be punished with 8000 Touman per head of animal.

The profound changes of an increasingly limited resource base in combination with an adjustment of the Shahsevan production system and migrational behaviour have deeply influenced economy and lifestyle of the nomads. In the past, the Shahsevan could rely on inherited *yaylaq*, *qeshlaq* and also migrational routes. These traditional rights included the use of several stopping places (*dushalgeh*) and waiting places (*dozalgeh*) along their migration route. Here, the nomads and their flocks could rest and spend a few days during their gradual upward migration and let the animals adapt to the highland temperature. Thus, the migration delayed the arrival to the summer pastures. Particularly those who had their *yaylaqs* in a higher altitude had additional intermediate pastures (*yazlaq*) in the foothill regions of the

Koh-e-Sabalan enabling them to spend another month before reaching their summer pastures. According to our own survey results, still today 43% of the interviewed households have their own *yazlaq* and 30% have rented from other nomads. The rest is forced to take their animals directly to the summer pasture.

3. Increasing marginalization: As discussed earlier, the population of the Shahsevan nomads has declined over the last decade. This, however, is not due to a decrease of Shahsevan people as such, but to the fact that fewer and fewer are registered as Shahsevan nomads. The regional distribution of these nomads and its changes between 1998 and 2008 shows remarkable differentiations, especially in regard to their settlements in the *qeshlaq*. As shown in Figure 3-1 the pastoral population in some districts such as Ardabil witnessed significant increase while other regions, especially in the Parsabad districts, are characterized by a dramatic decline.

These data can easily be interpreted as indicators of socio-economic changes and ecological marginalization of the Shahsevan nomads through a slight shift in their winter campsites southward to the higher altitudes in Ardabil, Nir and Meshkin regions. While the socio-economic aspects will be discussed under items 4 and 5, the ecological preconditions and consequences can be explained by two reasons: First, the relatively higher location of the settlements in the northern part of their winter campsites, which are areas of fertile soil and offer the possibility of irrigation extension schemes; second, the displacement of some tribesman southward to their former stopping places (*dushalgeh*) or waiting places (*dozalgeh*) along the migration road. Here the migrants could establish new *qeshlaqs*, such as Gozigurugi of Tomaghallu/ Moghanlu, Alachig Tapesi of Geiklu, Khanbabalu of Hampay/Gojabiglu (see map 1-3 p.21).

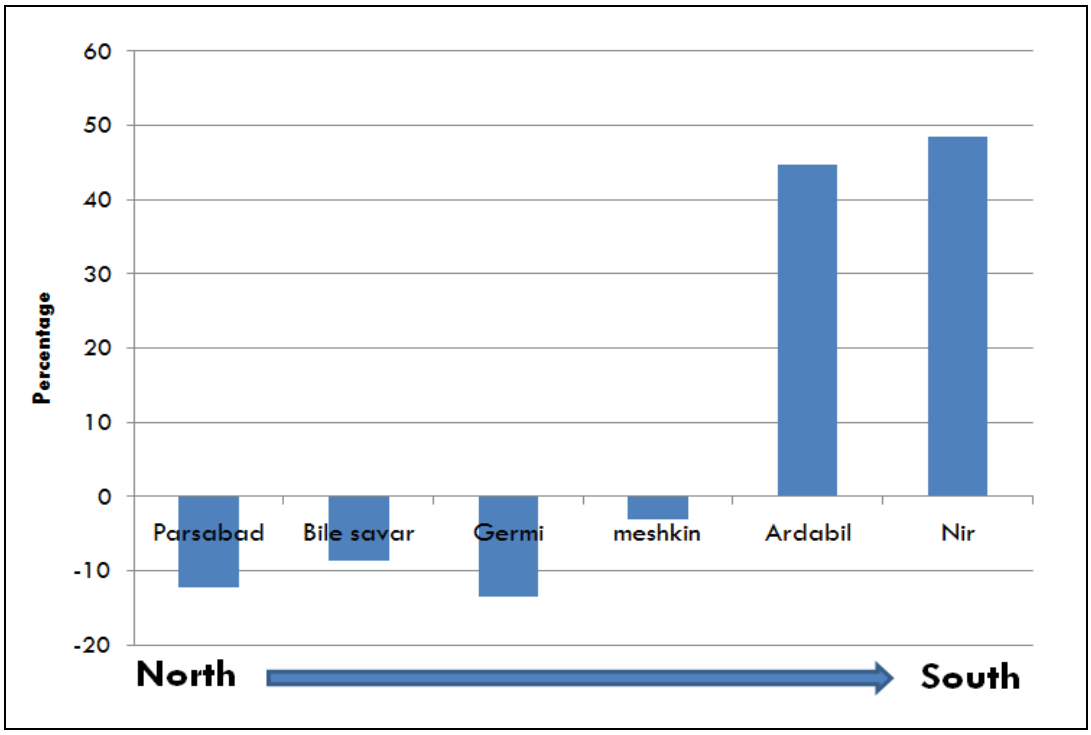


Figure 3-1 Change in Shahsevan population in different districts from north to sought

As results of these processes, many tribes, e.g. Ajirlu, Talbishmilkailu and Geiklu were settled and continued as farming agriculturalists, while some tribesmen continued their pastoral economy in newly established *qeshlaq*s. These nomads may have their own farmlands in the Dasht-e-Moghan and thus establish two winter residences (*iki-boneh*), one in their farmlands and another in these *qeshlaq*s, or just settle in *qeshlaq* and use the available pasture.

The Guzigurugi winter campsite, for instance, was established in 1985 in Arshaq with 15 households of the Tomaghallu sub-tribe of Moghanlu. Like the majority of these recently established *qeshlaqs*, it offers only very limited pastures, thus the nomads have to rely on supplementary forage. The *qeshlaq*, furthermore, lacks basic services, including appropriate roads, school and water, mostly because of its small size and limited population. Parts of their family, therefore, stay in nearby villages or small towns, e.g. Parsabad, local centres providing health services or schools for children, while others stay in Guzigurugi.

Moreover, the majority of these *qeshlaqs* is located in relatively higher altitudes than the Dasht-e-Moghan, and thus the growing season starts later. Therefore, they can delay their migration until the full maturation of the vegetation in summer pastures without the necessity to rent *yazlaqs*. Finally, also their relative proximity to the *yaylaq* allows them to pursue traditional migration easier and without major challenges and conflicts with peasants.

Thus, declining ecological conditions as well as the afore-mentioned stressors of shrinking pastures in *yaylaqs* and *queshlaqs* are severe causes of the Shahsevan economic and political marginalization. During the Pahlavi regime, sedentarization and integration of nomadism into rural or urban populations was considered as the only viable option for their future. After the Islamic Revolution in Iran, significant measures have been developed and implemented to provide basic services like roads, schools, electricity, veterinary and health care services for enhancing the living conditions of the remaining nomads. However, terminating their migratory lifestyle and settling them in one of their camping sites is still the main policy of the government of the Islamic Republic of Iran vis-à-vis its nomadic tribes. The Fourth Five-year Development Plan (2005-2009), for instance, sets the target of enhancing their socio-economic conditions by settling up to 50% of the remaining migrating pastoral nomads, though no figure on the progress of this objective has been reported. In the majority of development measures the nomads are treated as sedentary peasants registered in certain administrative provinces or districts, regardless of their migratory lifestyle. On the other hand, the Shahsevan, like many other nomadic groups in the country, have lost their political voice by disintegration of their traditional organizations, mainly during the Pahlavi period. This process has been perpetuated until today by ignoring their social organization and introducing modern alternatives such as pastoral cooperatives and the like. Increasing marginalization is, therefore, a kind of creeping disaster developed over many decades of strong governmental interferences into the traditions of the nomads and their inherited social and economic lifestyles.

4. Deteriorating traditional institutions: The elders (*aq-sagals*) have still considerable credit and play an important role in local issues. They mediate between the nomads of their own sub-tribes. They are extremely important in the process of selling the milk and the milk products. Every late August, the dealers from Tabriz and Ardabil come to the *qeshlaqs'* elders and propose their price to buy the milk. When they agree on the price, the dealer will go to individuals and prepay about 1/3 to 2/3 of the price of their milk, based on the amount of milk sold in the last year. Since the milk can spoil very quickly, and the nomads lack enough facilities to make their own dairy products, they usually agree to sell the milk to the dealer proposed by the *aq-sagal*. Otherwise, they might be left alone or with a minority group and fail to sell their milk to another dealer at comparable conditions. In this way, the elders somehow safeguard the interests of their tribal members. Also the disputes over rangeland are being settled easier through the traditional system where the local elders have proper knowledge of the cases and the parties, but also the authority as mediators.

Special importance is attributed to the role and function of the elders in the management of the communal rangelands. This is characterized by a grazing system locally called *sar-poshki.* Available pastures are divided into several sections and the year round ownerships of shareholders are determined via Sortition. Then through an annual rotation system, all camping unites are given the same chance to use different parts of the communal pastures. The This system is more practiced among those communities that have pastures with different qualities of grass growth or where it is not adequate for all households so that portions of them have to rent pastures elsewhere annually. In more homogenous areas, however, the division of pastures has a relatively permanent cycle, which secures their ownership and facilitates its management. In practical terms, therefore, *sar-poshki* is essential for improving the performance of the herds based on available forage resources. An important effect of this system is, for instance, that they leave some of the autumn vegetation untouched *(kham)* for the following spring season in March (*boz-ay*) where the temperature in the Dasht-e-Moghan increases gradually, and the herds need fresh pastures

and fodder. According to the Shahsevan, this saved *kham* have major influence on herd productivity, and fertility.

Role and functions of the *aq-sagal* are without doubt important until today. On the other hand, one must not forget that they represent the middle to lower strata of the traditional Shahsevan hierarchy, so that their existence does not contradict our observation of a deterioration of their traditional institution. But even on this level their importance is eroding. The above-mentioned traditions, for instance, are not practiced in all *qeshlaqs*. The Yosefkhankandi of Rezabiglu/Moghanlu, the Gurichai of Hzilu/Moghanlu, the Imanguyusu of Hoseinhajilu, the Chat*qeshlaq*i of Gojabiglu, or the Aghdagh of Gabelu, where mostly the critical roles of *aq-sagal* are replaced by modern organizations such as a Local Islamic Council or a Pastoral Cooperative. The nomads, consequently, have more conflicts and hardly reach an agreement. They use the *galkhuji* grazing system and the people are free to use the common rangeland without any limitations in time, space and herd size. In contrast to the *sar-pushki* grazing system, the nomads rush to return to *qeshlaq* in early autumn and use the available forage on the pasture. Consequently, they have relatively poor rangelands and week animals with extremely rare twice lambing and twinning rate.

The replacement of traditional institutions not only on the upper levels of the nomadic society, but also on their middle and lower ranks and their replacement by governmental institutions very obviously adds to a further weakening of the Shahsevan resilience towards socio-political and ecological stresses. There is, very obviously, a steady and continual process of decay and decline, trickling down from its late 19th century beginnings to the present day. This development culminates in today's dilapidation of the Shahsevan human resource base by increasingly voluntary abandonment of Shahsevan identity and tribal coherence.

5. Weakening human resources: The animal rearing in a pastoral system is a relatively high manpower-demanding business and requires contributions of all household members, including the children. Therefore, some Shahsevan households hesitate to send their children to school even though they know the importance of education for their children as a

precondition of career opportunities beyond pastoral life. Accordingly, more than 10 percent of males and 33 percent of females out of a total of 1363 people in our own survey sampling were illiterate (table 3-1). Beyond literacy, however, technical and cultural problems remain the biggest challenges to Shahsevan students succeeding in their schools. Although more than 75% of all students have access to and attend the primary school in their own *qeshlaq* (table 3-2), they mostly have to share the class and the teacher with students from other grades. Thus, the teaching hours are divided according to the number of grades, and the students are taught in the interval. The final examinations of nomadic pupils take place one month earlier than those of usual school children in order to enable them to participate in the spring migration of their *taifeh* or *oba*. As a result, the low-quality teaching system and the poor performances in schools are reasons why more than 27% of male and 40% of female students are quitting their studies in primary schools before reaching their final grade.

The difference in the figures of male and female students can be explained from a cultural perspective. First: girls might be prevented from participation in classes taught by a male teacher, particularly in higher grades.

Table 3-1 The education level of household members by gender

	Illiterate	Left primary School	Left secondary school	Left high school	High school diploma	University degree	Total
Male	75	200	125	111	136	80	727
Percentage	10.3	27.5	17.2	15.3	18.7	11.0	100
Female	215	256	76	22	43	24	636
Percentage	33.8	40.3	11.9	3.5	6.8	3.8	100

Table 3-2 The access of Shahsevan students to schooling locations at different study levels

	Their own *qeshlaq*	Commuting to nearby *qeshlaq*	Dormitory	Cities rented place	Cities own place
Primary school	75.2	3.4	0	2	16.4
Secondary school	16.1	18.5	14.8	6.4	32.9
High school	1	26.8	5	9.4	35.6

Second: their long-distance daily commuting to the neighbouring *qeshlaqs* or their accommodation in hostels is not culturally accepted by the majority of Shahsevan families.
Third: both male and female students have to take part in the countrywide examinations and compete with urban students at secondary and high school level. Therefore, nearly 50% of Shahsevan buy or rent houses in a nearby city to provide their children with a better schooling system.

However, only 30% of male and 11% of female students succeed to finish their high school final examinations. Nevertheless, the majority of children acquainted with urban life are unwilling to return to pastoral life. Many parents may help them to open their own small business, or they may look for jobs. Consequently, the family will gradually split up into two or more portions. The youth and educated people may stay in the nearby cities, while the elderly people who cannot get along with complicated urban life mostly stay in *qeshlaqs* and continue their pursuit of pastoralism. However, acquiring precise figures on the age composition of the community was almost impossible due to increasing sensitivity caused by the government irrigation extension scheme and the plan for settling them by allotting plots of irrigated lands. In any survey therefore, the Shahsevan are very cautious of including all family members living either in *qeshlaq* or in the cities.

The summary of the historical root causes of the Shahsevan increasing vulnerability ended with the statement that the burdens and legacies from the past have accumulated over many decades and must be seen as one of the decisive cornerstones of the present-day situation (ch. 3.2.1). Our analysis of today's dynamic pressures on the Shahsevan society reveals that - on the basis of historically caused fragile framework conditions - its contemporary situation has further deteriorated. The different dynamic pressures on the nomads, summarized in the preceding five aspects, show an increasing tendency of

- a steady, accelerating and irrevocable decay of the nomadic economy in competition with their agricultural neighbours and environments as well as competitive economic partners in a modernizing national development; and

- an obvious dissolution of the long-standing traditional social order by the political elimination of tribal leadership and its partial replacement by state and government institutions, many of which are neither acquainted with nomadic practices and experiences nor with a sufficient knowledge of sustainable range management etc.

Thus, it is fully justified to conclude that the political and socio-economic stressors of today - in combination with their historical predecessors - increased the Shahsevan vulnerability decisively. Further loss of economic efficiency and productivity through a number of political interferences, by reduction and fragmentation of their territorial rights and by their loss of competitiveness in comparison to other agricultural producers is one of the main reasons for their great exposure to vulnerability as defined in chapter 2 of our study. Another and equally important one is the disappearance of acknowledged leadership and the rapid dissolution of tribal coherence and solidarity. Whether *tirreh*, *taifeh*, *oba* or even the core family: the erosion of these structures and feelings of togetherness leaves more and more families and individuals unprotected and open to social and/or economic collapse. Under these circumstances additional stressors of entirely different origin may be sufficient to bring the whole system of Shahsevan nomadism and its remaining fragile components to a final end.

In contrast to those factors that have been discussed so far, the effects of climate change can very well be such a catalyst of additional stress to a highly vulnerable group, although coming from an entirely different angle.

With the following discussion of climate stresses as a hampering factor for the nomadism of the Shahsevan, we not only consider the physical side of their vulnerability, but also enlarge our analysis to include the external conditions of nomadic vulnerability: the double exposure.

3.3 Exposure to climate stresses

Exposure is defined as the nature and degree of climate-related stresses on a particular system caused by either change in short-term climate variability, including the magnitude and frequency of climate extremes or by long-term climate conditions (IPCC 2001). As mentioned earlier (chapter 2.2) we have argued that exposure is seen as an external side of vulnerability. Transferred to the Shahsevan we suggested that exposure refers to the nature and degree to which the nomads experience climate stresses as a hazard and as a demanding challenge of their political and socio-economic stressors. This approach goes hand in hand with ISDR's terminology, according to which exposure can be defined as "people, property, systems or other elements present in hazard zones that are thereby subject to potential losses" (UNISDR 2009, p. 15). In fact, exposure to climate variability, e.g. seasonality, temperature extremes and frequent drought are not new phenomena for the Shahsevan, and they have developed and are continuously using several strategies for coping with them. However, the characteristics of climate stresses are seemingly changing by the impacts of obviously intensified climate changes, thus increasing their exposure level. Therefore, analyzing the characteristics of climatic stressors, including magnitude, duration and frequencies of droughts or temperature extremes is critically important for analyzing nomadic vulnerability and will be discussed in the following sections.

Starting point of our discussion may be the results of the latest IPCC 2007 and its predictive scenarios for Western Asia. Without going into details of its analyses it must suffice to point to a few general observations and conclusions concerning our research area. Working group II observations (Impacts, Adaptation and Vulnerability) conclude that - for Western Asia - crop yields could decrease because of the expected climate changes (Cruz et al. 2007vol. 2, fig. 10.4). For Iran specifically, the same report refers to significant changes in temperature and precipitation: "During 1951 to 2003 several stations in different climatological zones of Iran reported significant decrease in frost days due to rise in surface temperature. Some stations

show a decreasing trend in precipitation (Anzali, Tabriz, Zahedan) while others (Mashad, Shiraz) have reported increasing trends." (op. cit., table 10.2).

3.3.1 Climate change and the Shahsevan

"*The snow in highlands of our summer rangelands used to last until the end of summer and be covered by new snow in early autumn while now it hardly lasts for midsummer*"[4]

While it is surely inappropriate to transfer these general assumptions and projections into a very specific scenario for our own research area, it is surprising to see to what extent the Shahsevan are aware of climatic changes and to what extent they try to cope with them. Nevertheless, it may well be questionable whether the long-term climate variability and change is exposing the Shahsevan pastoral economy to further climate stresses.

In order to evaluate the specific conditions of the Shahsevan territories in more detail, we tried to investigate not only officially available meteorological data, but also to scrutinize the nomads' perceptions. The majority of the nomadic respondents to in-depth interviews perceived that their environment is getting warmer and drier, and thus the behaviors of their ecosystems are changing. The shift in the growing season of their summer rangelands, for instance, was highlighted in many interviews. The perceived changes in their environment could be hardly explained by the average global warming of approximately 0.6°C over the last century. However, the local ecosystems respond much more to regional climate variations than to the worldwide climate change (Walther et al. 2002). Furthermore, the impact of increasing temperatures on rangelands must also be interpreted in relation to the long-term change in precipitation. It is obvious that these nomadic experiences are in line with the IPCC's most recent calculations and observations, especially in regard to intensity and duration of droughts, which will increase by the extended warmer periods and by rising

[4] Haj Avaz Moradi, personal communication in Agabigum *yaylaq* of Rezaguli sub-tribe, Moghanlu (July 2009)

evapotranspiration, particularly in the regions with no increase on precipitation (Schneider et al. 2007).

The Shahsevan observations are supported by the observations of meteorological stations and by research on the trends of climate and hydrology. In a study in Turkey, for instance, Partal et al. (2006) found a shift in the annual cycle of the hydrologic regime with negative trends in winter precipitation and a positive tendency in the spring and summer rainfall. Long-term climate variability analysis in Iran, furthermore, shows a very diverse tendency in precipitation and temperature trends over the country. Ghahraman and Taghvaeian (2008) studied the long-term change in annual rainfall all over the country and found both upward and downward deviations of the long-term trends in nearly half of the 30 synoptic stations. In another study, Raziei (2008) studied the long-term trend of precipitation in five homogenous subunits of western Iran and found statistically significant negative trend in the northern part in Azerbaijan region and an insignificant positive trend in southern part namely Hormozgan region. These findings support the earlier quoted statement of the IPCC 2007 report, according to which local variations of both temperature and climate in different parts of Iran are observable.

Long-term climate variability in Shahsevan territory: Evaluation of the possible impact of long-term climate variation on characteristics of climate-related stresses, and its implication for Shahsevan pastoral life, required a detailed analysis of long-term trends in climate data. Therefore, the precipitation data of seven stations and temperature series from four stations, with 35-45 years of data (table 3-3), were obtained from the Iranian Meteorological Organization and Ardabil Water Resource Institute. Considering the impact of seasonality and short-term variation of climate factors on the Shahsevan pastoral life, the monthly precipitation data and temperature series, i.e. monthly mean, maximum, minimum, absolute maximum and absolute minimum temperature, were used for this analysis.

Table 3-3 The characteristics of climatology stations

No	Station	Longitude	Latitude	Data Period		Number of Years
				precipitation	Temperature	
1	Aslandoz	39-25-56	47-22-26	1967-2006	1966-2006	40 Rainfall, 41 Temp
2	Borran	39-19-08	47-31-07	1969-2006	---------	38 Rainfall
3	Moshiran	38-32-55	47-32-06	1966-2005	--------	40 Rainfall
4	Nir	38-02-22	48-01-07	196-2005	---------	45Rainfall
5	Namin	38-24-51	48-28-03	1961-2005	1966-2006	45Rainfall, 41 Temp
6	Samian	38-22-29	48-14-47	1971-2005	1971-2005	36Rainfall , 36Temp
7	Sarab	38-02-16	47-40-39	1972-2006	1972-2006	35Rainfall, 35 Temp

Generally, two categories of parametric and non-parametric tests are used for trend detection in climate series. Non-parametric statistics are mostly robust and useful when the distribution of data is unknown or not normal (Rodrigo et al. 1999). Among non-parametric methods, the Mann-Kendall test is widely used for analyzing the monotonic (single-direction) trend in climate data. Particularly important about this method is the fact that it allows for missing data and its results are not affected by outliers. However, the existence of serial correlation in the data series could significantly influence its results. Therefore, first the Thom test (IRICS 2011; Tecer and Cerit 2009) was applied to examine the homogeneity of data, and the re´ults confirmed the homogeneity of all series at a 95% confidence level.

Next, the data were examined for existence of serial correlation by computing the lag autocorrelation of "r" at Lag-1. The pre-whitening process suggested by Storch (1999) was applied to the data with a significant correlation coefficient at 5% level (series highlighted in grey color in tables 3-4 to 3-7). The original data of X_t, therefore, were replaced by $Y_t = X_t - rX_{t-1}$ and the process continued until the autocorrelation decreased under 5% level significance. The Mann-Kendall test, then, was applied to evaluate the existence of significant trend in precipitation and temperatures series.

Being a nonparametric test, the Mann-Kendall method assumes no specific distribution for the data and uses the comparative magnitude of series than the original data (Hirsch and Slack 1984).

Therefore, first the Mann-Kendall statistic of S, also known as Kendall's τ, is computed using an equation (1) by comparing each data value of X_K with all its subsequent values of X_j and applying the signum function (2) to the results.

$$S = \sum_{k-1}^{n-1} \sum_{i=k+1}^{n} sgn(X_{j-} X_K) \quad (1)$$

$$sgn(x) = \begin{Bmatrix} +1 & if & (X_j - X_K) > 0 \\ 0 & if & (X_j - X_K) = 0 \\ -1 & if & (X_j - X_K) < 0 \end{Bmatrix} \quad (2)$$

Accordingly, each pair of comparisons was assigned by a number: +1 when the latter value was bigger than X_K , -1 when it was smaller, and 0 where it was equal to X_K , and the statistic of S was calculated by summation of all these number. Then the variance of S and statistic of Z were computed using the equations (3) and (4) respectively.

$$Var(S) = \frac{n(n-1)(2n+5) - \sum_{i=1}^{m} t(t-1)(2t+5)}{18} \quad (3)$$

$$Z = \begin{Bmatrix} \frac{S-1}{\sqrt{Var(s)}} & if & S > 0 \\ 0 & if & S = 0 \\ \frac{S+1}{\sqrt{Var(s)}} & if & S < 0 \end{Bmatrix} \quad (4)$$

The data series will show the significant trend, typically at a 95% or 99% level, if the absolute value of calculated Z is higher than its respective value in an acceptable level of significance. The positive and negative value of Z will further indicate its upward or downward trends respectively.

Changing nature of climate stresses: The results of the Mann-Kendall test showed a considerable trend in temperature parameters in comparison with rainfall data. Among the seven stations with precipitation data, statistically significant ($P<0.05$ and $P<0.01$) trends were found only in two stations, namely Nir and Samian. Both stations showed a declining trend in the March monthly rainfall at a 5% level of significance. The precipitation in Nir, furthermore, showed significant declining trends in April and an increasing trend in July at a 1% level. There were no major trends to be established in the monthly rainfall of other stations. This result is consistent with the findings of Moddares and colleague (2007) in a study on the trend of monthly rainfall in the arid and semi-arid regions of Iran. They found statistically significant trends in a few stations in their study area only in one or two months. However, their study indicates major increasing trends in March and decreasing trends in April, while in the current research both April and March rainfall had negative trends.

Table 3-4 to 3-7 present the results of our trend analysis on monthly temperature data in the Shahsevan territory. As can be seen from table 3-4, the monthly mean temperature in all four stations had a generally increasing trend, particularly between June to October. The most significant rising shift was found in August and September. Among these stations, Aslandoz is located in the Shahsevan winter pasture and the other three have more proximity to their summer pasture. In other words, the data are suggesting a more significant ($P< 0.01$) upward trend concentrated in the summer time in *yaylaq* as compared to a generally increasing trend in *qeshlaq* at a 5% level of significance. These results, therefore, are supporting the view of Shahsevan on declining snow cover in the highlands of their summer pastures. As documented in tables 3-5 and 3-6, the monthly maximum and minimum temperatures have shown more significantly increasing trends in February and March in comparison with the

monthly mean temperature. This period is the time when the Shahsevan keep their animals in the stable due to cold winter weather and stopping of the growing season in their winter pastures. This process, therefore, may shift the growing season of both summer and winter rangelands to an earlier time and potentially extend it on the condition of moisture availability.

However, the steadily declining trend of precipitation and increasing temperature may lead to more evapotranspiration and water and forage shortage on the rangelands. The negative trend in the temperature series was only observed in the absolute maximum temperature of July in Samian and Sarab stations at a 5% significance level (see table 3-7). Furthermore, the absolute minimum temperature showed a significantly (5% level) increasing trend just in Sarab station in August and September. Therefore, the temperature and rainfall trends in the study area suggest an increasing exposure of the Shahsevan pastoral nomads to climate stresses, particularly to extreme heat and drought conditions.

Table 3-4 Long-term trends in monthly mean temperature in the Shahsevan territory

Station	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Aslandoz			* ↑	* ↑	* ↑	* ↑	* ↑	* ↑			* ↑	
Namin	* ↑		* ↑	* ↑	** ↑	** ↑	* ↑			* ↑	* ↑	
Samian				* ↑	** ↑	* ↑						
Sarab		* ↑	* ↑		* ↑	** ↑	** ↑					

Table 3-5 Long-term trends in monthly maximum temperature in the Shahsevan territory

Station	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Aslandoz			* ↑		* ↑		* ↑				* ↑	** ↑
Namin	* ↑	* ↑	** ↑		** ↑	* ↑				* ↑	* ↑	* ↑
Samian												
Sarab		** ↑	* ↑			* ↑	* ↑					* ↑

Table 3-6 Long-term trends in monthly minimum temperature in the Shahsevan territory

Station	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Aslandoz				* ↑							* ↑	* ↑
Namin					* ↑	** ↑					** ↑	
Samian				* ↑	** ↑	* ↑					* ↑	** ↑
Sarab						** ↑	** ↑					

Table 3-7 Long-term trends in absolute monthly maximum temperature in the Shahsevan territory

Station	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Aslandoz							* ↑	* ↑				
Namin	* ↑	* ↑	* ↑			** ↑	* ↑	* ↑			* ↑	* ↑
Samian		* ↑		* ↓		* ↑				* ↑		* ↑
Sarab				* ↓								

* if trend at α = 0.05 level of significance
** if trend at α = 0.01 level of significance
↑ Increasing trend
↓ Decreasing trend
▢ Significant serial correltation at 5% level

3.3.2 Seasonality and temperature extremes

Temperature extremes in winter and summer seasons are among the main limiting factors both for the rangeland and the livestock production in Shahsevan territory. As can be seen in figure 3-2 the absolute maximum temperature in the Dasht-e-Moghan (Parsabad station) increases steadily from nearly 22°C in January to about 34°C in May and then rises to around 40°C in June, which dries up most of the natural vegetation on the Shahsevan winter pastures and causes significant heat stress for their sheep and lambs. The desiccation of the fresh vegetation and increasing temperatures cause the animals to reject the dried fodder, thus losing weight or getting sick due to heat-stress. The Shahsevan, therefore, start their seasonal migration by mid-May before the scorching heat of Moghan. However, the temperature in their summer pasture is still cold for the animals. Particularly the lambs, more fragile to heat-stress and mostly taken one or two weeks earlier than the ewes, could be hit by storm and blizzard. In fact, the Shahsevan traditional migration patterns have allowed their animals to gradually adapt to the temperature difference in the Dasht-e-Moghan and the highlands of Sabalankuh.

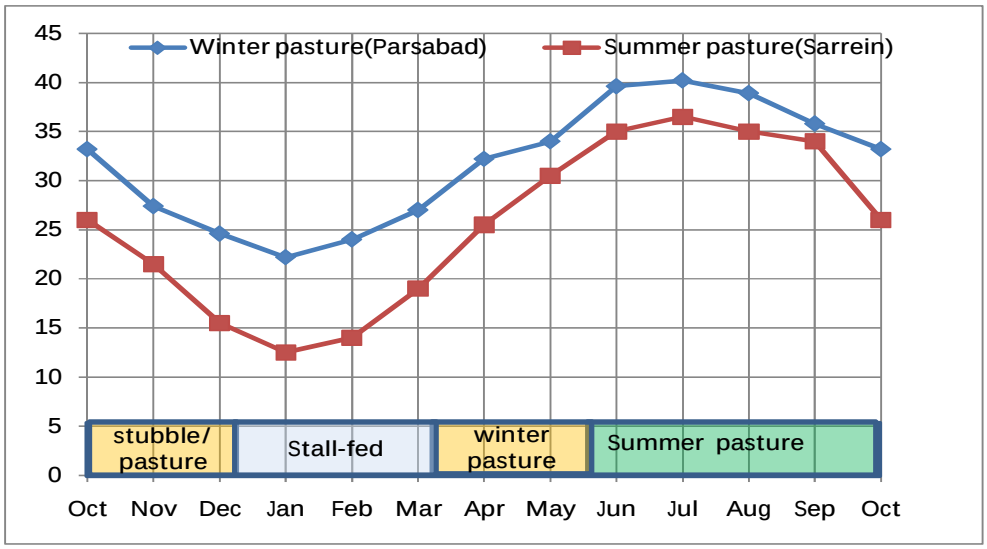


Figure 3-2 Variation of absolute maximum temperature in Shahsevan winter and summer pastures

Conversely, the modern transportation by truck shortens their migration from several weeks to a few hours and exposes the animals to extremely cold temperatures. Furthermore, the decision on the timing of spring migration used to be made by the nomads themselves based on the availability of forage on the pastures and the weather conditions in both *yaylaq* and *qeshlaq*. However, the Jangalbani has been authorized to decide on their migration date since the nationalization of rangeland, and the Shahsevan are obliged to leave Moghan after 30 Ordibehesht (20 May). The idea is to prevent them from an early arrival at *yaylaq* and let the natural vegetation to produce seeds for regeneration. However the growing season of the Shahsevan summer pasture significantly varies by seasonal and annual climate variation. On the other hand, many characteristics of their rangelands including the altitude, the slope and its direction, the soil quality and the weather conditions differs considerably from one *yaylaq* to other. Therefore, it is almost impossible to define a common and fixed date fitting all of their rangelands. The problem gets more complicated when the summer and winter pastures are under two different administrative units. Some Shahsevan from the Seidlar tribe, for instance, have their summer pasture near Sarab in Azarbaijan/Sharghi province while their winter pastures are located in Moghan under Ardabil administration. Each administrative unites mostly issue his own grazing period regardless of the conditions and obligations imposed by the other entity.

The return date from *yaylaq* is further subject to climate condition and availability of forage on the pastures. As shown in figure 3-3 the absolute minimum temperature in the Shahsevan summer pasture declines gradually from nearly 10°C in August to around 5°C in October, and then sharply drops to less than -8°C in January. While in the Moghan region, the weather is quite favorable by December and hardly falls below zero in January and February.

Accordingly, the Shahsevan leave their summer pastures in early October before the sudden snow could block their access roads. Timing and form of their autumn migration is subject to their access and ownership of rangelands and also farms in Moghan.

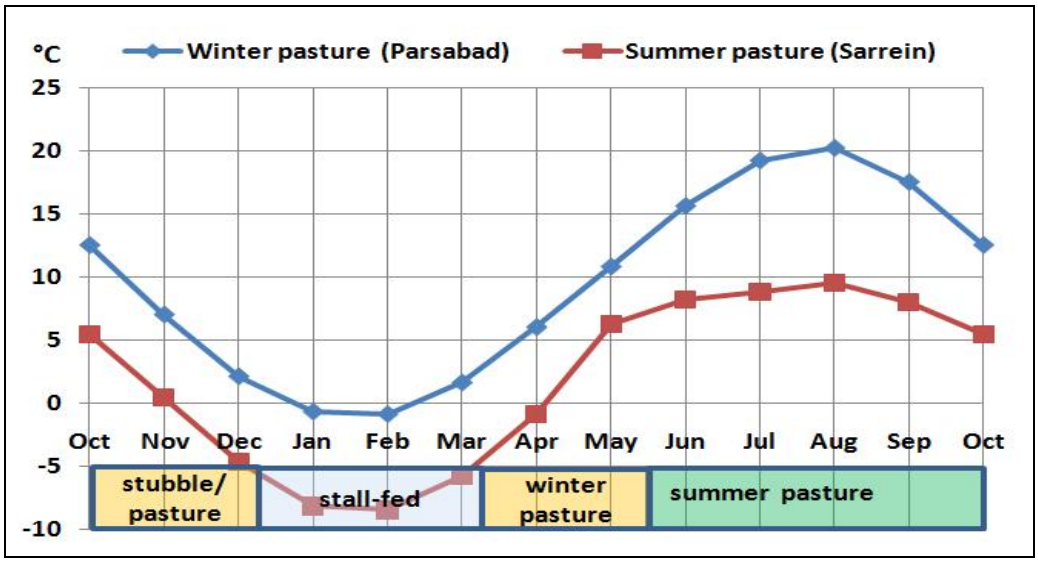


Figure 3-3 Variation of absolute minimum temperature in Shahsevan winter and summer pastures

As discussed earlier, the nomads with the *galkhuji* grazing system mostly return to Moghan quickly to use their common pasture rather than renting forage or stubble. Similarly, those who own farmland in Moghan, mostly use trucks for the transport of their herds and return sooner than the other nomads. However, the Shahsevan without adequate pasture or farmland in Moghan will try the traditional migration and spend a few weeks on their way back to Moghan.

Lambing is another important issue affecting the form of autumn migration. The Shahsevan put rams with ewes in April or May to have lambs in October, so that they can grow enough (*araghach*) before the spring migration, or probably to have a second lambing in next April. However, several factors such as heat stress, shearing, quality and quantity of forage and the quality of terrain could delay their season. Consequently, the lambs would be fairly young (*kurpa*) for spring migration and sensitive to temperature stress. Mechanized migration, therefore, will be used whenever the lambing season is fast approaching, otherwise the nomads may only take the lambs and old animals with the truck and the rest will be returned on foot. Depending on the weather conditions and growing season of rangelands, the

Shahsevan feed their animals in the stable for nearly three months, which can be prolonged for more than five months during a winter drought.

3.3.3 Pastoral drought perception and its consequences

Drought is one of the main features of arid and semi-arid regions of the world where pastoral nomadism is prevalent. In general terms, it is the period of shortage of available water due to a deficiency of precipitation and mostly classified into four drought types, namely meteorological, hydrological, agricultural and socio-economic. Several drought indices, e.g. Percent of Normal, Palmer Drought Severity Index (PDSI), Standard Precipitation Index (SPI), have been developed for defining and monitoring different types of drought. For detailed information on drought severity indices, see Hayes (2002) and Heim (2002). The natural vegetations of pastoral rangelands are very sensitive to rainfall variation, and thus the nomads are almost the first community that realizes the impact of drought as forage deficits. The pastoral drought in this connection is defined as the lack of available forage due to meteorological drought because of inadequate precipitation or inappropriate seasonality, timing and intensity (FAO 2011; Jupp et al. 1998b). Some scholars, e.g. Weber and Horst (2011) further argue that the improper range management practice by nomads may also lead to a soil moisture deficit and cause forage shortage. Applying this concept on the Shahsevan pastoral system requires some further considerations. Firstly, their resources are located in two distinctive geological locations with various climate conditions, and drought may occur in one or two sections of their territory with varying intensity and severity. Considering the differences in the physical and physiological conditions for their herds in winter and summer pasture, it may have different effects on their pastoral economy. Secondly, as discussed earlier, the socio-political process of diminishing pastures and increasing pressure on the remaining rangeland, particularly in their winter pasture, can significantly contribute to a degradation of rangelands and to forage deficiency. Finally, since their production system is rather integrated into the stall-fed animal husbandry, any change in market price and forage

supply may cause considerable fodder shortage, particularly in wintertime. In this research therefore, pastoral drought is defined as lack of forage availability resulting from combination of meteorological and socio-economic drought. In this context, the socioeconomic drought refers to the conditions that the demand for economic goods, forage in this case, exceeds its provision as results of rainfall and water shortage(Wilhite 1996).This will include the time and space dimensions of forage supply and demand in our definition.

This notion is applied to the case of 2008-9 drought in Shahsevan territory to examine its characteristics and impacts on their pastoral life and economy. To achieve this, a stratified sample survey, 301 households in 43 *qeshlaqs*, has been conducted to collect data on the change in forage of their summer and winter rangelands in comparison to the same period in 2009-2010, and to analyze its impacts on their livestock-based economy. Data on their pastoral production, i.e. milk, livestock, animals sold and their value, and change in their winter fodder consumption and its price, have been collected from the household heads or other financially knowledgeable members of the family (son or brother). On the other hand, frequency and severity of these droughts have been identified using the Standardized Precipitation Index (SPI) in two meteorological stations, Aslandoz in winter and Ardabil in summer rangelands. The SPI drought index is preferred due to the limited availability of data required for other indices, e.g. Local Available Water for PDSI, and furthermore because of the capacity of SPI for comparing the drought conditions in winter and summer pastures located in different areas. In this method, the cumulative probability of given rainfall events, is computed using the gamma distribution function, which has been found quite appropriate to fit the precipitation data. Then, the calculated probability has to be transformed into Z score, which is a standard normal random variable with mean of

Table 3-8 Drought severity based on SPI values
Source: (Hayes 2002)

SPI	Drought severity
2<	Extreme wet
1.5 to1.99	Severe wet
1 to1.49	Moderate wet
-0.99 to 0.99	Normal
-1.49 to -1	Moderate drought
-1.99 to -1.5	Severe drought
-2<	Extreme drought

zero and standard deviation of one, and makes the regional comparison possible.

The severity of drought event then will be obtained from table 3-8 based on calculated Z score. In this research, however, the SPI program (SPISL6) developed by the National Drought Mitigation Center of the University of Nebraska was used for calculating four time-interval SPIs, namely one-month, three-month, six-month and twelve-month intervals. The results then were compared with local information on the timing, duration and severity of pastoral droughts in June 2008 - May 2009.

Drought in winter pasture: The Shahsevan are mostly using their winter rangeland in two periods of November and December and then in early spring from March to May (figure 3-3). Consequently, droughts may occur in the first or second half or in both. However, coping with late winter and spring droughts is much more difficult for them. First of all, almost all their forage storages are being consumed in winter with the hope that in spring the herd will be able to graze on rangeland.

On the other hand, the nomads who sell their products, lambs and milk in summer and early autumn and buy fodder and other main necessities, are usually left empty-handed in late winter. The interviewees ware asked to rank the severity of the 2009 winter drought in comparison to similar periods in 2008 and 2010 and to categorize them in five classes: severe to extreme wet, moderate to severe wet, normal, moderate to severe drought and severe to extreme drought. Nearly 60 percent of the 298 respondents regarded the 2009 winter drought as severe to extreme drought, 32.5 percent moderate to severe and 6.5 percent normal. Many Shahsevan furthermore regarded the 2009 drought as one of the worst droughts in the last decade. Similarly, in 2010 the March, April and May conditions were regarded as normal by 26%, moderate wet by 57% and severe wet by nearly 15% of the respondents.

When comparing these results with the drought severity identified by different SPI time-intervals, this highlights the appropriateness of a six-month SPI for this purpose. As can be

seen from table 3-9, in one and three-month SPIs the drought severity in Farvardin[5] (20 March - 20 April) 2008 is more severe than in the year 2009, while in the six-month SPI the severity of drought in 2009 is higher. Therefore, the vegetation cover on their winter pasture is more affected by the cumulative rainfall from November to April than from one or three months of January to March.

Table 3-9 Comparing the 2009 winter pasture drought in Moghan by different SPI time intervals

	one-month SPI		three- month SPI		six-month SPI		twelve-month SPI	
Year	April	(May)	April	May	April	May	April	May
2008	-1.3	0.1	-1.08	-0.96	-0.3	-0.57	-0.84	-0.5
2009	-0.41	-1.07	-0.92	-1.13	-1.01	-1.29	-0.68	-0.99
2010	1.35	1.58	1.23	1.73	1.71	1.49	1.32	1.97

An analysis of the six-month SPI of May in Aslandoz Station in Moghan (figure 3-4) indicates that the Shahsevan have faced six moderate and two severe droughts over the last four decades. In other words, they are exposed to one winter drought every five years with similar severity or intensity as the 2009 drought. However, the severity of drought as experienced by the Shahsevan was significantly higher than that calculated by the SPI index.

A possible explanation for this observation lies in the socio-economic dimension of the drought. In fact, both the dramatic increase in fodder prices and the converse decline in the price for their animal products limit their capacity to purchase adequate fodder and thus exacerbate the drought conditions.

[5] The climate data used in this paper were in the Persian calendar, but for the sake of simplicity for readers the approximate equivalent months in the Gregorian calendar have been used in this article. Therefore, the Gregorian months of April to March stand for the Persian months of Farvardin, Ordibehesht, Khordad, Tir, Mordad, Shahrivar, Mehr, Aban, Azar, Day, Bahman and Esfand respectively.

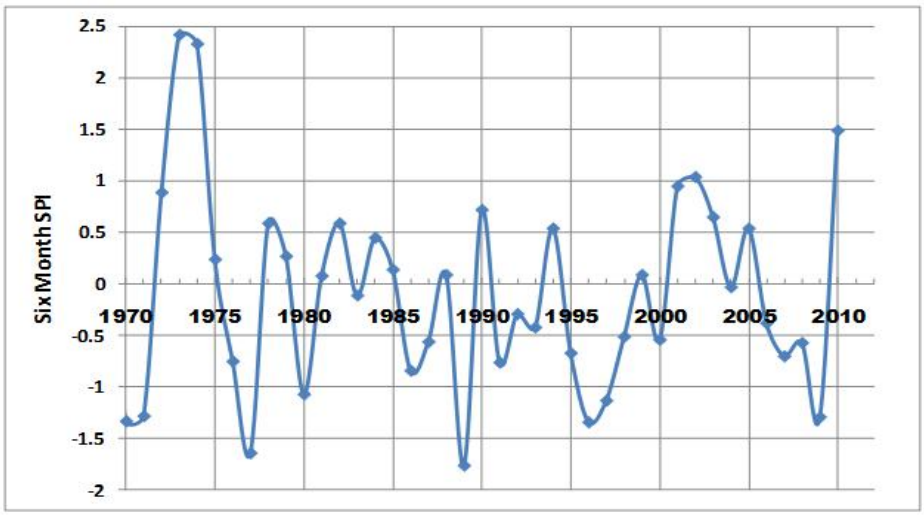


Figure 3-4 The nature of meteorological droughts on the Shahsevan winter pasture based on six-month SPI of May in Aslandoz station

The barley price, for instance, reached 400,000 Touman/ton in cash and 500,000 Touman by installment in the drought period, while it was 230,000 Touman/ton before and after the drought.

The subsidized barley distributed by the local office of Iranian nomadic affairs in the later stage succeeded to decrease the inflated price. However, according to the results of the survey sampling, the average payment per head of adult sheep for fodder in October 2008 to May 2009 was nearly 54,000 Touman as compared to the 30,000 Touman in the similar period of 2009-2010. A further analysis of the change in fodder consumption and its price indicates that nearly 53 percent of the increased costs were due to additional fodder required while 47 percent were caused by increasing fodder price.

The nomads, therefore, need instant access to fiscal resources to feed the starving animals. However, due to the inappropriate and time-consuming process of the financial support system, they are mostly compelled to either go into heavy debt or sell their animals. The price for their livestock was 2650 Touman/kg during the drought period and increased to 4000-5000 Touman after the drought. Consequently, the Shahsevan who sold some of their animals

had difficulties in building their herds after the drought. Furthermore, in 2009 there was a decline of around 30 to 50 percent in their milk production as compared to the year 2010. Quality and quantity of fodder play a significant role in milk production.

However, the Shahsevan leave more milk for the lambs as well as shorten the milking period to support their animals in the drought period. In a normal year, each head of sheep produces nearly 45-50 kg annually. The milk was sold at nearly 750 and 1000 Touman/kg in 2009 and 2010 respectively.

The winter drought has also considerable impacts on their animal production. Many Shahsevan, for instance, indicated that their herd estrus period had been delayed for 30-40 days in 2009. However, the impacts of drought on nomads varied significantly based on their access to various assets, particularly forage or fodder sources.

Those who have considerable farmlands in Moghan, for instance, and produce adequate forage apart from their rangeland, are able to cope easier with drought conditions, and further use the opportunity to extend their coping range. They not only avoid paying heavy prices for fodder or selling their animals at low prices in the drought period but earn good money from selling their forage surplus and buying some cheap wethers from other nomads, only to be sold again after the drought. However, by a drought prolongation or increase of its intensity, the decline in surface and groundwater water resources will ultimately cause a significant reduction in the nomads' yields and increase their dependence on market fodder. Consequently, they may sell some of their herds at relatively lower prices for purchasing fodder. This process could lead to a significant decline in their resources and ultimately increase their vulnerability to the next drought.

Drought in summer pasture: The drought in the summer pasture is different from that in the winter pasture for several reasons. First, the Shahsevan have limited access to hay and other supplementary fodder in the summer pasture and the drought could be quite difficult to bear, particularly for those with inadequate pasture. However, the possibility to rent a pasture and

meadow (*kham*) from neighboring areas or peasants is higher than in *qeshlaq*. Secondly, the summer rangelands are somehow at the end of their production cycle, and the majority of Shahsevan lack the capacity to return the wether to the winter pasture. Furthermore, the summer drought could raise their concern about a continuation of the drought in their winter pasture and convince them to sell their livestock surpluses even with a relatively lower weight and at a lower price.

Many Shahsevan stated that their animals were 5-10 kg under the normal weight when sold after the 2008 summer drought. However, collecting the accurate figure on the impacts of the past drought event on the animal weight was almost impossible. Figure 3-5 shows the characteristics of meteorological drought on their summer pastures.

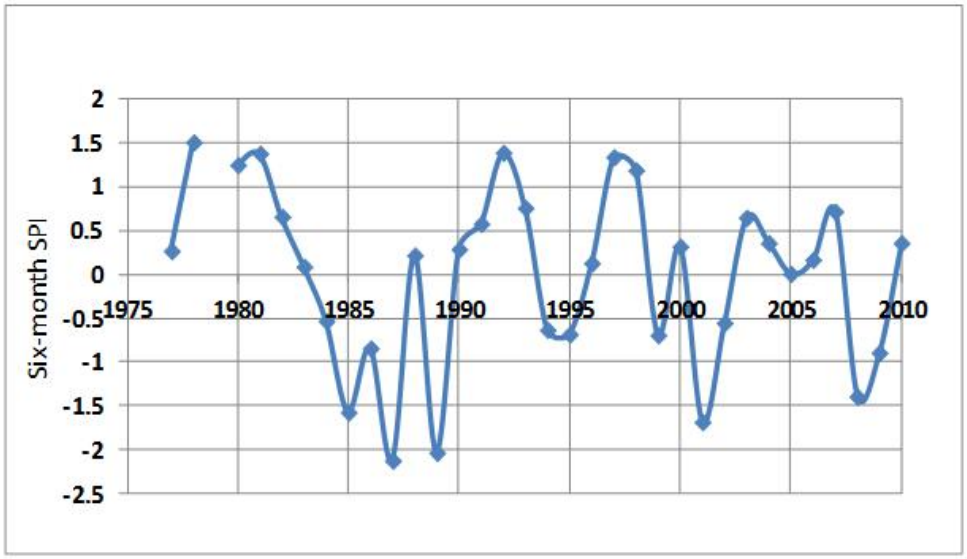


Figure 3-5 The nature of meteorological droughts on the Shahsevan summer pasture based on six-month SPI of June in Ardabil station

It can be seen that the Shahsevan were exposed to two very extreme and almost three severe summer droughts over the last 33 years. Comparing this figure with the data in figure 3-4 shows some similarities in the occurrence of the drought period in the summer and winter pasture. The 2009 winter drought, for instance, was most possibly the continuation of the

2008 drought in the summer rangelands. However, in some years, e.g. 1996 - 1998 the summer pasture experienced moderate to severe wet conditions, while the winter pasture faced a moderate drought.

3.4 Conclusion

This chapter employed the approach of "double-exposure" to analyze the external causes of vulnerability of the Shahsevan pastoral nomads to political and socio-economic pressures and climate-related stresses. It has been argued that the increasing pressure of both processes over the last decades and their mutual interaction and synergetic impacts on pastoral life are putting the Shahsevan under increasing vulnerability. The first section of this chapter evaluated the impacts of political and socio-economic pressures and changes of Shahsevan pastoral life over the last decades. Major contemporary socio-economic processes, e.g. weakening human resources, deteriorating traditional institutions, increasing marginalization, have been identified and discussed as the dynamic root causes of the Shahsevan vulnerability which in turn are diminishing their capacity for addressing the impacts of climate variability and change. These findings, however, offer new "windows of opportunities" for developing adequate policies and measures for enhancing their resilience.

One major finding in this section was the increasing ecological marginalization of the Shahsevan and slight shifts in their winter residence from productive pastures in the lowlands of Moghan to higher altitudes in Ardabil, Nir and the Meshkin region. Two main causes are substantially contributing to this process. First, the declining pastoral population in southern Moghan due to the extension of irrigated farming and a higher settlement rate in this area as compared to increasing human and animal population in the remaining winter pasture. Secondly, the relocation of some of the nomads from their winter pasture in Moghan to their former intermediate pasture (*dushalgeh*) along their traditional migration routes and establishing new winter campsites in these areas.

Nature and impacts of temperature extremes and drought as the main climate stresses factor on Shahsevan pastoral life have been detailed in the second half of this chapter.

The analysis indicates that the six-month SPI was more revealing to identify the characteristics of drought in 2008 - 2009 than the other time intervals. However, the severity of drought as experienced by the Shahsevan was significantly stronger than the intensity identified in this analysis. The socio-economic impact caused by a dramatic increase in the fodder price was the main reason for the higher degree of severity identified by the Shahsevan. More than 47% of the increased production costs in the winter of 2008-9 compared to the same period in 2009-10 were caused by escalated fodder prices, while 53% resulted from decline in rangeland productions. In other words, nearly half of the drought stresses during this period was caused by rainfall deficit while the other half was rooted in the socio-economic pressures.

The long-term variation of precipitation and temperature is obviously increasing the exposure of the Shahsevan pastoral nomads to climate stresses, particularly extreme heat and drought conditions. Meanwhile, the Shahsevan are facing more socio-economic drought due to the declining quantity and quality of rangelands and increasing dependence on the fodder market. The collective impacts of increasing methodological and socio-economic droughts, therefore, are among the main root causes of their increasing vulnerability.

It can be concluded that, therefore, the undermining pressure on their migratory lifestyle is emerging from the combined impacts and mutual interaction of socio-political and climate stresses. For instance, the dramatic changes in market prices for fodder and livestock productions during and after drought conditions in combination with diverse impacts of drought on their animal production are undermining their capacity and amplify their susceptibility to future stresses.

The most important finding to emerge from the analysis in this chapter, particularly pastoral drought, is that, the increasing exposure of the Shahsevan to both socio-political and climate

stresses may significantly increase the vulnerability gap between the individuals and social groups. Figure 3-6 summarizes the nonlinear relationship found between vulnerability, exposures and adaptive capacities. From this figure we can see that in the early stages of increasing exposure, the community will use their knowledge and capacity to make the necessary adjustments in their lifestyle and thus decrease their vulnerability to future stresses. By exceeding the exposure over their coping range, however, their vulnerability will increase sharply. The coping range here is defined as the level of exposure, which people can cope with and adapt to its consequences. It is determined by the adaptive capacity of the system and may vary significantly among the Shahsevan pastoral nomads. It is apparent from this figure that the increasing exposure of community members with different capacity and coping range will gradually widen the vulnerability gap among them. The diversity of adaptive capacity among the Shahsevan and its role in shaping the landscape of vulnerability at community level is further discussed in the next chapter.

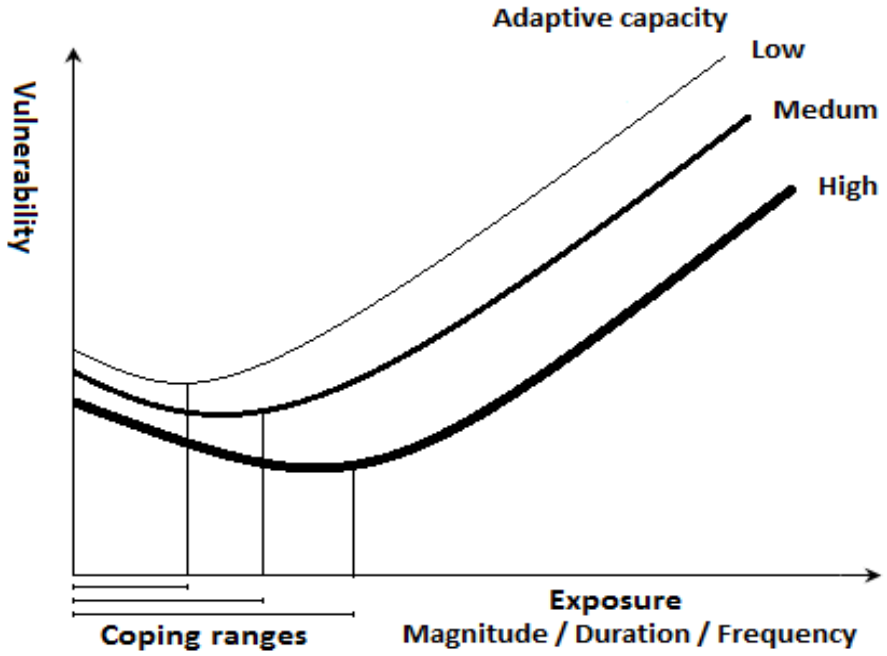


Figure 3-6 Growing vulnerability gap between the households with different adaptive capacity by increasing the exposure level

Chapter four

Dynamics of vulnerability at community level

4.1 Introduction

To this point, the focus of our study has been on the external underlying root causes of the Shahsevan vulnerability, particularly on their double exposure to socio-political and climate-related stressors. Nevertheless, it is important to recognize that the community is reacting to these conditions and makes necessary changes in their livelihoods based on the available resources and opportunities. And these changes go far beyond the described adaptation via purchase or selling of sheep and goats, i.e. via fluctuations of their herd sizes. These changes, in turn, have significant influence on their vulnerability. Several scholars, e.g. Elasha et al. (2005), Eriksen et al. (2005), have examined the availability of such resources to people under stresses, the importance of access to these capacities and the impact of these resources on peoples' vulnerability. However, the influence of household strategies in managing the available resources has been neglected in vulnerability research so far.

In this chapter, therefore, I argue that people's vulnerability at household level is influenced and varies continuously by the adjustments that people make in their livelihood strategy in response to pressures and opportunities within and outside their society. This hypothesis emphasizes several characteristics of vulnerability at community level, in particular among the Shahsevan pastoral nomads. Firstly, it highlights the impacts of external settings and the structure of their physical environment on their access to different resources. It brings us back to the arguments in the previous chapter on the combined impacts of multiple socio-economic and climate stressors on the nomads' resources. Secondly, it argues that the difference in vulnerability of community members living in a similar environment and being exposed to the same stressors is mainly based on the combination of adaptive capacity and sensitivity factors of individuals. Thirdly, it builds on the flexibility and dynamics of livelihood strategies adopted by nomads for managing their variable resources. It argues that their decisions on managing available resources significantly influence both their adaptive capacity

and can be interpreted as the individuals' specific sensitivity to stressors. Accordingly, the overall objective of this chapter is to examine the dynamics and diversity of vulnerability among the Shahsevan by evaluating their adaptive capacity and the sensitivities of five pastoral groups with different livelihood strategies.

The notions of sensitivity and adaptive capacity are very closely interrelated, so that many scholars perceive sensitivity contrary to the capacity of a system to respond to external stresses. According to Luers (2005) for instance, sensitivity of a system is determined by its ability to resist change and to return to the prior situation after the elimination of a threatening hazard. A higher capacity, however, will not necessarily lead to a lower sensitivity; rather the characteristics of resources and the strategies adopted to utilize them will determine their sensitivity. In this paper therefore, the term sensitivity stands for the attributes of the resources that make them susceptible to the impact of socio-political and climate stressors. Adaptive capacity, on the other hand, refers to the ability of making the necessary adjustments in the livelihoods to minimize the harm or cope with the negative consequences, or even benefit from the new opportunities from exposure to stress (Parry et al. 2007).

As mentioned in detail in chapters 1 and 2 of our study, there are several approaches that have been introduced and used for analyzing and measuring vulnerability. Some scholars, e.g. Cutter and colleagues (2003) employed the spatial perspectives for analyzing vulnerability, mostly at the national or regional level. At the community level, however, the resources possessed by different social groups and individuals, hardly follow the spatial pattern of resource distribution. Instead, they are determined by the socio-economic conditions of individual households and their access to various capitals. Other authors, e.g. Elasha et al. (2005), Badjeck et al. (2010), Nelson et al. (2010), argue that the Sustainable Livelihood Framework (SLF) developed by the DFID (Department for International Development London, 1999) contains useful analytical tools for evaluating vulnerability at local levels.

The following discussion of vulnerability at community level will be based on our earlier presentation (cf. chapter 2.4) of the "five capitals" approach. These five capitals of the

sustainable livelihood framework, therefore, will be adapted to the internal side of this study's conceptual framework (figure 2-4). Its ultimate aim and goal is to examine the sensitivity and adaptive capacity among the Shahsevan pastoral nomads. To this end, this chapter will discuss the five livelihood strategies of the Shahsevan. Then, the vulnerability of households in each livelihood category will be examined based on their access to or exclusion from the main livelihood capitals. Finally, the dynamics of vulnerability at household level will be examined and evaluated. Final outcome of these analyses should be a comparison between different strategies to overcome the joint pressures of natural and socio-economic stresses and to offer alternatives of adaptive livelihood strategies within a nomadic society.

4.2 Pastoral livelihoods strategies and means of living

Livelihood is defined as the capabilities, resources and activities for meeting the needs of life (Chambers et al. 1992). Many scholars, e.g. Johnson (1969), Khazanov (1984) regard pastoral nomadism as a livelihood continuum between absolute sedentary agricultural life, on one hand, and the purely pastoral nomadism with no farming activities whatsoever, on the other hand, with several transitional categories in between. Other authors, e.g. Tapper (1979), emphasize the danger of being "analytically sterile" and neglecting the internal diversity and dynamics within nomadic societies by classifying them into different typologies. Notwithstanding the difficulties in capturing the formal diversity and spatial heterogeneity of pastoral nomads in any classification, Khazanov (1984) argues that it can significantly promote our understanding of the nature and dimensions of their lifestyles. Therefore, he suggests a typology of nomadic pastoralism based on their increasing dependence on agriculture and declining mobility as presented in table 4-1. This classification, by the way, shows many similarities with specific typologies of German scholars, which were developed specifically for the high-mountain regions of Western Asia and/or Iran. In this context, mention must be made of Hütteroth (1973) and his attempt to classify types of nomadism and semi-nomadism in the mountain and plateau landscapes of Southwestern Asia and - more specifically - the studies by Ehlers (1980, 2000) and, above all, Schweizer (1970, 1973), who have observed and

described the transitions from pastoral to sedentary lifestyles of nomads in Iranian respectively Shahsevan contexts.

To some extent, the principles of Khazanov's classification, namely the households' mobility and the importance of agricultural farming in their economy, are applicable to the case of the Shahsevan. However, classifying their livelihood strategies, which could properly reflect their socio-economic conditions, requires more detailed criteria. Furthermore, in opposition to his approach, the increasingly stationary life of Shahsevan nomads is not necessarily augmenting their dependence on agricultural production; it can also contribute to their integration into urban life. In the other words: many Shahsevan households are practicing a sedentary lifestyle in order to improve their access to basic services and facilities in rural or urban centers, mainly in order to benefit from new carrier opportunities. This development has been supported by the fact that their productions systems have been increasingly integrated into stall-fed animal husbandry and fodder market.

Therefore, their access to farmlands and agriculture is not necessarily in contradiction to their pastoral economy. It rather serves as a complementary component of their production system by providing at least also parts of required fodder.

Table 4-1 Classification of pastoral nomadism by Khazanov (1984)

Type of Pastoralism	Characteristics of Economy
Pastoral Nomadism Proper	In purest form there is a total absence of agriculture. Its occurrence is uncommon and usually coexists with semi-nomadic pastoralism.
Semi-nomadic Pastoralism	Pastoralism is the main activity but agriculture is used in a supplementary capacity. This form of pastoralism involves extensive grazing and periodic changing of pastures over the course of a year.
Semi-sedentary Pastoralism	Sometimes called mixed farming. Agriculture plays the dominant role in the economic balance.
Herdsman Husbandry	Also called 'distant-pastures husbandry'. A majority of the population remain sedentary and engaged in agriculture while only specialist herdsmen travel with the animals
Transhumance (*Yaylaq* Pastoralism)	From the Turkic word *yaylaq* meaning summer highland pasture. Involves migration from a permanent base. Not to be confused with vertical forms of semi-nomadic pastoralism or pastoral nomadism.

Source: Khazanov 1984; Adapted from:(Goodall 2007: page 4))

The livelihood strategies among the Shahsevan therefore, can be examined by a combination of factors including their herd size, herding practices, seasonal migrations and access to pasture and farmlands. Using these criteria, five livelihood strategies i.e. shepherding, pasture partnership, semi-nomadic pastoralism, semi-sedentary pastoralism and herdsman husbandry, commonly practiced by the Shahsevan have been identified (Table 4-2). Accordingly, the households involved in our survey sampling were classified by their livelihood strategies into five pastoral groups. The term "pastoral group" in this research therefore, refers to the households commonly practicing one of these livelihood strategies. The vulnerabilities associated to each livelihood strategies then, were evaluated by analyzing the characteristics of five capitals, namely the natural, social, economic, human and physical capitals, possessed by households in each pastoral group.

Shepherding is the livelihood strategy adopted by nearly 15% of Shahsevan tribesman (figure 4-1). They represent that part of the Shahsevan society that lacks adequate resources, particularly pasture to keep enough animals for making ends meet. Therefore, they rely partially on the wage for working as a shepherd for other nomads and on the income generated by a few animals of their own.

Table 4-2 The characteristics of prominent pastoral livelihood strategies adopted by the Shahsevan

Pastoral livelihood strategies	Socio economic nature and characteristic				
	Average Herd size	Herding	Seasonal migration	Access to pasture	Farming
Shepherding	65	Shepherd for others	Most family members	Poor-inadequate for own herd	mostly not
Pasture partnership	140	Family member	Most family members	Poor-inadequate for own herd	mostly not
Semi-nomadic pastoralism	160	Hired shepherd for one herds	Part of family	Fair- almost sufficient for own herd	Limited- mainly dry faming
Semi-sedentary Pastoralism	75	Hired shepherds for both herds	Occasionally household head	Poor-inadequate for own herd	Limited- mainly irrigated faming
Herdsman Husbandry	250	Hired shepherds for both herds	Mostly household head	Good-mostly adequate for own herd	both irrigated and dry-farming

In fact, the shepherd is allowed to graze around 60-70 sheep and goats on the pasture of the *arbab* (the herd owner) for free, while he will pay for the cost of transportation, renting additional pasture, water and forage bought for the herd.

Hag is the traditional wage for shepherds in the Shahsevan society. Depending on the herd size, *hag* varies between 4-6 lambs for the herding of every 100 head of sheep and goats in a six-month period. For large herd sizes of around 300 head, the shepherd will be paid four lambs per 100 head, while for small herd sizes of nearly 100 head they will ask for six lambs.

Sheep are herded separately from lambs, and the shepherd's *hag* is paid differently. He will receive the milk of the herd every Sunday (*sut-guni, milk-day*) as his weekly wage. However, both shepherds and their families are responsible for the herding and will cooperate for the milking process.

Herdsman husbandry, on the other hand, is the source of livelihood for more than 24 percent of Shahsevan households (figure 4-1). They are locally known as *arbab* due to their extensive ownership of pastures and farmlands. They are mainly based in *qeshlaq* or nearby population centers, and their family members hardly participate in seasonal migrations.

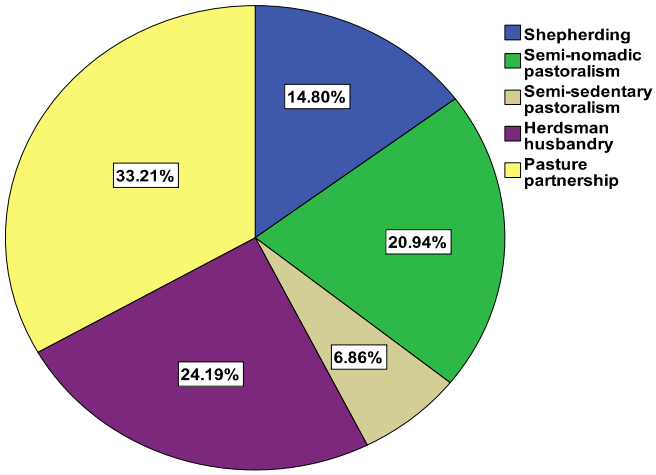


Figure 4-1 The portion of different livelihood strategies adopted by Shahsevan households (N=277)

Therefore, both sheep and lamb herds are entrusted to the hired shepherd. The *arbab*, on the other hand, may accompany the camp or visit the shepherds occasionally in *yaylaq* and provides them with essential supplies.

Apart from the economic importance of herding, herdsman husbandry guarantees the ownership and control of the *arbab* over his pastures, particularly over the *yaylaq*, which otherwise might be occupied or grazed by peasants or neighboring nomads.

By having the ownership over some farmlands and by integrating pastoral and agricultural economy, the herdsman husbandry has the significant advantage of producing all or part of the fodder required in wintertime. Only the lack of appropriate supervision over the performance of their shepherds is considered to be a major challenge of herdsman husbandry and may lead to a gradual decline of the *arbab's* herd size due to improper treatment of the animals by his shepherds. Therefore, he will pay much higher wages to trustworthy shepherds and treat them nicely building on mutual trust and honesty.

The cooperation among the pastoral groups, e.g. *arbab* and shepherd, is mainly based on efficient herding units and on the principle of minimizing the production costs. The Shahsevan consider an average of 300-400 head of animals as the optimal herd size which one shepherd could pasture properly. They believe that the herd performance would decline when exceeding the herd size of 400 head. They say: "*the tail of the herd could not reach its head."* It means that the fresh vegetation might be squashed by the animals in front to such an extent that the remaining vegetation cover is spoilt for the animals in the back section of the herd. Therefore, the *arbab* with nearly 300 head of animals may look for two shepherds owning around 100 animals of their own. The one with 200 animals would have more flexibility in the herd size of his shepherds. Sometimes, two or three *arbabs* with a herd size of 100 to 200 head each, for instance two brothers, unite their herds and entrust them to two shepherds. The quality and quantity of the *arbab's* pasture is another important factor influencing the shepherd's contract, and those with improper pasture may have difficulties in finding a good shepherd.

Where the household has around 140 head of sheep and goats, which is considerably higher than the average herd size for shepherding, but lower than the optimal herd size, the owner may go for a pasture partnership (*koda-gonshuluq*) and join one or more nomads collaborating in herding practice. Nearly 33% of the Shahsevan in our survey sampling had a pasture partnership. These cooperations between two or three pastoral households are not only the most commonly practiced form among the Shahsevan but they also seem to be the most appropriate one to organize herding by family members. However, since many of them lack access to adequate pastures, they mostly rent pastures and share the cost based on the number of animals.

In contrast, semi-nomadic pastoralism is practiced by those nomads (21%) who have better access to pasture than the households practicing *koda-gonshuluq*: They have average herd sizes of around 160 head. Their family members participate partially in seasonal migration. Therefore, the family members manage the pasturing of one of the herds consisting of adult animals, while the second one, consisting of lambs, is herded by hired shepherds. Considering the fact that they mostly lack extra pasture for the animals brought by the shepherds, they prefer individual (*jal-aghay*) shepherds who join their family and eat and sleep with them. The wage in such a case is paid in cash of up to 2,300,000 Touman[6] for herding approximately 300 -400 head of animals for six months.

Finally, semi-sedentary pastoralism refers to the livelihood strategy of for nearly 7% Shahsevan households who have about 75 sheep and goats and also some irrigated farmlands. The family members are mostly sedentarized in the winter camping sites and hardly take part in seasonal migration. The herds (both lamb and sheep) are joined with those of other nomads and entrusted to two shepherds to be taken to the *yaylaq*. Lamb and sheep herds are pastured separately. The household heads may visit the summer campsites intermediately. Although the nature of semi-sedentary pastoralism is very close to herdsman

[6]One USD in Iranian currency was 7.57 Touman in 1965 and around 1100 Touman during my field work in 2009-2010. At this time one EUR was equal to roughly 1270 Iranian Touman.

husbandry, there are significant differences in their access to resources and the livelihood income among these categories. The access to livelihood capitals among these different pastoral groups will be discussed in detail in the following section.

4.3 Livelihood assets and access to resources

Having discussed the main typologies of livelihood strategies adopted by Shahsevan pastoral nomads, it is now important to examine the characteristics of their livelihood assets that form and determine their adaptive capacity and sensitivity to multiple socio-economic and climate stressors. Livestock rearing through vertical migration and utilizing seasonal rangelands are common features of all these pastoral groups. However, people with more resources have a wider range of possibilities to make necessary adjustments in their livelihood strategies (DFID 1999). Furthermore, their sensitivity to external stresses is embedded in the characteristics of these resources used for forming their livelihood. Therefore, the five capitals suggested in the context of SLF (SLF stands for Sustainable Livelihood Framework), namely the natural, financial, social, human and physical capitals will be used to examine both the adaptive capacity and sensitivity of their livelihoods.

It is important to note here that some of these assets, e.g. access to health centers or electricity, are subject to the spatial distribution of the winter campsites rather than to the socio-economic conditions and livelihood strategies of the individual Shahsevan households. Therefore, only those resources that show statistically significant differences between the five pastoral groups (households with the same livelihood strategies) are considered for this study.

4.3.1 Natural capitals: pasture and farmland

In the context of current research, natural capital refers to the tangible natural resources, i.e. pastures and farmlands, which are directly used for pastoral production of the Shahsevan nomads. The influence and interactions between socio-economic and climate stresses, such

as pastoral drought and quality and quantity of their summer and winter rangelands, have been discussed in the previous chapter. However, the access of the Shahsevan pastoral groups to these resources and their importance for developing specific livelihood strategies will be discussed in detail in this chapter.

Rangeland: The livelihood of the Shahsevan relies heavily on the exploitation of natural vegetation in their rangelands, which varies significantly in time and space. Consequently, proper access to pastures in different ecological zones in *yaylaq* and *qeshlaq* is essential for adjusting their pastoral economy to the variations of their resource basis. Increasing socio-economic pressures, however, have disturbed the balance of human and animal population with the carrying capacity of their rangelands. As indicated in previous chapter, however, most of the Shahsevan are lacking enough pasture in *yaylaq*. Renting grazing lands from the nomads who have already settled is therefore common and far-spread practice.

The pasture deficit in *qeshlaq*, on the other hand, is mostly being counteracted by purchasing crop residue and supplementary fodder. Table 4-3 reflects the ownership and rent of *yaylaq* among the five Shahsevan pastoral groups in our study area. It can be seen that around 90% (251 out of 277) of the interviewed households had their own *yaylaq*. Nevertheless, nearly 50% of them rented additional pastures to meet the forage needs required for their animals. Among the remaining households without pasture ownership, only 19% are able to continue their pastoral life without renting summer pastures, mainly shepherds.

The size and quality of pastures is another important factor determining their natural capital. How important this factor is, is shown by the fact that the Shahsevan have their own particular rules for measuring pasture size ownership and rights of usage. Each pasture is divided into six shares (*akhcha*) and each *akhcha*, in turn, into four *istil* and each *istil* into four *charak*. Therefore, the right of individual households or groups of close kinship, mostly brothers and cousins are determined in terms of shares from the main pasture in akhcha, istil and charak. Consequently, the sizes of these units are different from one place to another.

Table 4-3 *Yaylaq* ownership and rent among the Shahsevan households with different livelihood strategies

Yaylaq Ownership				Pastoral livelihood strategies					Total
				Shepherding	Semi-nomadic pastoralism	Semi-sedentary pastoralism	Herdsman husbandry	Pasture partnership	
yes	*Yaylaq* rent	yes	Count	13	35	4	26	44	122
			% of Total	5.2%	13.9%	1.6%	10.4%	17.5%	48.6%
		no	Count	21	21	14	38	35	129
			% of Total	8.4%	8.4%	5.6%	15.1%	13.9%	51.4%
	Total		Count	34	56	18	64	79	251
			% of Total	13.5%	22.3%	7.2%	25.5%	31.5%	100.0%
no	*Yaylaq* rent	yes	Count	2	2	1	3	13	21
			% of Total	7.7%	7.7%	3.8%	11.5%	50.0%	80.8%
		no	Count	5	0	0	0	0	5
			% of Total	19.2%	.0%	.0%	.0%	.0%	19.2%
	Total		Count	7	2	1	3	13	26
			% of Total	26.9%	7.7%	3.8%	11.5%	50.0%	100.0%

The size of one akhcha of Moghanlu's pasture in Tolkulu *qeshlaq*, for instance, is different from one akhcha of their pasture in Agh-bashlar *qeshlaq*.

This system makes the comparison of pastures held by individuals or groups very complicated. Even with the accurate knowledge of the size of the pastures, the amount of available forage will vary significantly, not to speak of considerable differences in their sizes.

In this research, therefore, the nomadic access to summer pastures is calculated based on the expenditure for renting additional summer pasture in *yaylaq* and purchasing complementary fodder in *qeshlaq*. Figure 4-2 demonstrates the average cost of renting summer pasture per head of animal with a 95% confidence interval in 2009. As shown in this figure the households with the semi-sedentary pastoralists and shepherding livelihoods had the lowest payment for summer pasture. On the contrary, the pasture partnerships, followed by the semi-nomadic pastoralists, had the highest payment for renting *yaylaq*. On the other hand, their pastoral economy had the highest dependence on rented pasture, which makes it very sensitive to external pressures and stresses including price fluctuations.

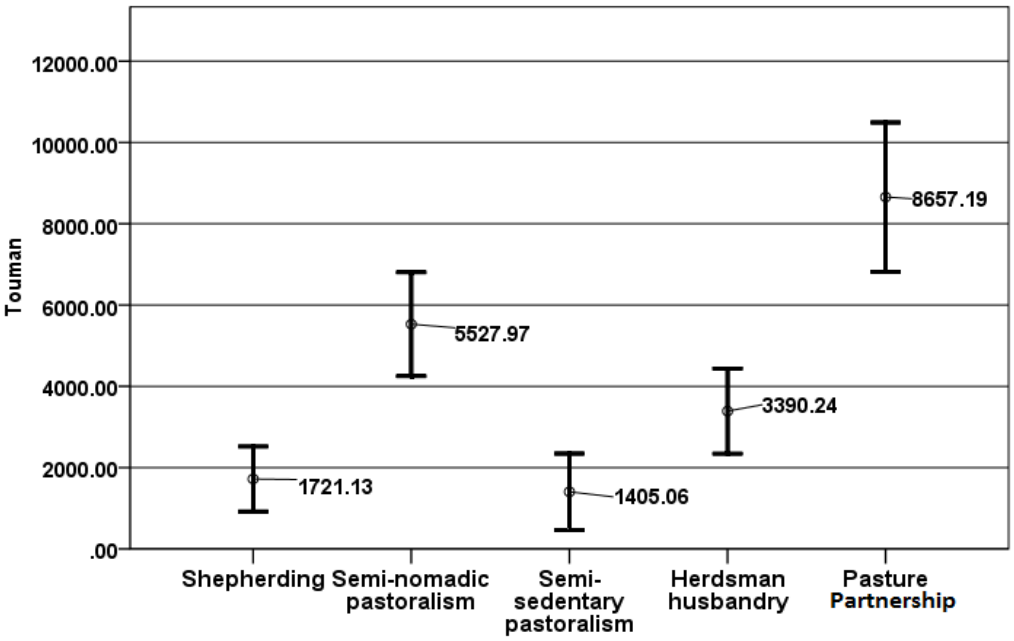


Figure 4-2 95% confidence interval average payment per head of sheep for summer pasture in 2008-2009

In winter rangelands the expenditure on fodder varied significantly depending on their access to pastures and climate conditions and added up to around 100,000 Touman for the winter season. In the moist winter of 2009-10 for instance there was a more than 40% decline in their expenditure on winter fodder in comparison to the relatively dry year 2008-9. In this research therefore, the mean costs for 2009-10 and 2008-9 have been calculated as the average cost of supplementary fodder for each pastoral group.

As it shown in figure 4-3, the herdsman husbandry pastoralists had the lowest payment compared to the other groups. With a 95% confidence level, their average cost varied between 35,000 to 47,000 Touman for each head of animal. In contrast: the semi-sedentary pastoralists had the highest expenses of nearly 50,000 to 74,000 Touman per head of animal. Considering their small animal number of around 75 head of sheep and goat, their higher cost is indicating their poor access to rangelands in *qeshlaq* and the high dependence of their animal on supplementary fodder. This condition is mostly caused by the extension of farmlands to their territory (cf. Schweizer 1970) and to the loss of access and control over their former winter pastures.

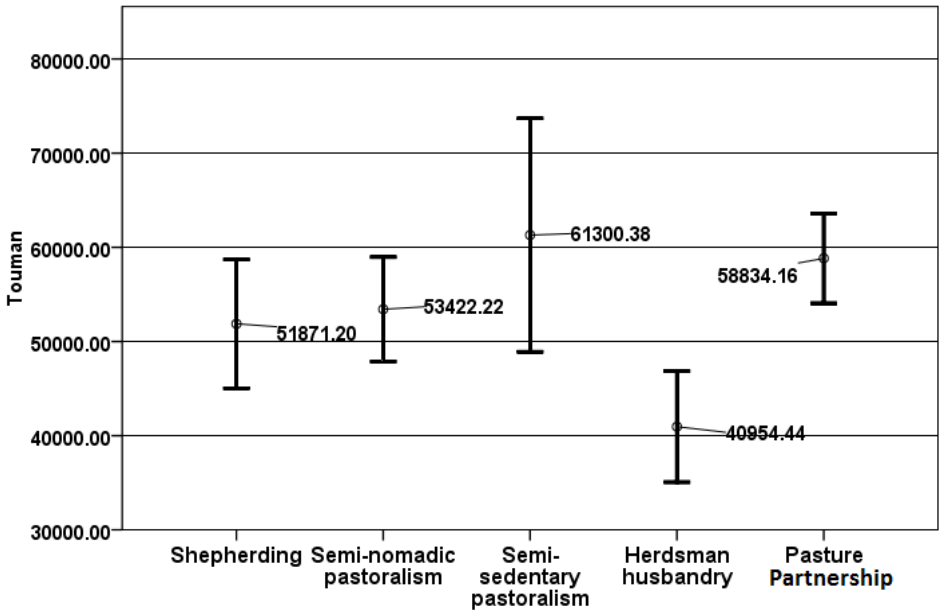


Figure 4-3 95% confidence interval average payment for winter fodder per head of animal in 2008-2009

Farmland: *"Khishinan Fieshinki Totmaz":* the plough and whistle do not get along". This very common proverb among the Shahsevan refers to their negative attitude toward agrarian economy. However, three socio-political and economic phenomena have been significantly contributing to integrating their pastoral economy into agricultural activities. Firstly, the period of nearly 10 years of forced sedentarization in the 1920s, beyond its negative impacts on their traditional life, acquainted them with the basic knowledge of agricultural practices. Secondly, the land reform and the nationalization of rangelands, as discussed earlier, persuaded the Shahsevan to convert many parts of their pastures to dry-farming land to secure their property titles on these lands. Thirdly, by increasing integration of their migratory economy to stall-fed livestock husbandry the access to farmland and producing part of the required fodder themselves is becoming a major priority for many Shahsevan.

Due to many legal and ecological constraints, however, they fail to fully realize their ambitions. As highlighted by many earlier studies, e.g.Tapper (1997), their rangelands are more suitable and productive as pasture than conversion to dry-farming. From the legal

perspective on the other hand, the Shahsevan have only utilization right of pasture and any change in land use are strictly forbidden.

Figures 4-4 and 4-5 present the amount of agricultural lands among the identified five Shahsevan pastoral groups. These graphs, indicate that the people practicing herdsman husbandry pastoralism hold significantly more irrigated lands (*suluakin/abi*) and dry-farming lands (*demakin/daymi*) in comparison with other groups. The maximum area of rain-fed cultivation for one household within this group is around 30 hectares. However, 75% of these households have less than 15 hectares of dry-farming lands. Their access to irrigated farming is slightly higher than that of the other groups and reaches more than 11 hectares. Semi-nomadic pastoralists hold the second position in possessing dry-farming lands with a maximum of up to 22 hectares. The distribution of rain-fed agricultural land in this category is more scattered compared to that of the herdsman husbandry: around 75% of these people hold less than 9 hectares of *daymi*. The access to irrigated lands, on the other hand, is significantly higher among the semi-sedentary pastoralists in comparison to the semi-nomadic pastoralists.

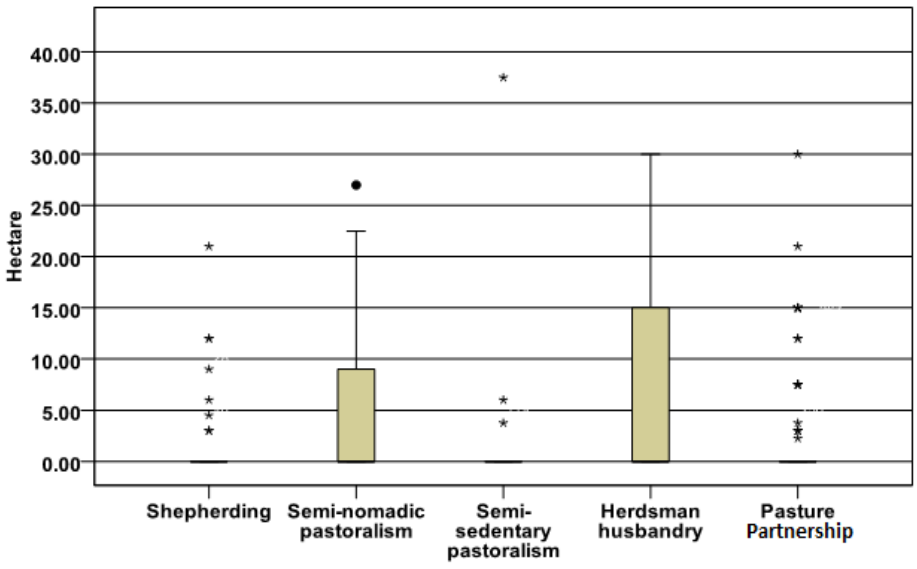


Figure 4-4 Variation of dry-farming lands among the Shahsevan with different livelihood strategies

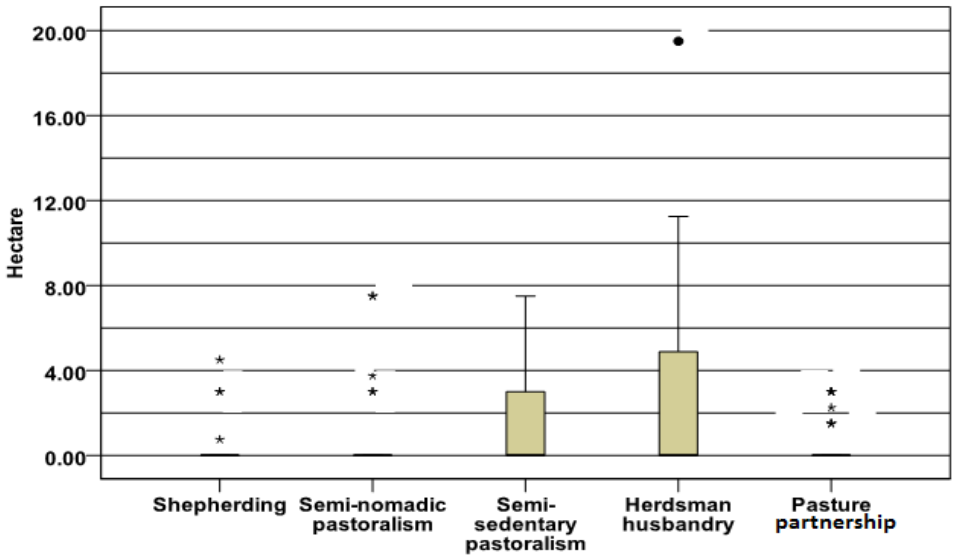


Figure 4-5 Variation of irrigated farmlands among households with different livelihood strategies

Sensitivity of natural capitals*:* It is easily understandable that ownership of natural capital and its control is probably the major asset of any pastoral household. It enables their owners not only to produce their urgently needed agricultural products and/or fodder for their animals, but also to rent out rangelands and/or farmlands if possible or necessary. Thus, it is not surprising that the quality of the natural capital, particularly of the rangelands, is the main source of livelihood for the majority of the Shahsevan. It contributes significantly to the sensitivity and flexibility of their pastoral economy to external stresses. However, collecting precise figures on the characteristics of pastures and farmlands held by individual households was not feasible in the context of this research. Reluctance in giving exact information, but also the complicated rules and traditions of land distribution and ownership rights (akcha - istil - charak) make it almost impossible to generate exact facts and figures. Therefore, proxy indicators such as the herd twinning rate and the pressure of livestock population on their rangelands were used to measure the sensitivity of their natural capitals.

Figure 4-6 compares - on the basis of a 95% confidence interval - the mean percentage of twinning rate of the herds among our five pastoral groups in the study area. From this graph, we can see that the lowest twinning rate belongs to the herds of pasture partnerships,

varying from approximately 5 to around 8 percent. In contrast: the highest twinning rate of livestock is 11.34 percent for herdsman husbandry, and by a 95% confidence interval it varied between nearly 9 to 13.5 percent. One unexpected finding was the higher twinning rate of livestock owned by shepherding households in comparison with semi-sedentary pastoralists and pasture partnerships, despite their poor access to rangelands (see table 4-2). This difference is based on the fact that their animals are mainly grazed on the rangelands of other pastoral groups, e.g. herdsman husbandry, semi-sedentary pastoralists or semi-nomadic pastoralists and benefit from their fine pastures.

The data of this figure will later be used for calculating their herd productivity and annual income from livestock rearing (see table 4-6). According to NLBC reports, the average twinning rate of the Moghani strain of sheep owned by the Shahsevan is 28.5% (NLBC 2011). The difference between this number and the twining rates of herd in each pastoral group therefore, is considered as an indicator for quality and sensitivity of their pastures.

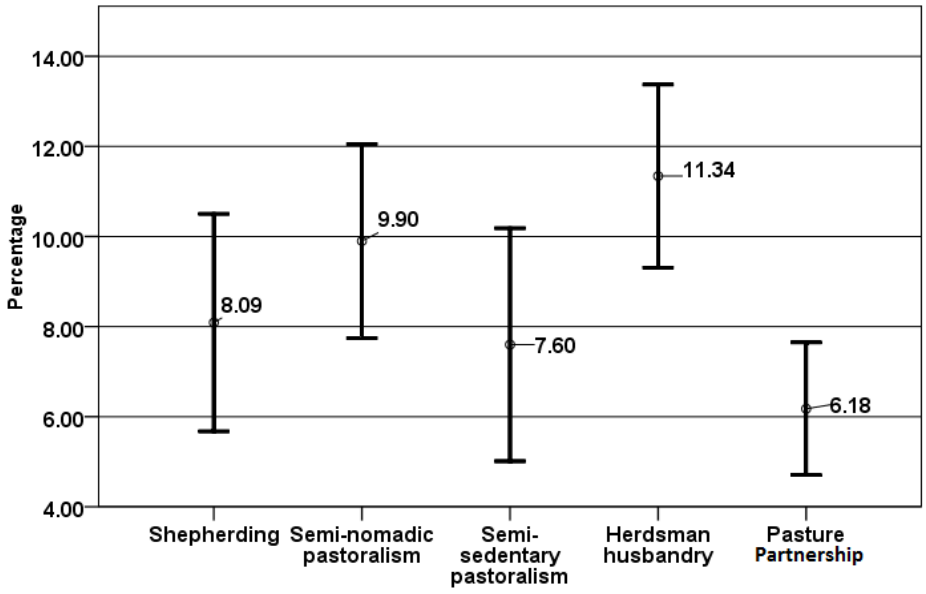


Figure 4-6 95% confidence interval average of twinning rate of animals held by the Shahsevan with different livelihood strategies

The pressure of livestock population on summer pastures is examined by the ratio of the current herd size to the carrying capacity of rangelands. As discussed earlier in chapter 3, each head of sheep and goats with lambs consumes around 12,000 Touman of forage in *yaylaq*. The Shahsevan, however, pay only for the portion of pastures they rent from other people. The fact that a herdsman husbandry pastoralist, for instance, pays an amount of 3,390 Touman per head of animals indicates that their own pastures are providing up to 72% (8,610 Touman) of the required forage for each animal. Multiplying this figure with their herd size of 250 animals (table 4-2) and then dividing it by 12,000 Touman will lead to 179 head of sheep and goats as the carrying capacity of their own pasture. The pressure on the summer pasture, therefore, can be obtained from dividing the number of animals held by each pastoral group by the calculated carrying capacity of their pasture (table 4-4).

In the winter campsites, on the other hand, the expenditure for supplementary fodder in normal conditions is determined by their livestock number and pasture size. In other words: the cost of fodder per head of animal rises significantly if the herd size exceeds the carrying capacity of the pasture held by a household. Every head of mature sheep and its lamb needs around 1.5 respectively 0.9 kilograms of dried fodder per day. Considering nearly 70 lambs and kids for every 100 head of sheep and goats, a herd of 100 mature animals will roughly consume 51 tons[7] of fodder during the eight months in *qeshlaq*.

Table 4-4 The characteristics of summer pasture held by households with different livelihood strategies (costs in Touman)

	Average cost of renting summer pasture/ head of animal	Average herd size	Value of forage from summer pasture/head of animal	Total value of forage on summer pasture	Carrying capacity of summer pasture	Pressure on summer pasture (herd size/ carrying capacity)
Shepherding	1700	65	10300	669500	56	1.2
Semi-nomadic pastoralism	5770	160	6230	996800	83	1.9
Semi-sedentary pastoralism	1400	75	10600	795000	66	1.1
Herdsman husbandry	3400	250	8600	2150000	179	1.4
Pasture partnership	6900	140	5100	714000	60	2.4

[7] Each ton of forage cost around 225,000 Touman in 2009-2010.

The total feeding costs, therefore, can reach up to 1,150,000 Touman per head of animal if their owners have no access to forage on pastures and farmlands. However, they will pay only a portion of this cost depending on their pasture and herd size, that is for the amount of additional forage required to feed the animal. The shepherding pastoralists, for instance, are paying 51,870 Touman per head of animal during the wintertime. In other words: their pasture is providing 63,130 Touman (55%) of required forage for each head of animal. This figure will be used to calculate the entire economic value of available forage on their pasture by multiplying it by the number of their sheep and goats. Then the carrying capacity of their pasture is estimated by dividing the total monetary value of forage on the pasture with the cost of forage required for each head of animal (Table 4-5). Finally, the pressure of livestock population on their rangeland, calculated by dividing their herd size with the estimated carrying capacity, is derived. These calculations allow us to understand and to compare the resources available to different Shahsevan pastoral groups. However, several considerations should be taken into account when dealing with the calculated carrying capacities. First of all, the value of forage on summer pastures is calculated based on its price in the market. It is assumed that they would pay the same price if they do not have access to pasture. Secondly, the carrying capacities were estimated based on the assumption that the animals are exclusively fed by the natural rangeland vegetation for the whole duration of their stay in *qeshlaq*. This capacity would be higher for exploitation system supplemented by stall-feeding for few months.

Table 4-5 The characteristics of winter pasture owned by households with different livelihood strategies (costs in Touman)

	Average cost of winter fodder/ head of animal	Average herd size	Value of forage from winter pasture/head of animal	Total value of forage on winter pasture	Carrying capacity of winter pasture	Pressure on summer pasture (herd size/ carrying capacity)
Shepherding	51870	65	63130	4103450	36	1.8
Semi-nomadic pastoralism	53420	160	61580	9852800	86	1.9
Semi-sedentary pastoralism	61300	75	53700	4027500	35	2.1
Herdsman husbandry	40950	250	74050	18512500	161	1.6
Pasture partnernership	58830	140	56170	7863800	68	2

Thirdly, the temporal distribution of these resources makes it impossible to use for the entire period of eight months in *qeshlaq*, and the Shahsevan are compelled to feed their herds in stable for nearly three months, as already shown in figure 3-2.

Finally, the crucial point is that in normal conditions many Shahsevan relieve the pressure on their rangelands by renting additional pastures and by purchasing supplementary fodder from the market. In the times of external stresses such as drought conditions however the feasibility of providing complementary fodder resources decreases significantly. Thus, the nomads are compelled to overexploit their own pastures to avoid the escalating costs of forage. Therefore, the estimated pressure of animal population is particularly felt in times of external stresses.

In summary, we have to conclude that the "natural capital" factor plays an important role - if not the most important one! - in the Shahsevan pursuit to adapt to the external stressors, to develop new and innovative livelihood strategies and to practice a flexible combination between land ownership, renting of land and the necessary additional purchase of fodder for their animals. However, natural capital is scarce, it is a limited resource and it is extremely unequally distributed among and accessible to Shahsevan households. Thus, it has to be supplemented by other capital factors in order to ensure the livelihood of all households.

4.3.2 Financial capitals: income and savings

It goes without any further discussion that many Shahsevan households live on the brink of poverty and that most of them can hardly sustain their livelihood on the basis of animal husbandry alone. Nevertheless, the herd sizes and the composition of the herds together with other sources of income constitute the main financial capital for the Shahsevan pastoral economy.

Herd size[8] and composition: The number of animals is mostly determined by the overall economic conditions of households and the availability of pasture and labor. Figure 4-7 illustrates the number of sheep and goats among the 297 interviewed households. It can be seen from this figure that only about 3% of the households own fewer than 50 head of sheep and goats. More than half of the population has a herd size ranging from 50 to 150 animals. The proportion of households owning larger herds gradually decreases to 6.5 percent with 200-250 head of animals. There is another small increase in the number of households where the animal number reaches 250-300 head and then declines to around 4 % of herd sizes with more than 300 head of sheep and goats. Figure 4-8 gives further details on the diversity of herd sizes among our five pastoral groups in the study area. From this figure, we can see that the smallest herd size is held by the shepherds with animal numbers between 40 and 90 head, while the first and third quartiles of their herd size are 60 respectively 70 head of animals.

In other words, more than 50 percent of the shepherds have around 60-70 head of sheep and goats. In the herdsman husbandry, in contrast, the animal number varies from 100 to 350 head, and more than 50% of the nomads in this category hold nearly 200 to 300 sheep and goats. Following the shepherds, the semi-sedentary pastoralists and pasture partners have the smallest herd sizes. There are also some exceptional large herd sizes with nearly 550 and 600 head of animals, which are highlighted as outliers in this figure.

[8] The Shahsevan have their own exclusive counting system and unit for counting the animal number which can be misleading for people from outside. First of all they include lambs in counting the herd size only after the first year when the red-brown color of the fleece changes to a white color (*aq-tuk*). Secondly, they use to count the animals of their herds by pairs, thus 40 pairs represent 80 head of sheep and goats. Thirdly, they only use the numbers from 1 to 49 for counting the pairs of animals. Therefore, the 40 pairs stand for 80 head of animals, and 49 pairs stand for 98 head of animals. After 49 pairs, they count one hundred followed by one hundred and one pairs, one hundred and two pairs, two hundred, two hundred and one pair and so on. Consequently, one hundred and thirty pairs, for instance, means 160 animals for them, while it indicates 260 animals for us.

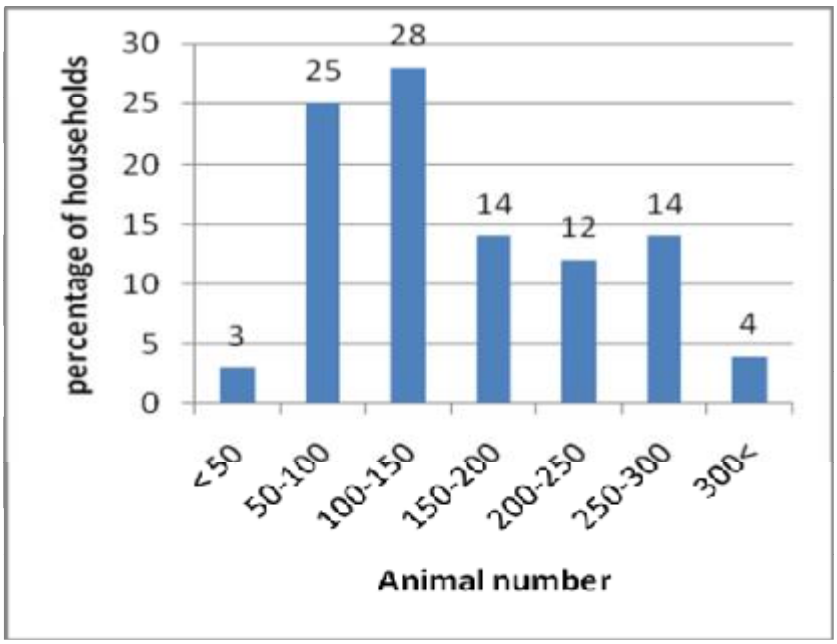


Figure 4-7 The number of animals owned by the Shahsevan households (N=295)

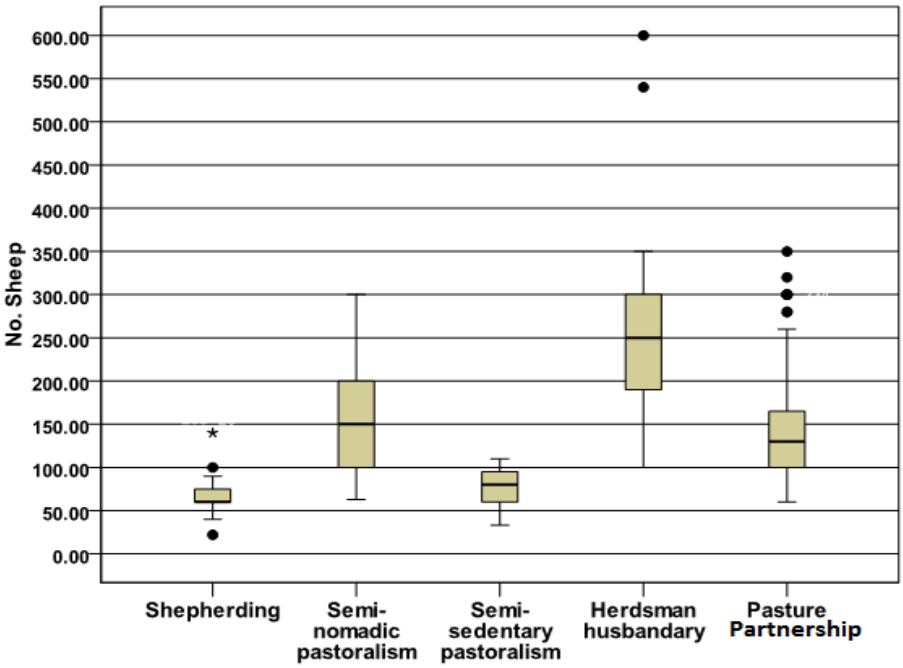


Figure 4-8 The number of sheep possessed by different Shahsevan households with different livelihood strategies

The sheep and goats are considered as the main financial resource and represent the preferred asset from the ecological, economic and social perspective. Sheep and goats are suitable for the rocky and steep pastures and can walk long distances between summer and winter pastures more easily than for instance cows and other milk- and meat-producing animals. Nevertheless, there are some differences in the economic performance of sheep and goats. Sheep are preferred due to their higher meat production while goats are considered useful because they demand less quality fodder and produce more milk. Goats are further important for the herd mobility, especially in summer time when the sheep prefer to stay in one place. However, goats can destroy and damage the stable, spoil the forage and even hit pregnant ewes. Therefore, those herd owners without enough stable capacity to separate goats from sheep prefer to have very few goats. The poorer nomads, on the other hand, mostly keep more goats because of their better milk production. According to Tapper (1979), the average ratio of goats to sheep in the Shahsevan herds was 15% to 20% during the time of his field work and varied from over 30% among the very poor families to less than 5% among the rich households. However, the considerable higher price of sheep milk and meat products is encouraging many Shahsevan to turn to sheep rearing.

The results of our survey sampling show that only 26% of all Shahsevan families had also cattle farming as part of their livestock economy. However, it shows considerable variations among our five livelihood strategy groups. The figure was around 19% and 22% for the households with shepherding and pasture partnership strategies, while nearly half (47.4%) of all households practicing semi-sedentary pastoralism had cattle farming. In the other words, the tendency for cattle faming among the more stationary pastoralists e.g. semi-sedentary Shahsevan were higher than the other pastoral groups. However, their number of cattle was mostly limited to 1-5 head of animal, while the cattle size of more than 10 head was prevalent in the herdsman husbandry households. By the time of my fieldwork in 2009-2010, the sheep milk was sold at 1000 Touman/kg while the cow milk was nearly 300 Touman/kg. The beef cow had further lower price of 3000 to 3500 Touman per kilogram compared to 4500 to 5000 Touman of sheep in 2009.

Income from livestock rearing: The income from livestock rearing is in nomadic societies normally the main source of income. This holds also true under present-day conditions, although its role and importance has diminished considerably. For our study, the income from livestock rearing has been calculated based on the average number of animals, i.e. sheep, goat and cattle in each livelihood group. Table 4-6 presents the details of pastoral production costs and sources of income. For instance, considering the 80% herd productivity and a 20% of goat to sheep rate (figure 4-9), the shepherding households with 65 head of animals will have nearly 42 fertile ewes and 10 fertile goats. According to NLBC (2011), the Moghani strain of the Shahsevan sheep is characterized by a 96% fertility rate and a 92% lambing rate. Consequently, with an average twinning rate of 6.18% in their herd (see figure 4-6) the family will have 48 lambs and 12 kids annually. Taking into account the 8% annual loss in lambs and 5% in adult sheep and the 20% replacement rate of barren ewes and rams (NLBC 2011), the family will have 33 lambs of around 37 kg, eight adult sheep of around 50 kg, eight kids of 20 kg and three goats of 30 kg to sell each year. Furthermore, they will produce around 3900 kg milk and nearly 100 kg of fleece annually. With an average price of 4500 Touman per kilogram of their animal products and 1000 Touman for each kilogram of milk or fleece (average prices in 2009-2010), the

Table 4-6 The annual income of Shahsevan households from livestock rearing (Income and costs in 1000T)

	Shepherd	Semi-nomadic	Semi-Sedentary	Herdsman	Pasture partnership
Herd size	65	160	75	250	140
Goat	13	22	13	30	24
Sheep	52	138	62	220	116
Cattle	0.83	1.64	2.63	4.26	1.2
Fertile goat	10	17	11	24	19
Fertile sheep	42	111	50	176	93
Lamb number	40	108	48	174	87
Lamb loss	4	11	5	17	9
Replacement	10	28	12	44	23
Lamb sale	26	70	31	113	55
Sheep sale	8	21	9	33	17
Income - lamb	4262	11575	5132	18748	9177
Income- sheep	1755	4671	2088	7425	3912
Kids number	10	17	10	24	18
Kids replacement	3	4	3	6	5
Kids loss	1	2	1	2	2
Kids sale	7	11	7	16	12
Goat sale	3	5	3	6	5
Goat income	405	675	405	810	675
Kids income	630	990	630	1440	1080
Calf meat	99.6	196.8	315.6	511.2	144
Income - calf	349	689	1105	1789	504
Cattle milk	1008	1992	3195	5175	1458
Income- cattle milk	302	598	959	1553	437
Annual sheep milk (kg)	3900	8976	4387	13800	8165
Income- sheep milk	3900	8976	4387	13800	8165
Annual fleece sale	96	256	114	408	213
Income - fleece	96	256	114	408	213
Total income	9945	28430	14821	45973	24163
Winter fodder cost	3587	8985	5403	11109	8589
Cost of pasture rent	110	923	105	850	966
Water, electricity transportation	415	1009	529	1628	876
Veterinary	207	505	265	814	438
Infrastructure (stable)	691	1682	881	2713	1460
Shepherding	1708*	4205**	1972	6571	3680*
Total cost	5011	15207	9155	23689	12329
Annual net income from herding	4933	13222	5666	22287	11834

*All by household labour

** Partially by household labour

household will earn the sum of 9,945,000 Touman from livestock rearing. This figure must, however, be balanced against the production cost of 5,011,000 Touman; it amounts to approximately 77.100 Touman per head of animal annually. This figure highly depends on access to different resources and varies among the different pastoral groups. It can therefore be considered only as a rough estimate. The shepherds, for instance, receive part of their wages in form of free herding of roughly 60-65 head of their own animals on arbab pastures. Consequently, their average payment for summer pasture is nearly 1700 Touman per head of animal compared to 6900 Touman of pasture partnership pastoralists.

All in all, the shepherd households will have a net annual income of 4,933,000 Touman from animal husbandry. This is the lowest annual income from livestock rearing, while the herdsman husbandry pastoralists will earn the highest annual income of 22,287,000 Touman among the Shahsevan pastoral groups (table 4-6). These figures again demonstrate the wide variety of today's nomadic economies and stand for the dangers of too quick and too simple generalizations.

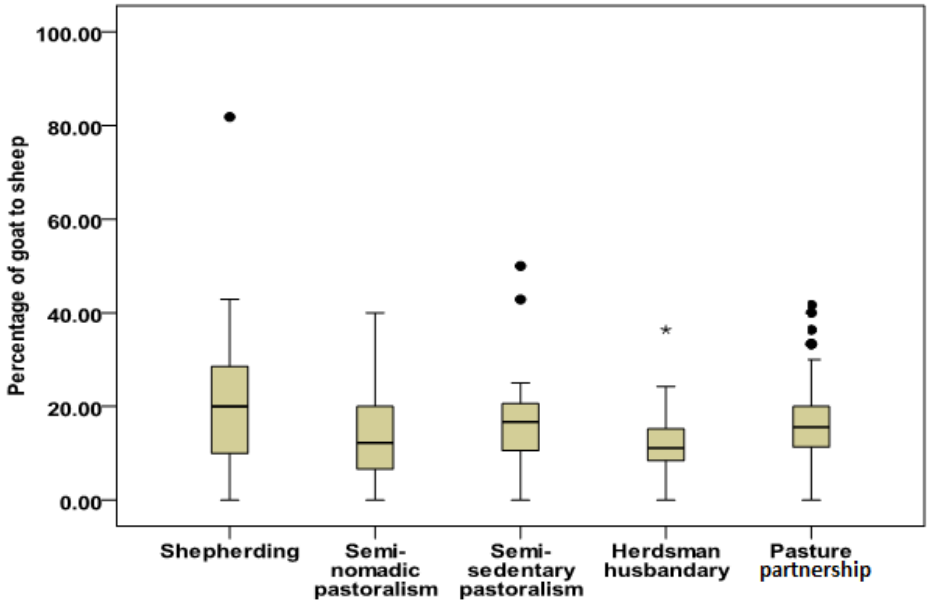


Figure 4-9 The percentage of sheep to goats in the herds of the Shahsevan

Income from agriculture: Income from farming is considered the second main source of income form many Shahsevan nomads. Lucerne and sainfoin are the dominant forage crops (*gu-akin*) cultivated by the Shahsevan in irrigated farmland while cereal (*aq-akin*), e.g. barley and wheat, is preferred in dry-farming areas. Wheat is the preferred crop on *daymi* lands because the government guarantees attractive purchase prices. However, many Shahsevan grow also barley for their own animal consumption. In 2009, both barley and wheat had an average price of 300,000 Touman per ton. In addition, nearly 250 kg of hay for each ton of cereal priced at 70,000 Touman per ton is produced. The cultivation of each hectare of irrigated (*suluakin/abi*) farming and dry-farming (*demakin/daymi*) costs roughly 300,000 Touman respectively 100,000 Touman.

Prices of production costs and the market value of wheat, barley or hay are one side of the coin. The available hectarage for the households and the distribution of these lands into *suluakin/abi* or *demakin/daymi* is the other side. According to our findings, the average size of farmlands among the Shahsevan pastoral groups and their annual income from agricultural activities is presented in table 4-7. From this table, we can see that the herdsman husbandry pastoralists had the highest annual income of 8,913,000 Touman from their farmlands while the shepherding pastoralists with 1,525,000 Touman earned the lowest annual income from farming. These figures are by no means surprising in view of the different average farm sizes available to the members of the different groups. On the whole, however, they show the relatively minor importance of agriculture compared to animal husbandry. Even if - for reasons of confidentiality and also fear - it was not possible include the costs of agricultural production, the comparison of table 4-7 with table 4-6 indicates the relatively minor economic importance of crop cultivation for the majority of the Shahsevan compared to livestock husbandry. Nevertheless and for reasons discussed earlier, agriculture has a vital role to play, especially in view of the vital importance of their pastoral economy's decreasing dependence on the fodder market and to protect their pastoral households from price fluctuations.

Table 4-7 Income from farming among the Shahsevan households with different livelihood strategies (income in 1000T)

	Dry-farming (hectare)	Irrigated farming (hectare)	Income from dry-farming	Income from irrigated f.	% income from dry - farming	% income from irrigated f.	Total farming income
Shepherding	1.76	0.56	663	861	43	57	1525
Semi-nomadic	6.02	0.77	2268	1183	65	35	3452
Semi-sedentary	2.48	1.66	934	2552	27	73	3486
Herdsman H.	9.78	3.4	3685	5227	41	58	8913
Pasture partner	2.6	0.41	979	630	60	40	1610

Sensitivity of financial capitals: Animal husbandry, crop cultivation and off-farm activities, including labour work and herding are considered as the main sources of income for the majority of Shahsevan. Table 4-8 illustrates the total annual income situation and its importance for the different Shahsevan pastoral groups. It can be seen that the herdsman husbandry pastoralists have the highest income of over 33,650,000 Touman per year, while the pasture partnership pastoralists followed by the shepherding households have the lowest income with around 13,880,000 Touman and 10,300,000 Touman annually. However, their financial situation as well as the composition of the different incomes according to their success show a broad variety. As shown in table 4-8 herding is the main income source for all Shahsevan groups, ranging from approximately 48% of the total income of sheepherders to 85% of those practicing pasture partnerships. Vice versa: these groups have also the biggest differences in off-farm incomes: 37% vis-à-vis less than 4%.

Table 4-8 Annual income and its sources among the Shahsevan households with different livelihood strategies (income in 1000 Touman)

	Livestock rearing		Agriculture				Off-farm activities; shepherding, labour work		Total annual income
			Dry-farming		Irrigated farming				
Shepherding	4933	48%	663	6.4%	861	8.3%	3853	37.3%	10310
Semi-nomadic	13223	74%	2268	12.7%	1183	6.6%	1156	6.7%	17831
Semi-sedentary	5666	51.6%	934	8.5%	2552	23.2%	1833	16.7%	10986
Herdsman husbandry	22287	66%	3685	10.9%	5227	15.5%	2450	7.6%	33650
Pasture partnership	11834	85%	979	7%	630	4.5%	436	3.5%	13880

Considering the higher sensitivity of rain-fed cultivation (*daymi*) to climate stresses in comparison with the irrigated farming (*abi*), the percentage of income from dry-farming can be considered as another indicator for the sensitivity of the Shahsevan financial capital. As the data in table 4-8 show, the semi-nomadic pastoralists, followed by herdsman husbandry, have the biggest share of their annual income from rain-fed cultivation. Semi-sedentary pastoralists, on the other hand, have the highest percentage of their annual revenue from irrigated farming, which makes them less sensitive to climate stresses.

Altogether it becomes very obvious that the "financial capital" sector is still a major asset of all Shahsevan nomads. The income sequence livestock - agriculture - off-farm activities is valid for all groups. Only the shepherds have to rely stronger than the others on off-farm income, especially in view of their poor access to agriculturally usable lands. The more they have to depend on and look for other forms of survival strategies that are beyond the pastoral and agricultural sphere. These are to be found in traditional nomadic societies in indigenous social networks or - in our present "modern" world - in activities beyond the nomadic society and economy.

4.3.3 Social capitals: networks and associations

Social capital plays a central role in responding to external stresses and pressures among the Shahsevan. It facilitates their access to different resources and opportunities and further helps them to cope with negative consequences of stressors. Particularly where the formal institutions and organizations, e.g. with the regulations of grazing licenses or range management plans, hamper flexible solutions for rights on pasture, inherited social traditions and long-standing relationships are the only trustworthy means of securing access to the required resources.

Among the many institutions of this kind, only one shall be mentioned as part of a functional social network and association: *kheir-o-shar* (joy-and-sorrow). It is the most significant social capital factor with diverse socio-economic functions for the Shahsevan. It is a social network

developed by individual households of close friends and relatives to practice mutual help and support in different situations. It comes in place case of great hardship, for instance, such as significant animal loss due to natural events. The members of the *kheir-o-shar* donate some animals to help the affected family in rebuilding their herd and provide other means to overcome the setback. The network further provides a unique platform for exchanging information on available pastures or *labour* opportunities and helps them to find the proper counterparts for joint campgrounds, herding and pasture leasing. The mutual trust established within the networking process guarantees a maximum of social and economic interaction among the Shahsevan.

The networking process starts with receiving an invitation from a friend or kin to participate in a social event, e.g. a wedding ceremony, and the family will be automatically included in the network by accepting the invitation. The participants will contribute some money as gift. The record of contributions will be kept by the host family for compensation in a similar event. The amount of gifts mostly varies between 20,000 Touman and 50,000 Touman, and the total contributions can reach to 3,000,000 Touman for small networks to up to 15,000,000 Touman for extended networks. Ending the relationship with the other members, on the other hand, is considered socially very awkward and counterproductive. Therefore, partnerships are carefully selected and established on the basis of whom they can trust. The size of the network is mostly determined by the social-economic position of its members. This also explains that the wealthy and influential families are associated with more people. Consequently, the number of *kheir-o-shar* events - wedding and funeral ceremonies - and the participation of household heads or their representatives is considered very relevant for evaluating their role and function as social capital. The Kruskal-Wallis test is applied to examine the difference in the number of *kheir-o-shar* among Shahsevan pastoral groups, and the results were statistically significant at 1% level, ($X^2(4) = 17.491$, $p=0.002$). As can be seen from table 4-9 the shepherds and the herdsman husbandry pastoralists had the lowest and highest mean ranks in the number of social events respectively.

Table 4-9 Results of Kruskal-Wallis test on the number of Kheir-o-Shar attended in 2009 by Shahsevan households with different livelihood strategies

	main livelihood	Average No. Events	Mean Rank
Number of events participated in 2009	Shepherding	8.1	49.80
	Semi-nomadic pastoralism	15.6	83.43
	Semi-sedentary pastoralism	14.2	89.15
	Herdsman husbandry	15.1	91.51
	Pasture partnership	10.8	66.14

The number of events as well as the mean rankings can be interpreted as an expression of the social cohesion among the different groups. But it also shows another fact: the similarity of figures in shepherding and pasture partnerships, and to a greater extent among the semi-sedentary and herdsman husbandry pastoralists, is revealing the fact that the size of their social network is obviously and definitely influenced by the degree of their stationary life. In other words: nomads with a more sedentary lifestyle have bigger-sized social networks..

This observation can be explained by the change in Shahsevan lifestyle. According to Tapper (1979), the Shahsevan used to organize weddings and other planned festivities commonly after the main sheep-selling period in the *yaylaq*. Consequently, the majority of them was able to actively participate in these social events. By the gradual shift to permanent dwellings in *qeshlaq* and better access to basic services in the winter quarters, almost all social events are held in *qeshlaq*. Consequently, those nomads who are fully engaged in seasonal migration have fewer opportunities to attend many of these important events organized in the summer time.

Imaji is another form of association between the Shahsevan nomads. It is much smaller in size than *kheir-o-shar* and only limited to immediate neighbors and cousins. For many issues, such as sheering the herds and washing the wool, making tent covers, packing and loading the luggage for migration, building houses and stables, the household head informs some of his male cousins and neighbors to come and help. They will not be paid for their work but will be

served with food, tea and light meals during the work. The women use *imaji* for washing the wool, making bed cloth and cooking bread. However, as the data showed no significant difference in the size of *imaji* among the pastoral groups they will not be discussed further.

Natural and financial capital are increasingly exposed to external factors of stresses. Especially the political interferences into the traditions of nomadism, the rapidly growing conversion of rangelands into farmlands, but also the competitive disadvantages of pastoral products on local and regional markets: all these factors add to increasing vulnerabilities of the Shahsevan nomads and households. Therefore, it is not surprising that traditional institutions and networks gain momentum in the nomads' search for survival and sustainable livelihood strategies. However, it becomes more and more apparent that new adaptations to the growing pressures and new sources of income have to be generated. And these may lie outside the nomadic realm.

4.3.4 Human capitals and labour

In regard to human capital there are three main factors that are significantly influencing the adaptation and coping capacity of Shahsevan to external pressures: namely age, education and labour. On the one hand, the nomads' production system is very labour intensive. The nomads without adequate household labour will have lower capacity to withstand outside pressures and stresses. On the other hand, also young nomads need formal education. Education is a precondition for obtaining access to information, resources and facilities, particularly the ones offered by bureaucratic state organizations. The education further facilitates people's access to new income sources, which can potentially supplement their pastoral economy and diminish pressures on their limited resources.

Education and age: Several aspects of the Shahsevan contemporary life make education critically important for a number of reasons. Firstly, the increasing integration of the nomadic production system into market economy and its competition with stationary and industrial livestock husbandry demands appropriate access to information and opportunities outside

pastoral life. Therefore education, particularly for the children, will help to diversify household income sources and reduce the pressure on available resources. Secondly, since nationalization of the rangelands in the 1960s, traditional nomadic rights on rangelands are embedded in very complicated and bureaucratic institutions of state organizations. Education is necessary to understand this complexity. Educated and knowledgeable young people are needed who can argue and fight for the nomadic rights on lands and other resources.

Analyzing the average years of education completed by the household heads among the Shahsevan nomads indicates a significant relationship between types of pastoral livelihood and education level. Again, the results of the Kruskal-Wallis test on the data are presented in table 4-10. The data show a statistically significant relationship between the level of sedentary lifestyle and schooling years, ($X^2(4) = 12.957$, $p=0.011$): semi-sedentary pastoralists and pasture partners had the highest respectively the lowest education level achieved.

The maximum schooling years of the family members is considered as a second important indicator of education among the Shahsevan pastoral groups. As shown in figure 4-10, with a 95% confidence level, the pasture partnership and shepherding households had the lowest range of study years varying from approximately seven to nine years.

Table 4-10 Results of Kruskal-Wallis test on the number of education years completed by households with different livelihood strategies

	main livelihood strategies	N	average year of education	mean rank
Education of household head	Shepherding	41	1.17	130.82
	Semi-nomadic pastoralism	58	1.43	135.77
	Semi-sedentary pastoralism	19	2.47	172.61
	Herdsman husbandry	67	2.2	154.76
	Pasture partnership	92	1.01	126.27
	Total	277		

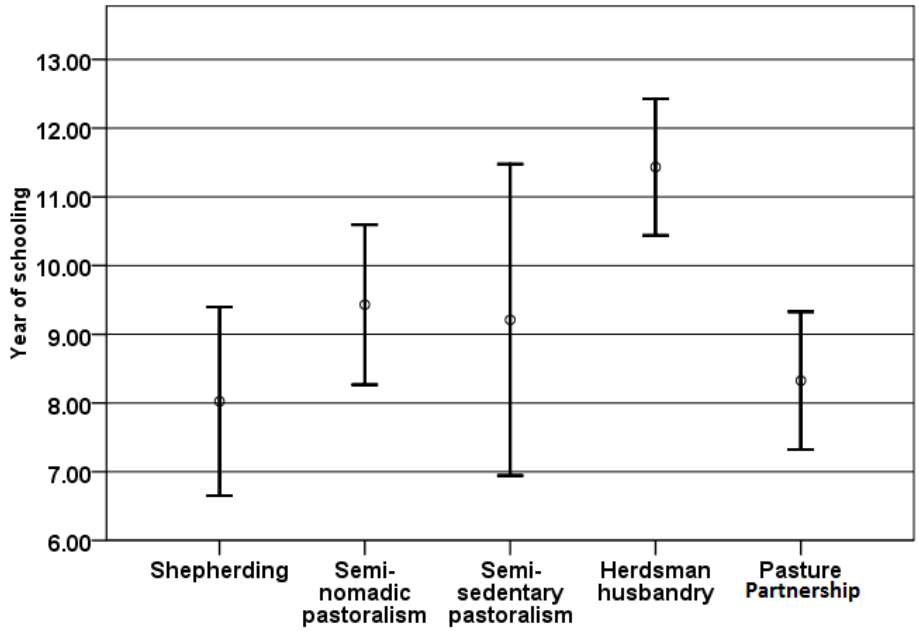


Figure 4-10 95% confidence interval maximum education level of household members among the Shahsevan with different livelihood strategies

In contrast, the households practicing herdsman husbandry pastoralism had the highest education between 10.4 to nearly 12.5 years.

Considering the average of 12 years schooling for obtaining a high school diploma, it can be expected to see at least one person in every herdsman husbandry household who finished (or is about to finish) his high school education. This, in turn, increases their capacity to negotiate and uphold their right on resources particularly in the bureaucratic system of state organizations.

Labour force: Labour is one of the main cost factors in the pastoral production system. Herding, for instance, accounts for more than 20% to 30% of the Shahsevan production costs, while several other activities, e.g. dairy production, require more people. Although there are many kinds of cooperation in herding and other activities to minimize the required labour force, the Shahsevan are facing a real challenge of labour shortage due to the increasing tendency of the younger generation to sedentarize and look for an urban-based lifestyle. The average of people over fifty years as household heads (figure 4-11) indicates the

dominance of the older population groups in the Shahsevan pastoral society. Also in regard to the "human capital" there are considerable differences among the five Shahsevan pastoral groups in the availability of household labour and dependence on the labour market. Those with adequate family size will rely preferably on the household labour, thus diminishing the cash payment for production costs. Shepherds and pasture partners, for instance, manage the herding by their own family members and save the amount of 26,300 Touman cash payment for every head of sheep and its lambs that are herded separately. Herdsman husbandry and semi-nomadic pastoralists in contrast entrust one or both herds to hired shepherds and pay roughly 13,150 Touman for each animal (table 4-6). Therefore, the payments for labour per head of animal can also be properly used as an indicator for the household human capital.

Sensitivity of human capitals: The highly labour-demanding nature of pastoral nomadism make especially those households headed by elderly people extremely sensitive to external pressures and stresses. As shown in figure 4-11, the age of the household heads for the shepherding pastoralists is slightly lower than that of other pastoral groups and varies between 30 to 72 years.

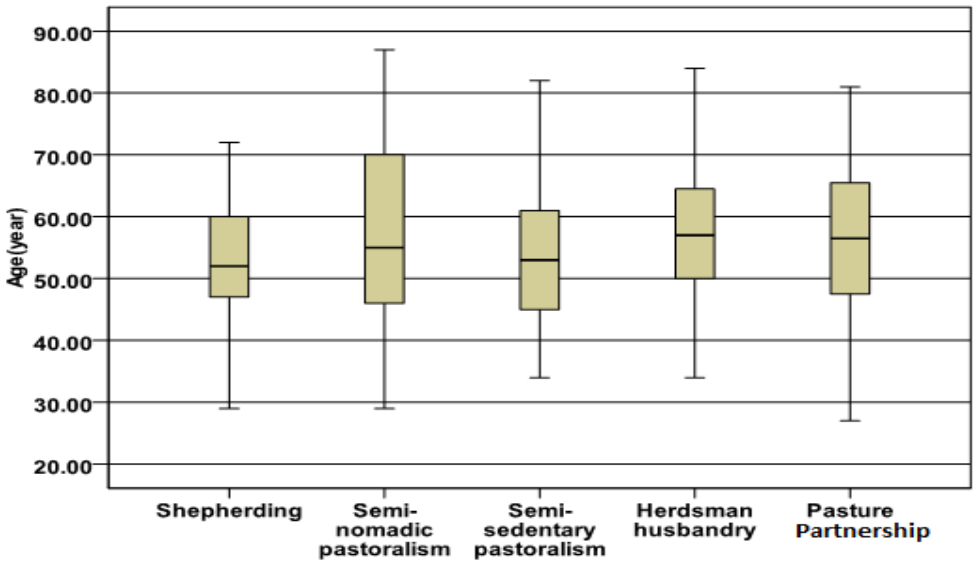


Figure 4-11 The age of household heads among the Shahsevan households with different livelihood strategies

Particularly for the semi-nomadic pastoralists, the maximum age of a household head can reach to more than 80 years, and the average age is a little higher than with the shepherds. The Kruskal-Wallis test was also applied to these data to evaluate the relationship between the type of pastoral livelihood and the age of the household head. The null hypothesis was not rejected, $X^2(4)= 5.243$, $P>0.05$. In other words: the differences in the age of household heads among the pastoral groups were not statistically significant. Consequently, the percentage of household heads aged over 65 years (third quartile of the whole population) was used to compare the sensitivity of human capital among these categories. It can be seen from the data in table 4-11 that the semi-nomadic pastoralists followed by pasture partnerships have the highest and the shepherding households the lowest portion of household heads aged over 65 years. One has to keep in mind, however, that the age limit of 65 is, of course, a very high one.

The more one has to be aware of the overall structure of the Shasevan nomads in which the younger generation prevails. What will happen to the "human capital" factor and its importance for the nomadic labour market if more and more of the younger people prefer sedentarization and life in urban environments?

Table 4-11 The percentage of household head aged over 65 years among the households with different livelihood strategies

			main livelihood					
			Shepherding	Semi-nomadic pastoralism	Semi-sedentary pastoralism	Herdsman husbandry	Pasture partnership	Total
Household aged over 65	yes	Count	8	23	4	17	27	79
		% within main livelihood	19.5%	39.7%	21.1%	25.4%	29.3%	28.5%
	no	Count	33	35	15	50	65	198
		% within main livelihood	80.5%	60.3%	78.9%	74.6%	70.7%	71.5%
Total		Count	41	58	19	67	92	277
		% within main livelihood	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

4.3.5 Physical capitals

In the context of the sustainable livelihood framework, the physical capital is defined as the basic infrastructure and the ownership of manufactured goods required to support the livelihood (DFID 1999). It includes access to services such as water supply and sanitation, electricity, health services, markets, transportation means etc. As already noted, however, many of these assets, such as electricity and tap water, are available only in rural or urban population centers and not so much in the scattered areas of individual nomadic households. Consequently, the resources that had statistically significant variations at household level, e.g. means of transportation, communication devices, quality of housing or access to markets, were used for the aim of this research.

Communication devices: Telephones and mobile phones are the most important modern means of communication among the Shahsevan. They connect them to the sedentary people and facilitate their access to information and markets. Based on the data collected in our survey sampling, 74% of all Shahsevan households had telephones in their winter houses. However, the relationship between their livelihood strategies and access to telephone lines was examined using the Chi-Square test, and the results were statistically insignificant at 5% level, ($X^2(4) = 8.051$, $p=0.090$). In other words: the access to telephones was more subject to the location of their *qeshlaq* rather than to their livelihood strategies.

Conversely, the access to mobile phones was greatly influenced by their socio-economic conditions and varied significantly among the pastoral groups. As shown in table 4-12, around 54% of Shahsevan households had at least one mobile phone in their home. The highest and lowest figures of access to mobile phones were 71.6% and 40% among the herdsman husbandry and shepherding families respectively. The results of the Chi-Square test indicate the statistical significance of these differences at a 0.01% level, ($X^2(4) = 13.918$, $p=0.008$). Consequently these figures can be considered as representative for the diversity of access to communication devices among the Shahsevan pastoral groups.

Table 4-12 Access to mobile phones in 2009 by Shahsevan households with different livelihood strategies

			main livelihood					
			Shepherding	Semi-nomadic pastoralism	Semi-sedentary pastoralism	Herdsman husbandry	Pasture partner	Total
Mobile phone	yes	Count	16	31	11	48	42	148
		% within main livelihood	40.0%	53.4%	57.9%	71.6%	46.2%	53.8%
	no	Count	24	27	8	19	49	127
		% within main livelihood	60.0%	46.6%	42.1%	28.4%	53.8%	46.2%
Total		Count	40	58	19	67	91	275
		% within main livelihood	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Means of transportation: Traditionally, animals (horses, mules and donkeys) and particularly camels used to be the main means of transportation for the majority of Shahsevan. However, due to changes in their migrational patterns and also due to adaptations to modern means of transportation and in order to avoid conflicts with farmers and urbanites, the possession of an individual vehicle is becoming a main priority for the majority of the Shahsevan and their annual migrations. However, according to the results of our field survey, only 23.6% of all households possessed their own individual cars. Yet, this figure varies significantly among the Shahsevan pastoral groups. As can be seen from table 4-13, the households practicing herdsman husbandry had the highest percentage (38.8%) of an own vehicle. On the other hand, only 12.5% of the shepherding families possessed individual cars. The results of the Chi-Square test verified a statistical significance of the observed differences at 5% level, ($X^2(4) = 15.205$, $p=0.004$). Therefore the percentage of households holding their own car is used as an appropriate indicator of physical capital among the five pastoral groups.

Sensitivity of physical capitals: Access to market and also type of dwelling significantly influence the sensitivity of the Shahsevan livelihoods towards socio-economic and climate stresses. They generally use four types of houses, namely *alachiq*, *kuma*, modern tents and concrete buildings in winter and summer pastures depending on their socio-economic conditions.

Table 4-13 Access to personal cars in 2009 by the households with different livelihood strategies

			main livelihood					
			Shepherding	Semi-nomadic pastoralism	Semi-sedentary pastoralism	Herdsman husbandry	Pasture partnership	Total
Car	yes	Count	5	15	5	26	14	65
		% within main livelihood	12.5%	26.3%	26.3%	38.8%	15.2%	23.6%
	no	Count	35	42	14	41	78	210
		% within main livelihood	87.5%	73.7%	73.7%	61.2%	84.8%	76.4%
Total		Count	40	57	19	67	92	275
		% within main livelihood	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Their traditional tent is called *alachiq* and is used as the main dwelling, both in summer and winter rangelands. Its wooden structure is made of 24-28 curved struts (*chubekh*) connected to a wooden roof-ring called *chanbareh*, which is securely anchored to the ground by a huge peg. The resulting hemispherical shape makes it stable against strong winds. The felt cover keeps it warm in winter and cool in summertime, especially in comparison to modern tents with fabric cover. The wooden structure of *kuma* is made of the stems of local trees, which make it lighter and cheaper than *alachiq*. A small size *alachiq* (24 *chubikh* and nearly 20m²) for instance, would cost about 1,500,000 Touman. In contrast, a same size *kuma* and modern tent will cost about 200,000 and 500,000 Touman respectively. Likewise, building a small (two rooms totaling 30m²) rural house will require roughly 5,000,000 Touman. Considering the unsuitability of *kuma* and modern tents to temperature extremes, the cumulative percentage of households using them as the main shelter in *yaylaq* was used to examine the sensitivity of their physical resources.

However, concrete buildings became the dominant house form from the 1960s onwards. Today, more than 90% of all households in *qeshlaq*, but only 7% of the households, mostly shepherds and pasture partners coming from other regions, use *alachiq* as main dwelling.

Again, the Chi-Square test was applied to examine the relationship between the type of shelter used in summer and winter pasture. The results are statistically significant only for their summer camps. Table 4-14 presents the different house types used by the Shahsevan in their summer pasture in 2009. As shown in this table, nearly 60% of 277 households used *alachiq* as their main shelter in *yaylaq*. However, this traditional form was used by more than 76% among the herdsman husbandry pastoralists and only by 32% of the households practicing semi-sedentary pastoralism. In contrast: the shepherding families had the highest percentage of *kuma* as their main shelter.

Table 4-14 The main dwelling types of the Shahsevan with different livelihood strategies

			main livelihood					
			Shepherding	Semi-nomadic pastoralism	Semi-sedentary pastoralism	Herdsman husbandry	Pasture partnership	Total
Main Dwelling	Building	Count	0	1	2	1	0	4
		% within main livelihood	.0%	1.7%	10.5%	1.5%	.0%	1.4%
	Alachiq	Count	18	38	6	51	53	166
		% within main livelihood	43.9%	65.5%	31.6%	76.1%	57.6%	59.9%
	Tent	Count	13	16	11	13	35	88
		% within main livelihood	31.7%	27.6%	57.9%	19.4%	38.0%	31.8%
	Kuma	Count	10	3	0	2	4	19
		% within main livelihood	24.4%	5.2%	.0%	3.0%	4.3%	6.9%
Total		Count	41	58	19	67	92	277
		% within main livelihood	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Access to market: As discussed earlier, the majority of Shahsevan sell their animals in midsummer before a considerable decline in quality and quantity of the natural vegetation on their *yaylaq* diminishes the quality and the weight of their animals. However, due to a higher supply of livestock in this period the prices are considerably lower. This observation holds true especially for the predominantly nomadic areas in comparison with the markets in population centers. Therefore, access to market, particularly in drought years, plays an important role in the sensitivity of their pastoral economy to external stresses. Table 4-15 shows the place of selling the livestock by different Shahsevan pastoral groups in 2009-2010.

The data reveal that more than 68% of the Shahsevan are selling their animals to dealers and middlemen in their summer pasture and only 32% sell them in the markets of Parsabad, Ardabil and Tehran cities. Among the pastoral groups, however, there are significant differences in their access to market. More than 80% of all shepherding households, for instance, sold their animals to dealers, while almost 50% of the herdsman husbandry pastoralists could take their animals by their own to the markets in nearby cities. In contrast: more than 73% of the households of semi-sedentary pastoralists sold their animals to local dealers. The relationship between their livelihood strategies and their access to market was examined using the Chi-Square test and produced statistically significant results at 5% level, ($X^2(4) = 10.011$, $p=0.040$). Therefore, the percentage of households without proper access to the market was used as an indicator for the sensitivity of their livelihood to socio-economic and climate stresses.

Remembering the fact that this chapter deals with different dynamics of vulnerability at community level, we have to recall to our minds that this community level is represented by five nomadic groups that are differentiated by their differing strategies to adapt to external pressures and to ensure their livelihood.

Table 4-15 Place of selling livestock in 2009-2010 by the households with different livelihood strategies

			Pastoral livelihood strategies					
			Shepherding	Semi-nomadic pastoralism	Semi-sedentary pastoralism	Herdsman husbandry	Pasture partnership	Total
Place of selling livestock	To dealer in *yaylaq*	Count	33	41	14	36	65	189
		% within main livelihood	80.5%	70.7%	73.7%	53.7%	70.7%	68.2%
	To market	Count	8	17	5	31	27	88
		% within main livelihood	19.5%	29.3%	26.3%	46.3%	29.3%	31.8%
Total		Count	41	58	19	67	92	277
		% within main livelihood	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

These groups are, as outlined in table 4-2, in our study the following ones:

Shepherds - pasture partnerships - semi-nomadic pastoralists - semi-sedentary pastoralists - herdsman husbandry households.

All statistical analyses (tables 4-3 to 4-15) are based on this grouping and reveal adaptive strategies, which differ mainly because of the different socio-economic backgrounds and standings of these five groups. The question remains, how their differing access to and availability of "capital assets" can be combined to a more or less coherent survival strategy.

4.4 Access profile and adaptive capacity: a methodological approach

So far 17 indicators (see Fig. 4.12) of adaptive capacity of the Shahsevan pastoral nomads have been identified and discussed in five categories, namely: social, financial, human, natural and physical capitals. The access to these resources at household level was examined against the five distinct livelihood strategies adopted by the Shahsevan. However, evaluating the adaptive capacity of these social groups requires an aggregated single index. To this end, two further steps are required. First, due to the diversity of units used for measuring the indicators, the data were normalized before entering them in calculation. For the normalization process, the equation 4.1, employed by UNDP for transforming the indicators of the Human Development Index (HDI) into normalized dimensions index (UNDP 2012) and calculating the standardized value for each indicators, was adopted.

$$Ni_g = \frac{\mathrm{Xi_g} - \mathrm{Xi_{min}}}{\mathrm{Xi_{max}} - \mathrm{Xi_{min}}} \qquad \text{Equation 4.1}$$

Where Ni_g is the normalized value and $\mathrm{Xi_g}$ is the average of observed values in the specific pastoral groups and $\mathrm{Xi_{max}}$ and $\mathrm{Xi_{min}}$ are the maximum and minimum values of indicators among all households in our survey sampling. To avoid the influence of outliers on the relative comparison, the box plot was used to identify the upper and lower value of each indicator among all pastoral groups (table 4-16). Furthermore, for three indicators - i.e. means

of transportation, communication devices and household labour - the percentage of households having access to these resources were directly entered into the calculation. However, neither of these indicators nor the respective capitals have equal importance in the adaptive capacity of the Shahsevan pastoral nomads.

In a second step therefore, the weight of each capital with its respective indicators in the final adaptive capacity index was determined. In this regard, initially the Principal Component Analisys in SPSS was meant to be applied to the data. There were two main obstacles in applying this test. On the one hand, the test did not allow for including nominal indicators such as type of dwelling or communication device, which are important for this study. On the other hand, the component identified based on the correlation of indicators did not follow the main capitals used in our conceptual framework (figure 2-4, chapter 2).

Therefore, the Analytic Hierarchy Process (AHP) developed by Saaty (1994) was applied to determine the weight of each capital and its related indicators. AHP is a multi-criteria decision making method based on pair comparison of criteria and driving ratio scales from Principal Eigen vector (for further details of this method see: Saaty 1994 and Teknomo 2006).

Finally, five knowledgeable senior experts on the affairs of pastoral nomads in Iran's Ministry of Agriculture were involved in the weighting process of indicators. The ratio scales then were computed by building a comparison matrix and by calculating the Principal Eigen vectors. The consistencies of their comparisons were examined by calculating the Principal Eigen value. Therefore, the comparisons with a constancy index of less than 10% were averaged out to obtain the final ratio scales.

Figure 4-12 shows the resulting importance of different capitals and indicators based on the outlined calculation process. From this figure, we can see that the natural capitals including access to pasture and farmlands had the highest importance of 53% for the Shasevan pastoral production system. Within natural capitals, the higher weight of rangelands underlines its broader functionality for the pastoral production system beyond producing forage.

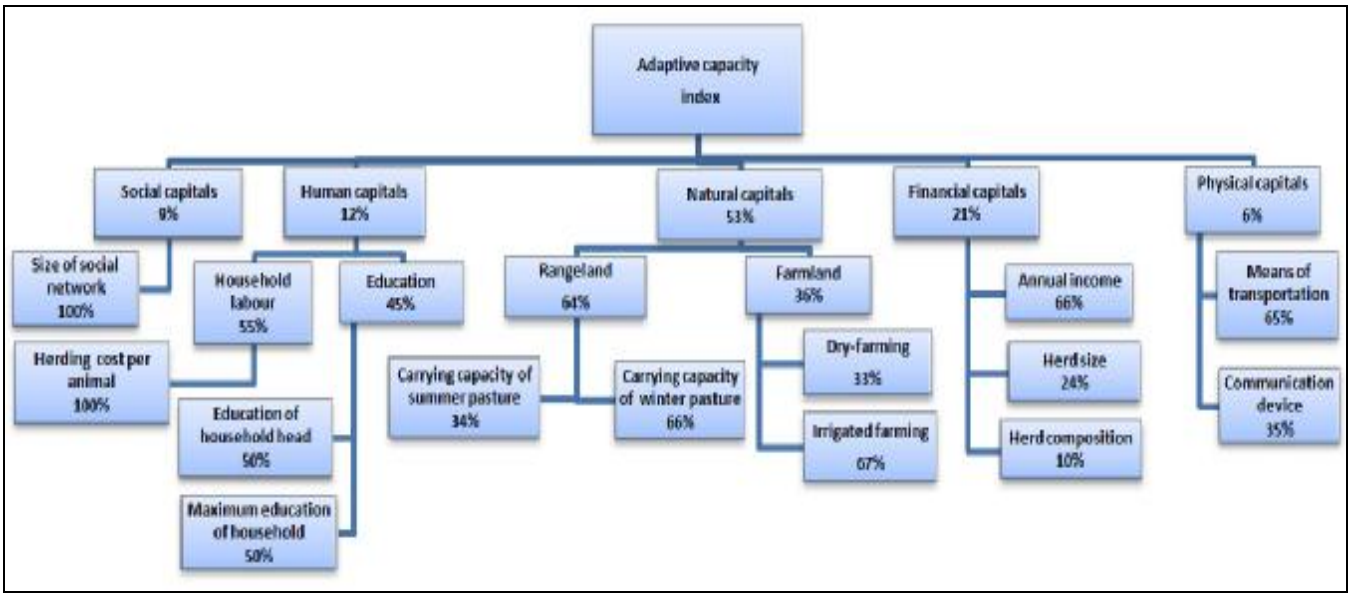


Figure 4-12 The components of adaptive capacity index and their weights based on AHP

According to the Shahsevan, the proper access to pasture both in *yaylaq* and *qeshlaq* and migrations are essential for preventing the animals from seasonal climate stresses and extreme temperatures and consequently declines in their productivity. Conversely, the physical capitals, including communication devices and means of transportation, had the lowest importance (6%) among all five capital factors.

The adaptive capacity for each pastoral group was calculated by aggregating the normalized value of indicators multiplied by their respective weights (table 4-16). Figure 4-13 demonstrates the access profile of Shahsevan pastoral groups to different livelihood capitals. It shows that the households with herdsman husbandry pastoralists have the highest access to financial, natural and physical capitals. However, pastoralists have the highest access to financial, natural and physical capitals. However, their human capital is among the lowest range. On the other hand, it is to be stressed that the pasture partnerships and shepherding pastoralists have the highest human capital compared to the other pastoral groups.

4-16 Calculation of the adaptive capacity for the Shahsevan pastoral groups in 2009

Adaptive capacity index												
Capital	weight of C	indices	weight of In.	Sub-indices	weight of SI.	Shepherdi ng	Semi-nomadic pastoralism	Semi-sedentary pastoralism	Herdsman husbandry	Pasture partner	Maximum value	Minimum value
Social capitals	9%					0.27	0.52	0.473333333	0.103333333	0.86	0.52	0.27
		Size of social network	100%									
				Number of social events(weddings and funeral) participated	100%	8.1	15.6	14.2	15.1	10.6	20	0
				Normalized value		0.27	0.52	0.473333333	0.503333333	0.36		
Human capitals	12%					0.655475	0.105775	0.160225	0.200025	0.6613	0.655475	0.105225
		Household labour	55%			100%	50%	0%	0%	100%		
				% of herding cost (per head of animal) covered by household labour		100%	50%	0%	0%	100%	100%	0
				Normalized value		100%	50%	0%	0%	100%		
		Education	45%			0.3010656	0.152777778	0.4306	0.46116667	0.2661444		
				Education of household head	50%	1.17	1.43	2.47	2.72	1.01	7.5	0
				Normalized value		0.156	0.190666667	0.329333333	0.362666667	0.134666667		
				Maximum education in household	50%	8.03	9.43	9.21	11.43	8.32	18	0
				Normalized value		0.4461111	0.523888889	0.511666667	0.635	0.4622222		
Natural capitals	53%					0.0734077	0.1008136	0.106957571	0.10074053	0.1201592	0.140074053	0.07340767
		Rangeland	64%			0.0632	0.25102	0.05416	0.58049	0.17112		
				Winter pasture Carrying Capacity	60%	80	80	80	161	68	250	22
				Normalized value		0.016	0.256	0.052	0.556	0.184		
				Summer pasture Carrying Capacity	34%	56	87	66	179	60		
				Normalized value		0.116	0.344	0.176	0.698	0.168	250	22
		Farmland	36%			0.0333333	0.10715	0.123703333	0.309715333	0.0561677		
				Dry-farming(hectare)	33%	1.33	5.48	2.6	8.76	2.655	0	30
				Normalized value		0.0888333	0.182666667	0.086666667	0.292	0.0858333		
				Irrigated farming (hectare)	67%	0.55	0.77	1.06	3.4	0.41	0	11
				Normalized value		0.0366061	0.07	0.150909091	0.309090909	0.0372727		
Financial capitals	21%					0.161775	0.309857143	0.180665174	0.0303746	0.2788814	0.6303746	0.0170501
		Annual income	65%		60%	9370000	16814000	9678000	31694000	13428000	50365000	9370000
				Normalized value		0.1446308	0.297066577	0.146611038	0.59602313	0.2301231		
		Herd size	25%		25%	55	150	75	250	170	350	30
				Normalized value		0.103125	0.40625	0.140625	0.6875	0.340625		
		Herd composition	10%	(% of sheep in the herd)	15%	80	86.5	82.5	88	82.8	95	70
				Normalized value		0.4	0.66	0.5	0.72	0.512		
Physical capitals	5%					0.30175	0.10315	0.1681	0.6012	0.3535	0.6012	0.103175
		Transportation	65%	% of households having their own car	65%	0.4	0.534	0.579	0.716	0.462		
				Normalized value		0.4	0.534	0.579	0.716	0.462		
		Communication	35%	% of households with mobile phone	35%	0.135	0.263	0.263	0.388	0.163		
				Normalized value		0.135	0.267	0.267	0.388	0.163		
Appropriated adaptive capacity index						0.1974461	0.306800038	0.188088248	0.459612292	0.2634255	0.552260492	0.188096312

As already discussed earlier, the human capital was examined against two main indicators: the availability of household labour and the education of both household head and family members. Therefore, the higher human capitals among the pasture partnership and the shepherding households are embedded in two facts. Firstly, the engagement of their family members enables them to supply the required labour for pastoral activities within the households, while the other pastoral groups are more or less dependent on market labour. Secondly, compared to the labour force, the formal education has little functionality in their pastoral production system. Consequently, despite the fact that the herdsman husbandry and semi-sedentary pastoralists have a significantly higher education level, they have the lowest human capital performance due to limited participation of their family member in the pastoral production system. Therefore, their family members may provide limited support or even may suggest to leave pastoral nomadism in favor of a sedentary life.

Nevertheless the data reveal the fact that the higher level of engagement in migratory lifestyle has a negative impact on the nomads' social capital and their interactions within their social networks. Consequently, the herdsman husbandry and the semi-sedentary pastoralists with a more stationary lifestyle have a higher social capital compared to other pastoral groups. The most striking observation is the glaring inconsistency between their social capital and their access to economic resources. As shown in figure 4-13, the herdsman husbandry pastoralists, for instance, have substantially higher financial capital than the semi-sedentary pastoralists, while they share the same level of social capitals. In contrast: the shepherding households have quite a low social capital, even lower than the semi-sedentary pastoralists, in spite of a close similarity in their economic capitals.

On the basis of the access profiles of the five Shahsevan pastoral groups (fig. 4-13) the complexity and diversity of adaptations and adjustments within the nomadic society becomes obvious. Equally obvious are the consequences: a strongly differing variability of the nomadic groups in regard to their adaptive capacities, their sensitivities and their corresponding vulnerabilities.

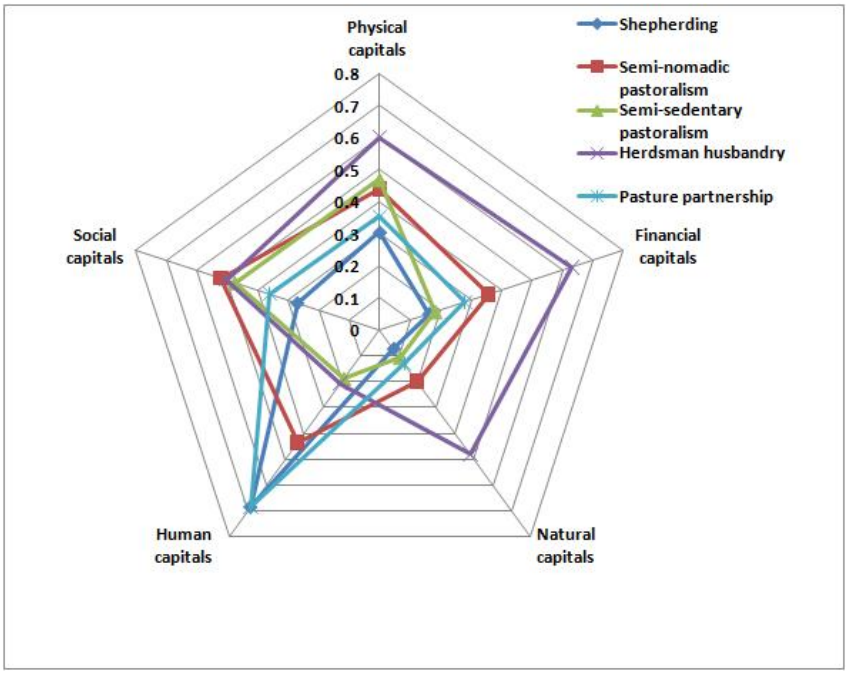


Figure 4-13 Access profile of the Shahsevan pastoral nomads with different livelihood strategies

4.5 Sensitivity to multiple socio-political and climate stresses

Unlike adaptive capacity, the sensitivity index was calculated by examining only 12 indicators and four forms of capitals, because the factor "social capital" and its indicators did not prove to be statistically relevant. Based on the results of the AHP method, the financial and natural capitals had a weight of 43% and 39% in the index of sensitivity. The sensitivity of financial capital was determined at 65% by the income diversity and at 35% by dependence of income on dry-faming cultivation. The physical capital had the lowest weight of 7%, which in turn depends by 68% on access to market and by 32% on quality of dwelling. The remaining 11% of the sensitivity index are attributable to the sensitivity of human capital.

The results obtained from the analysis of sensitivity among the Shahsevan pastoral groups are presented in figure 4-14. The households with pasture partnership had the highest sensitivity of natural capital to multiple socio-economic and climate stresses followed by the semi-

nomadic pastoralists. On the other hand, the sensitivity of physical capital is prominent among the shepherding and semi-sedentary pastoralists. In terms of human capital, however, the semi-nomadic pastoralists have the highest sensitivity.

Comparing the data of figures 4-13 and 4-14 illustrates the discrepancy in the access to different capitals and related different sensitivities. As shown in figure 4-13, the pasture partnership pastoralists, for instance, have the third position in access to natural capital out of five pastoral groups. Conversely, they have the highest sensitivity of natural capital resulting mainly from the lower quality of their pastures and the pressures on their rangelands. Similarly, the sensitivity among the herdsman husbandry pastoralists is significantly higher than among the shepherding and semi-sedentary pastoralists, although they have the greatest financial capitals. Consequently, any change in the livelihood strategy of pastoral nomads will influence both their sensitivity and adaptive capacity.

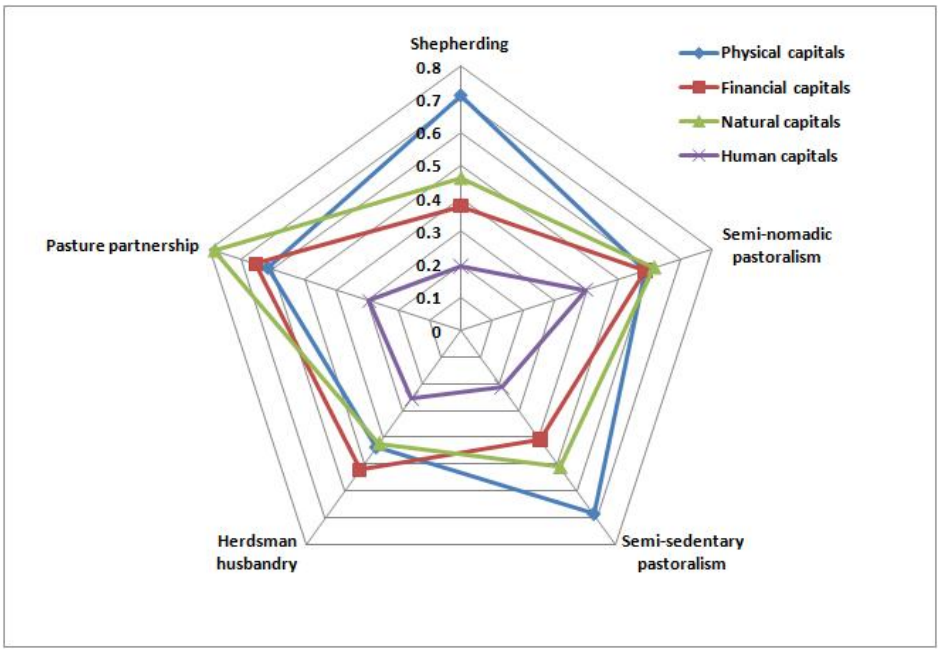


Figure 4-14 Sensitivity profile among the Shahsevan pastoral nomads with different livelihood strategies

4.6 Conclusions: Adjusting vulnerability level by changing livelihood strategies

The striking similarities in access to many capitals between the households practicing shepherding and pasture partnership nomadism, and to some extent also semi-sedentary pastoralism, show the proximity of the different types of Shahsevan pastoralism. But it also highlights the possibility of shifting from one livelihood strategy to another depending on the available resources. In fact, the adjustment in livelihood strategy is a very common measure employed by many Shahsevan households in response to variations of resources and opportunities caused by external pressures and stresses, but also by new and/or unexpected opportunities. It is important therefore, to examine the influence of changing livelihood strategies on the ultimate vulnerability of households.

As already indicated, the vulnerability at community level has direct relationships with sensitivity and inverse relationships with adaptive capacity. As shown in the equation 4.2, the highest vulnerability will result from the juxtaposed interactions of highest sensitivity and lowest adaptive capacity. Accordingly, the vulnerability of each pasture group was calculated using the equation 4.2. Based on the maximum and minimum values of different capitals among all pastoral groups (table 4-16), the highest and lowest numbers of sensitivity, adaptive capacity and thus vulnerability were computed. Finally, the equation 4.1 was used to normalize the calculated vulnerability figures for each pastoral group.

$$Vulnerability = \frac{Sensetivity}{Adaptive\ capacity} \qquad \text{Equation 4.2}$$

Relative adaptive capacity, sensitivity and vulnerability among the Shahsevan pastoral nomads with different livelihood strategies are illustrated in figure 4-15. Households with pasture partnership livelihood strategies have the highest sensitivity and vulnerability to socio-economic and climate stresses. The highest adaptive capacity of herdsman husbandry pastoralists, on the other hand, makes them the least vulnerable group within the Shahsevan society. Although the semi-sedentary pastoralists and the shepherding households have the same level of adaptive capacity, the higher sensitivity of the semi-sedentary pastoralist households places them among the highest vulnerable groups.

Based on these computations, we can see how the change in livelihood strategies may influence the vulnerability of the different pastoral groups. In in-depth interviews several Shahsevan indicated that they stopped practicing pasture partnership (*koda-gonshuluq*) due to a forage shortage in the 2008-2009 drought. Instead, they reduced their animal numbers and joined other nomads as shepherds.

It can be seen from figure 4-15 that this change in their livelihood strategy will significantly decline their sensitivity, slightly decrease their adaptive capacity, and, all in all, will make them more resistant to an overall vulnerability. There are other cases, where shepherding households increased their animal numbers in response to increased rangeland productivity in 2010. They joined other nomads in pasture renting and herding and became pasture partners (*koda-gonshuluq*). In fact, they are fully aware that it will increase their sensitivity and vulnerability, but hope that it will bring more revenue. Therefore, they deliberately undertake such risks.

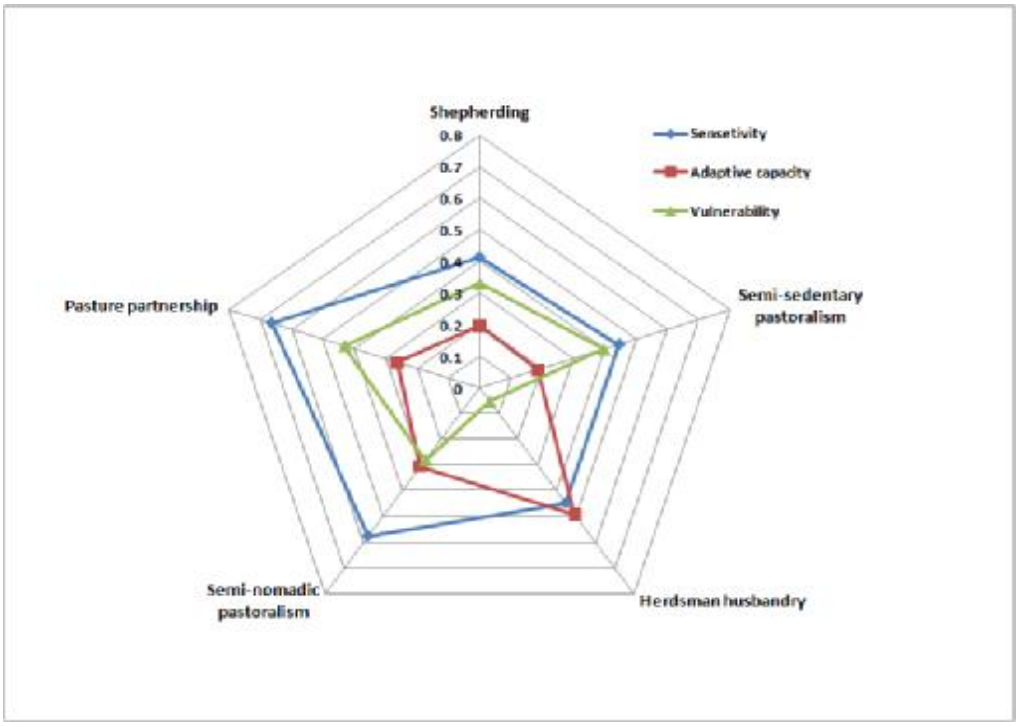


Figure 4-15 Variations of adaptive capacity, sensitivity and vulnerability by the livelihood strategies of Shahsevan nomads

In contrast to the still rather mobile lifestyle of pasture partnerships, of shepherds or even semi-nomadic pastoralists, the Shahsevan of the semi-sedentary and herdsman husbandry pastoralism are more stationary. They can be regarded as the representatives of the transitional stage from pastoral livelihood strategies to sedentary rural or urban life. This is mostly connected with the processes of state sedentarization programs where the nomads are provided with some incentives to settle down. Nevertheless: in spite of the allocation of small plots of irrigated farmland they mostly will continue their livestock production system, particularly in the early years of settlement. Especially the continued access to the summer pastures, the *yaylaq,* is a major driving force for their maintenance of a partly migratory lifestyle. In *qeshlaq*, on the other hand, they are more depending on supplementary feeding and market fodder, which in turn can increase their vulnerability.

Trying to summarize the overall findings of our fieldwork among the different pastoral groups of the Shahsevan and our analyses of their vulnerabilities, we can conclude: semi-sedentary pastoralists, herdsman husbandry, semi-nomadic pastoralists, pasture partnerships and shepherding were identified as specific pastoral groups with equally specific lifestyles in regard to their use of available capitals (resources) and corresponding strategies to adjust to the given socio-economic and physical stress factors. A closer examination of their adaptive capacities and their sensitivity resulted in a revealing set of options by which the nomads can respond to the threats of vulnerability caused by external (or internal) stressors.

The results of this study indicate that for the more mobile parts of the Shasevans, size of social network and participation in the social events is significantly lower than among the households with more stationery pastoral production systems. In contrast, the human capital is obviously lower in the sedentarized parts of the Shahsevan society, despite their statistical higher-education level. This means that household labour is more decisive for the Shahsevan pastoral production system than formal education.

The most interesting finding is that the households practicing pasture partnership had the highest vulnerability despite of having higher adaptive capacity than the shepherding and semi-sedentary pastoralists.

In the other words their highest vulnerability is not coincide with the lowest adaptive capacity. Rather, the combination of high sensitivity and low adaptive capacity make the pasture partnership as the most vulnerable livelihood strategy.

As discussed earlier the livelihood strategies of Shahsevan are very flexible. They frequently shift from one livelihood strategy to other, in respond to the stresses and pressures and also opportunities provided within or outside their pastoral system. Consequently, the households capacities, sensitivities and thus vulnerability profiles change significantly by their reaction to external side of their vulnerability. These findings support our theoretical framework discussed in chapter 2.4, where the vulnerability of pastoral nomads have been conceptualized as function of external exposures and internal capacity and sensitivity.

The question remains, how the interaction between exposure to multiple socio-political and climate stresses with the Shahsevan response in form of coping and adaptation strategies will shape the feature of Shahsevan pastoral nomadism?

Chapter five

Conclusion: Nomadic survival strategies for adaptation to socio-political and climate stresses

5.1 Introduction

The previous chapter tried to map the diversity of vulnerability among the Shahsevan and provide us with an idea of how household decisions on managing available resources are of influence to nomadic vulnerability. We concluded that the adjustment of livelihood strategies as a means of responding to external stressors can significantly contribute towards reducing their vulnerability. The question that arises is therefore: What are the adaptation strategies employed by the Shahsevan in response to the multiple socio-economic and climate stressors and to what extent can they resist, adjust to or overcome these pressures? And what are the implications of their adaptation strategies for the continuation of Shahsevan pastoral nomadism? These questions will be discussed in this chapter. It is argued that the manifestations of their capacities to respond to external pressures are deeply embedded in the broader context of state policies and governmental interventions. Therefore, three possible scenarios of their pastoral production system are suggested. They are based on a combination of their own adaptation strategies and the state adaptation policies for pastoral nomads.

According to the United Nations International Strategy for Disaster Reduction (2009), the notion of adaptation refers to "the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (UNISDR 2009). In the context of human dimensions of global changes, adaptation refers to processes, actions or outcomes in a system. Such systems can be households, communities or other groups which help the system to cope with, manage or adjust to the changes, pressures, stresses, risks or opportunities (Smit and Wandel 2006). In a

recent work on adaptation to environmental change, Nelson et al. (2007) examined two main approaches in the adaptation discourse. The actor-oriented perspective concentrates on the agency of social actors in response to external stresses and their capacity to make decisions and take actions. The second is the resilience approach, which focuses on the amount of change a system can undergo without losing its functionality and structure. They suggest that both approaches converge in three main principles of system characteristics, adaptation processes and outcomes, while the resilience view provides helpful framework conditions for analyzing coupled-human systems (D. R. Nelson et al. 2007). In our study, however, we prefer the actor-oriented approach and apply it to the case of the Shahsevan. As can be seen from figure 5-1 the characteristics of their pastoral production system and its vulnerability to multiple socio-political and climate stresses are characterized by their adaptive capacity and sensitivity, which have been discussed in previous chapters. The *institutional structure* has been included in the original model to examine the policies and measures taken by the relevant state organizations and assess their influence on the adaptation process of the Shahsevan. In this context, the adaptation process refers to the adjustment made in their livelihood to minimize the risk and to improve its effectiveness.

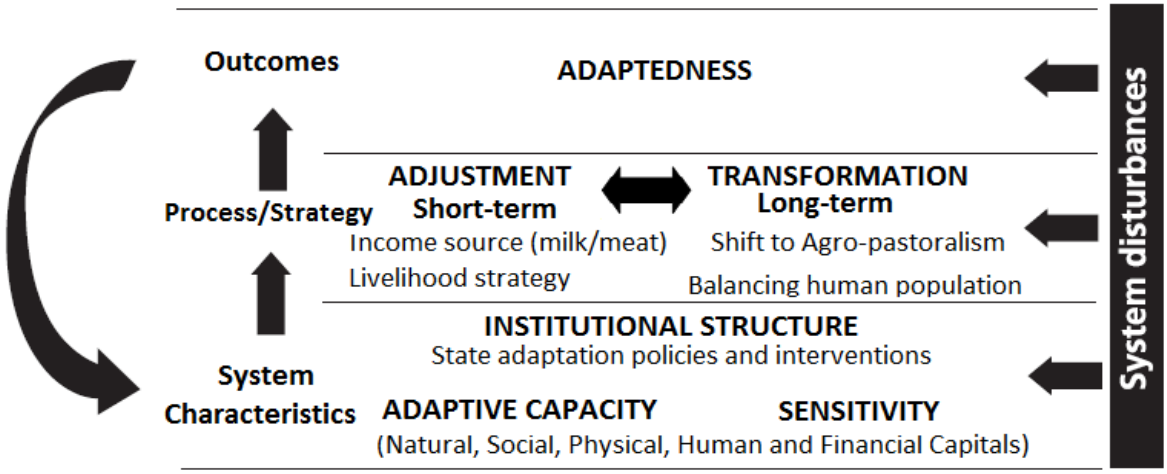


Figure 5-1 Characteristics, processes and outcomes of adaptation strategy.
Adapted from Nelson et al. (2007, p. 400).

It consists of two main strategies: the short-term adjustment and the long-term transformation. The outcome of the adaptation process is their *adaptedness,* which refers to the level of effectiveness of their strategies in minimizing the risks and benefiting from possible opportunities (D. R. Nelson et al. 2007). Therefore, this chapter will continue with the analysis of the *institutional structure* and the opportunities that are provided by state intervention and governmental policies in regard to adaptation measures for pastoral nomadism.

Finally, the adaptation strategies employed by the Shahsevan in response to multiple socio-political and climate stressors will be examined as well as their implications for the continuation of Shahsevan pastoral nomadism.

5.2 Institutional structure, state adaptation policies and interventions

In the first half of chapter 3 the underlying socio-political root causes of the Shahsevan vulnerability have been discussed from historical as well as contemporary perspectives. In particular, the impacts of state policies and interventions in form of enforced sedentarization, land reform and nationalization of rangelands were analyzed and discussed in regard to their vulnerability. However, considering the negative consequences of the radical impacts on pastoral nomadism, several efforts, particularly after the Islamic revolution, have been made to help the pastoral nomads cope with the new conditions. In this regard, the state adaptation measures for pastoral nomads in general, and for the Shahsevan in particular, can be categorized into three main areas of efforts, namely:

- improving rangelands conditions,
- providing basic services and infrastructure for nomads, and
- measures for mitigating the drought impacts.

5.2.1 Improving rangeland conditions

As discussed earlier, the nationalization of rangelands abolished the traditional rights and institutions of the Shahsevan on their ancestral rangelands. Consequently, they responded by an extensive conversion of their rangeland to dry-farming fields and agriculture, regardless of the ecological capacities and constraints. A dramatic increase in human and animal population reliant on rangelands was another consequence of the nationalization process, which altogether is considered as one of the main causes of rangeland degradation (Badripour et al. 2006). For addressing these challenges, the forestry organization (*Jangalbani*) was commissioned to investigate not only traditional property rights, but also to develop appropriate future-oriented means and measures to ensure sustainable land-use practices that consider both the ecological situation and the rights and needs of the nomads. These measures include among others:

- identification of traditional right holders and the recognition and security of their rights on pasture via issuing grazing licenses and the delopment of Range Management Plans (RMP);
- regulation of animal and human population vis-à-vis the carrying capacity of pastures; and
- protection, rehabilitation and sustainable future development and use of rangelands.

The RMP aims at addressing the problem of rangeland preservation both from an ecological and a legal perspective. On the one hand, it provides a list of management activities including the proper stocking rate, time and duration of utilization of rangelands and measures for the rehabilitation of vegetation in degraded areas. On the other hand, it aims to enhance the sense of ownership over the pastures by giving the nomads the long-term (30 years) right of taking benefit of the pastures.

However, the results of my interviews with the Shahsevan show that, for several reasons, the policy failed to convince the Shahsevan to prepare and implement the RMPs. Firstly, it limited their right on their pastures to a 30-year utilization right, while they perceive the pastures as their ancestral properties and claim permanent title on them. Therefore, the majority of the Shahsevan perceive the conditions of RMP as a means of securing a long-term state ownership on pastures rather than a protection of their undeniable rights. Secondly, carrying capacity, grazing time and duration are determined and fixed in the RMP based on plant physiology and on the principles of rangeland succession models. In contrast, the nomads adjust their herd size or grazing period to the variation of rangeland vegetation based on prevailing and rapidly changing climate conditions. Applying the RMP hinders their flexibility in herd size and grazing practice in immediate response to resource variations. Thirdly, the RMPs are introduced exclusively to the nomads' summer and/or winter pastures and take no account of their ecological and economic linkages and their complementarities for the annual cycle of animal husbandry. The RMP regulations do not appropriately consider size, carrying capacity, time and duration of exploitation of pastures. The nomads therefore have to rent additional pastures, lease part or all of their pastures to other nomadic households or have to find grazing land in other places. Consequently, the administrative boundaries and management strategies identified in the RMP hardly fit the actual dynamism and flexibility practiced by the nomads. This situation gets even more complicated by the fact that any transfer of grazing rights is considered illegal. Nomads have to stick to the official management plan. All these conditions contribute to a basic ineffectiveness of state policies and measures for improving rangeland conditions.

One of the main shortcomings of both RMP and state policy in issuing grazing licenses to individuals is the allocation of the Shahsevan communal pastures along their traditional migration routes to individual tribesmen or peasants. These pastures are in fact the ecotone of mountain and lowland ecosystems and are characterized by the combination of climate and ecological factors of *yaylaq* and *qeshlaq*. The growing period and maturation of

vegetation, for instance, is always later than that of the winter pastures in *Dasht-e-Moghan* and earlier than in the summer pastures in *Sabalan-Kuh*. The Shahsevan were able to delay their arrival to the mountain pastures and allow the vegetation to mature enough by utilizing the intermediate pastures for days or even weeks. Losing the intermediate pastures, therefore, broke down the ecologically viable adjustment to the fodder requirements of the animals by splitting up their territory and leaving limited spatial flexibility of pastoral nomads in response to climate stresses. In other words, diminishing their rangelands in general and expropriation of intermediate pastures and traditional migration routes in particular caused big time and resource gaps in their production system. As a result, many Shahsevan started to combine their traditional production system of animal husbandry with some farming activities. This strategy and its practicality in line with other state policies and interventions will be discussed in more detail in section 5.3.2.

As stated earlier, the pressure of animal overpopulation on rangelands is considered as one of the main challenges for their sustainable management. It is estimated that the number of animals is 2.2 times higher than the actual carrying capacity of rangelands (Badripour et al. 2006). In this regard, the state organization takes mainly two approaches to address this pressure. The first policy encourages the nomads to quit their migratory production system and change towards a sedentary lifestyle. In return to incentives such as the transfer of plots of farmland, their grazing permits and pasture rights will be invalidated and transferred to other shareholders. In the second policy, the state organizations provide some incentives e.g. low interest rate loans, technical advice and veterinary services for the nomads to replace their traditional focus on sheep and goat husbandry by cattle faming. The underlying assumption is that cattle are not suitable for grazing on most of the Shahsevan pastures and should be fed mainly on the basis of market fodder. Therefore, changing their income sources to large animals will decrease animal pressure on the fragile pastures. In practice, however, this policy has achieved little success in solving rangeland or grazing problems. The reasons are manifold. One of the main reasons is the almost diametrically opposite handling of grazing

issues by the state and by the nomads. While state organizations focus their activities on administrative rules and regulations and their more or less rigid implementation, nomads rely on experience and creative adjustments both in ecological and in socio-economic terms. Utilization of pastures, rent and/or transfer among tribal households etc. are based on long-standing and proven practices with a high degree of flexibility. The state interferences are additionally hampered by the fact that the majority of grazing rights issued by *Jangalbani* have not been revised over the last three decades. Most of the Shahsevan have inherited their grazing licenses from their fathers or grandfathers and share them with their kin. In many cases, therefore, there are no individual utilization permits to be invalidated after receiving the state subsidies. The Shahsevan also believe that small animals like sheep and goats and their products are more appropriate for the demands of the market and that they ease their economic response to socio-economic and climate stresses. Last but not least is the fact that most Shahsevan lack the resources, experience and knowledge for an animal husbandry system that is connected with cattle raising and a more or less stationary housing in a stable.

Figure 5-2 Extension of agricultural land to the Shahsevan traditional migration route and intermediate pastures

5.2.2 Improving the socio-economic conditions of pastoral nomads

As already discussed in chapter 3, sedentarization is the dominant policy of state organizations for improving the living conditions of pastoral nomads. It is rooted in state modernization policies from the 1920s onwards when pastoral nomadism was perceived as a backward and traditional way of life that needed to be transformed into a modern sedentary-based farming system. In contrast to the period of the Pahlavi regime, in which the sedentarization of nomads was mostly enforced by the state and by military actions, the sedenterization after the Islamic Revolution of 1979 took place on a voluntary basis. Besides, the government helped the nomads to resettle the surplus of their people in rural or urban population centers. The population of the Shahsevan pastoral nomads for instance has declined by around 8% during the period 1998-2008 (ISC 2012). Furthermore, the improvement of the conditions of migratory communities received a great deal of attention after the revolution. Besides the fact that nomads were titled as the Treasures of the Revolution "*Zakhayer-e-Engelab*" by the supreme leader Ayatollah Khomeini, the Organization of Nomadic Affaires (ONF) "*Sazman-e Omur-e Ashayer*" was established to "provide appropriate services for improving the socio-economic conditions of pastoral nomads". Therefore, many nomads benefited from infrastructural services such as access roads, drinking water, fossil fuels etc. provided by the ONF. According to the results of the 1978 census for instance, fuelwood and coal were used by more than 80% of pastoral nomads as their main energy source for cooking. This figure has declined to around 60% by the time of the 2008 census (ISC 2012). Arrangements for others services, such as electricity, education or social welfare, are made by the relevant ministries in close cooperation with ONF. Joint efforts with the Ministry of Education for instance led to a 10% increase in the literacy rate among the Shahsevan during 1998-2008. Historical data show that the literacy rate of Shahsevan over 6 years old was 55.76% in 1998 and increased to 67% in 2008 (ISC 2012). These figures, however, are significantly lower compared to the 85.06% and 73.04% literacy rate among the rural and urban population of Ardabil province in 1996 (PDSPC 2012). These

figures are testimony to the fact that social and educational endeavours have led to remarkable improvements of nomadic living conditions, although much still needs to be done.

In 2004 the government established a special fund for social insurance of peasants and pastoral nomads. Pastoral nomads aged between 18 to 55 years can apply for this insurance. They have to choose one income category out of eight income levels and pay 5% of it as a monthly fee. Their monthly payments varied between 6,750 to 16,500 Touman in 2011-2012. The government contributes by paying twice that amount, i.e. 10% of their monthly income to the fund. The applicants therefore will benefit from health insurance, pensions and disability insurance (MCLSW 2012).

The insurance of the nomads' animals is another important measure initiated to support their pastoral production and shield it against natural hazards and diseases. In 2010, the annual cost of insuring each head of animal (sheep and goat) cost the nomads 350 Touman. The amount of 50,000 Touman refund is being paid for each head of lost animal. To be precise: the insurance policy covers only the loss of animals as a consequence of natural disasters. Nonetheless, the findings of this study indicate that pastoral drought is one of the main stresses on their pastoral production system, which would/could mean that the governmental insurance would come up for drought-related animal loss. In reality, however, the nomads hardly lose animals as a consequence of drought. They are rather impelled to sell their animals at a loss to pay for the mounting prices of fodder. Therefore, their animal insurance fails to cover the main risk of their production system. The question remains: What are the state drought management strategies to help the pastoral nomads?

5.2.3 Pastoral drought management

As mentioned in chapter 3, pastoral drought perception refers to the shortage of fodder and water resulting from the interaction of meteorological droughts and market fluctuations. A proper drought management strategy based on risk management approaches requires three key components, namely: monitoring and early warning, risk and impact assessment, and a

mitigation and response system (Iglesias et al. 2009; Sivakumar and Wilhite 2002). Analyzing the existing policies and institutions for drought management indicates several shortcomings in managing pastoral droughts in Iran. The first limitation arises from the underestimation of the socio-economic impacts of drought and limiting its notion to the decline in rangeland forage production due to rainfall deficit.

Figure 5-3 Installation of the first solar water heater system in Shahsevan winter camp site in Dasht-e-Moghan, Ardabil
Source: http://www.ashayer-ar.ir

Figure 5-4 Drinking water distribution by Organization of Nomadic Affairs
Source: http://www.ashayer-ar.ir

Consequently, the combination of relevant drought monitoring and early warning system is narrowed to the production of monthly vegetation maps using satellite data and the Normalized Difference Vegetation Index (NDVI). Figures 5-5 and 5-6, for instance, show the vegetation maps of January and February 2012 based on NDVI data of the Iranian National Center for Agricultural Drought Management (NCADM). Comparing these maps with data of similar periods in previous years could provide useful information on short and medium-term changes of rangeland productivity and thus the severity of drought conditions. However, the findings of this study show that the decline in the rangeland forage production and the simultaneous increase in fodder prices play an almost equal role for the increase of production costs and the resulting severity of the 2008-9 drought experienced by the nomads. Therefore, monitoring the price of fodder and the pastoral production is necessary for a sound pastoral drought monitoring system. Furthermore, shortage of drinking water for the nomads and their animals is another important aspect of pastoral drought perception hardly to be forecast by NDVI. Altogether the outcome of a functioning and viable monitoring system should be available in form of easily accessible and understandable early warning data for end users, particularly the pastoral nomads to help them in their proper and in-time decision- making.

Relying on crisis management is the second shortcoming of pastoral drought management strategies, because it often leads to undesirable side effects for nomads, but also for the population in general. In the 2008 drought in Dasht-e-Moghan for instance, the state organization helped the nomads by distributing subsidized fodder, especially barley. This effort had significant influence on the market price. However, its effectiveness is questionable for several reasons. Firstly, the bureaucratic system of state organizations is unable to ensure in-time reactions to drought conditions. Therefore, the majority of the Shahsevan nomads were compelled to buy forage at prices double to threefold higher than those before state intervention. Secondly, the subsidies were evenly distributed among all Shahsevan, thus failing to target the most vulnerable groups.

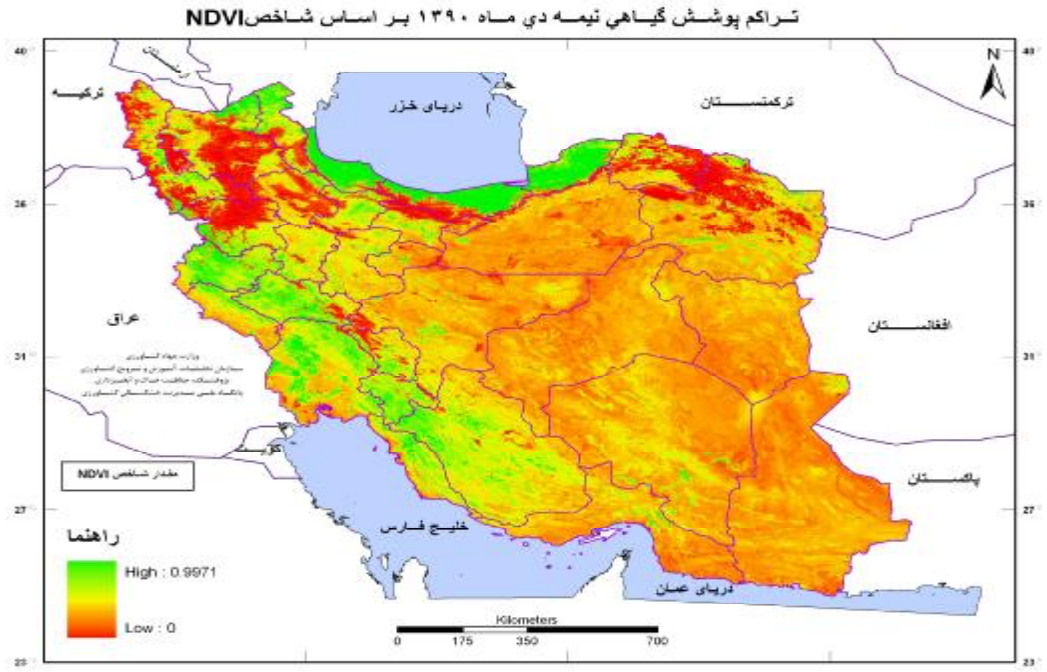


Figure 5-5 Vegetation density map of January 2012 using NDVI data
Source: NCADM 2012,WWW.ncadm.ir

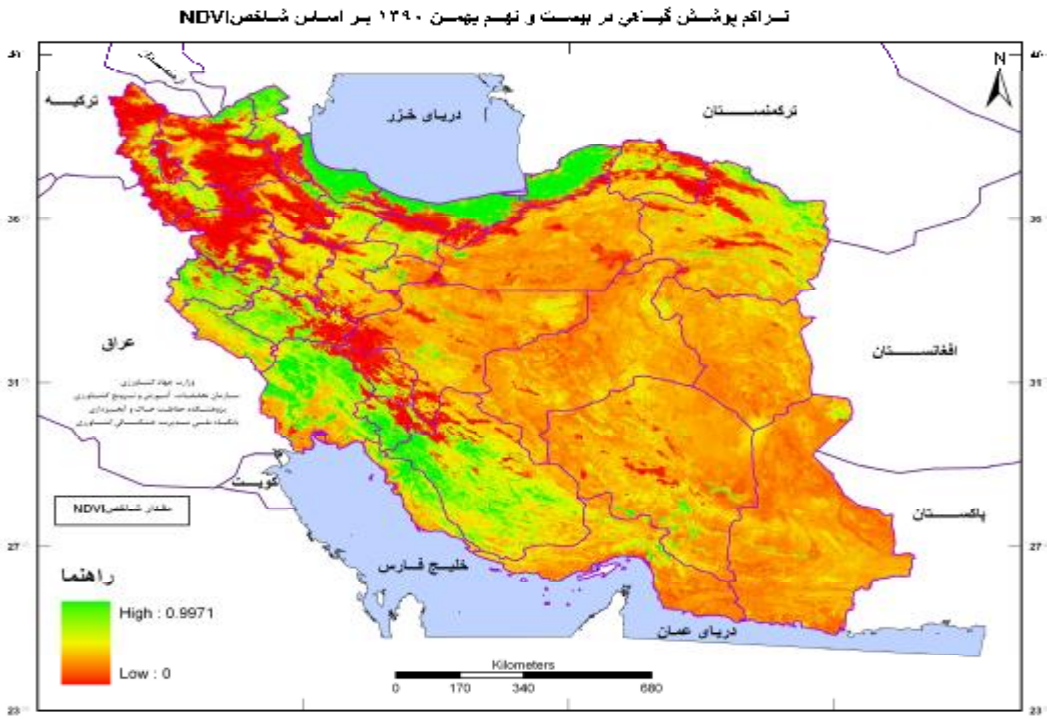


Figure 5-6 Vegetation density map of February 2012 using NDVI data
Source: NCADM 2012,WWW.ncadm.ir

Therefore, subsidies not only failed to ease the nomads' vulnerability, but they also increased their reliance on government support systems. In other words: the concentration on crisis management can indirectly contribute to increasing the long-term vulnerability. This finding is in line with the results of Hayati's research on the impact of state polices and intervention on farmers' vulnerability(Hayati et al. 2010). They argue that the equal treatment of all farmers by state organizations leads to an increasing vulnerability of the poor farmers. It can be concluded that analyzing the root cause of vulnerabilities and identifying the vulnerable population is an essential component of both long-term drought mitigation strategies and short-term response - a method that needs a differentiated analysis of affected households and groups and an equally differentiated response system to target the available subsidies to those households in need.

5.3 Coping and adaptation strategies for nomadic survival

As outlined in figure 5-1 the strategies of the Shahsevan in response to multiple socio-political and climate stresses are categories in either short-term adjustments and/or long-term transformation strategies. The adjusting coping strategies refer to the measures taken to face a specific stresses, in our case pastoral drought as a result of socio-economic and climate stresses. The long-term strategies, on the other hand, are actions oriented toward reducing their future vulnerability (Iglesias et al. 2009). As suggested by Nelson et al. (2007), however, there are no clear borders between these two strategies, rather they are pursued along a continuum. People may shift continuously between adaptation and coping strategies; and it may well be that a certain activity may be considered as coping strategy by one person and adaptation strategy by another person (Davies 1996). Nevertheless, differentiating the long-term transformation from short-term adjustments and responses is helpful for understanding the system dynamics and its future transformation. For analyzing the strategy of pastoral nomads twenty in-depth interviews in five *qeshlaqs* (four interviews per camp) were

conducted with nomad elders, mainly over 50 years old, to explore their strategies for coping with pastoral drought.

5.3.1 Short-term adjustment and coping strategies

The event of the 2008-9 pastoral drought provides a very useful case to examine the coping strategies of the Shahsevan nomads in response to multiple socio-economic and climate stresses. On the one hand, pastoral drought, as discussed earlier, is the outcome and real manifestation of socio-economic and climate stresses. On the other hand, the nomads hardly undertake particular actions in response to only one specific stimulus. It is rather the combined impact of multiple stresses in mutual interaction with the capacities and opportunities within and outside the system that leads to formulation and implementation of adaptation strategies (Adger et al. 2007). Pictures 5.7 and 5.8 compare the vegetation of Dasht-e-Moghan during the 2008-9 drought conditions and the normal year of 2010. Taken at the same time of the year (May 2009 and May 2010) from the same location the view shows the comparatively poor vegetation cover in the drought year compared to a comparatively lush grass vegetation one year later!

The result of our in-depth interviews highlights the following major strategies which are commonly adopted by the Shahsevan in response to the 2008-9 pastoral drought.

- Altering the income source from meat to milk production: The Shahsevan keep a Moghani strain of sheep of which meat and milk are the main products. The gestation period for this strain is about five months, and every matured ewe will produce about 60 kilograms of milk annually. With an average price of 1000 Touman per kilogram of milk in 2010 the Shahsevan were able to gain around 60,000 Touman from the milk production of each fertile ewe. This money helps the nomads to purchase the basic needs and survive until the lamb selling season in midsummer. This money is helpful particularly during winter droughts where and when they have to buy additional forage for the animals.

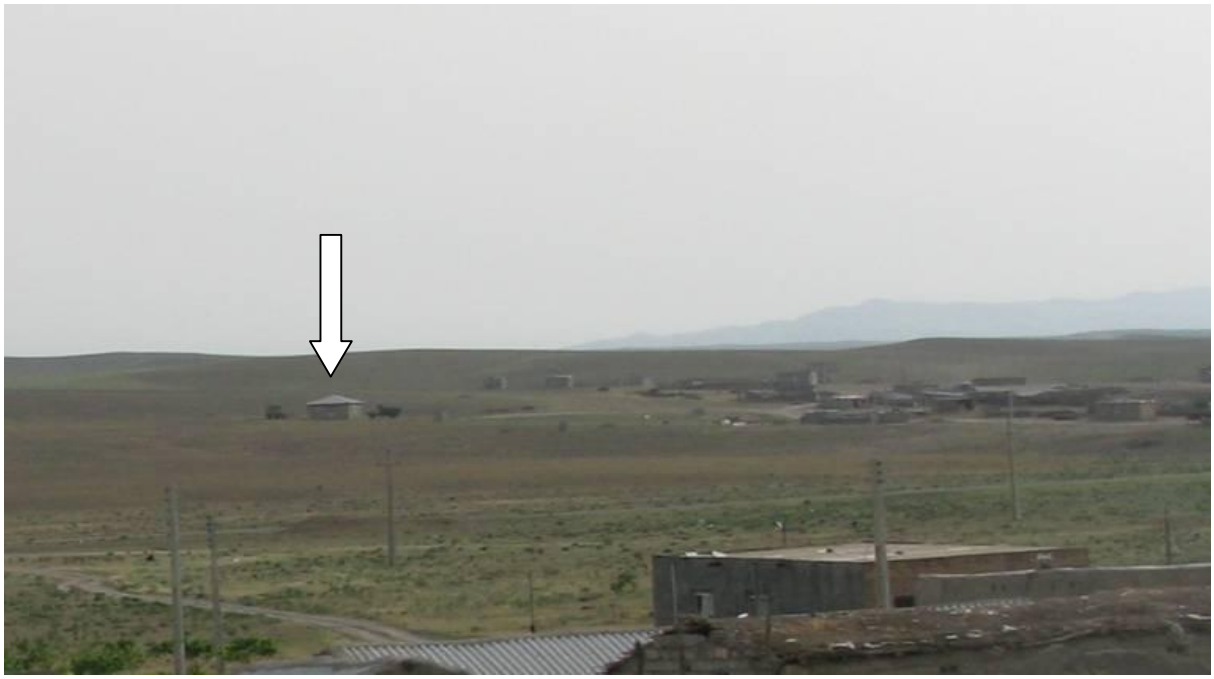


Figure 5-7 The landscape of Shahsevan winter pasture in 2008-9 drought condition
The Agh-bashlar *qeshlaq* of the Moghanlu tribe in May 2009

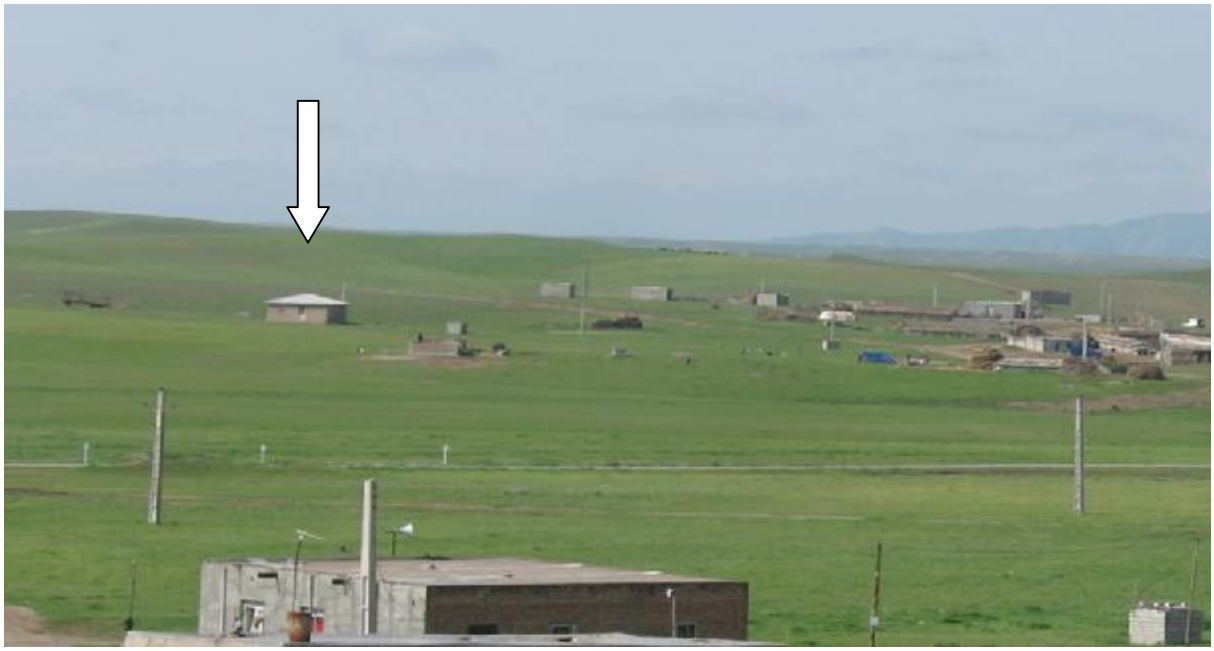


Figure 5-8 The landscape of Shahsevan winter pasture in normal year 2009-10
The Agh-bashlar *qeshlaq* of the Moghanlu tribe in May 2010

However, milking will be stopped immediately after each new pregnancy. In drought conditions, therefore, they prefer having milk products that can be sold easily and gain money to purchase the required forage and other basic needs. But in good years, they put the rams with the herd for a second time in November, around 40 days after delivery, to have the second lambing by April, so that the newborn lambs have time to get strong enough before migration in mid-May. Another reason for this choice is the stability of milk prices in drought conditions compared to the meat price, which usually shows a dramatic decrease. Furthermore, there is a risk of losing both the ewes and lambs if they cannot feed the ewes sufficiently because of drought conditions and increase in forage prices. Therefore, in severe drought periods some nomads prefer to wean the lambs earlier than usual to support the survival of weak sheep.

- Change in timing and form of migration: Many researchers (e.g. Barth 1961; Tapper 1979; Ehlers & Schetter 2001) consider seasonal migration of pastoral nomads in Iran as a core strategy for coping with variabilities in their specific environment. In the other word: the temporal and spatial variability of their natural environment in terms of temperature, rainfall, water and forage resources forces pastoral nomads to have a flexible and migratory lifestyle. This lifestyle allows them to adapt their livelihood to the surrounding ecological situation rather than converting the environment to fit their life. (Barth 1961; Ehlers and Schetter 2001). Although in many cases the nomads' migration routes, *el-yolu,* have already been bounded by extensions of farmlands or individual pastures (see figure 5-2), migration is still a strategic means of coping with resource variability, especially in drought conditions. The impacts of droughts on the timing and form of migration are radically different in summer and winter pasture. During winter droughts, the nomads are forced to migrate earlier than usual while their summer rangelands are not yet matured. Therefore, many nomads will engage in traditional migrations in order to delay their arrival at *yaylaq*. To this end, they are nowadays mostly compelled to pay for utilizing their own traditional pastures along the migration route, now occupied by peasants or

sedentarized nomadic settlers. In summer drought, on the other hand, the pastures along the migration route are located in lower altitudes and will dry out earlier than summer pastures. Therefore, many nomads rent some cultivated fields from neighboring villages and stay in *yaylaq* until early October and then return to *qeshlaq* by truck. In normal years the pastures and farming residues along their migration route will offer sufficient forage, and more people take traditional migration. But it is not only drought alone that plays an important role in this process. Cold weather and driving snow, for instance, can also force the nomads to load everything on a truck and return to *qeshlaq* in early autumn.

- Change in herd size and composition: Adjusting herd size and composition is another strategy used by the Shahsevan to cope with drought conditions. The process of reducing the herd size in drought conditions usually starts with selling the fattened lambs, shearlings, wethers, infertile ewes and goats. If the drought continues, the herd will lose weight and the prices will fall radically. The demand for weak animals will decrease, and the nomads will be forced to sell their milking ewes, which are their main capital. Usually the demand for goat meat is lower than that for lamb and its price is cheaper than that for sheep. On the other hand, goats produce more milk, which the family can rely on and which can be sold in exchange for the purchase of the required fodder. Therefore, they usually keep the goats as long as possible, and they may even buy a few additional goats instead of keeping the rather fragile sheep. Particularly after selling the sheep, there is also more space in the stable to allocate a separate place for the goats. It is worth noting that the percentage of goats to sheep varied from nearly 11% among the group pursuing herdsman husbandry to more than 20% in the flocks of the shepherds. The results of this study indicate that by a 10% increase in the ratio of goats to sheep, from 20% to 30% for instance, there would be a 4.92% decline in the annual meat production and an increase of around 10% in the amount of milk production of households. Goat milk has less protein and fat content and thus it has a lower price. However, the Shahsevan milk their sheep and goats together, and the milk is mixed before selling. Therefore, a significant increase

in the number of goats will lead to a decline in the overall herd milk quality and its price. The main reason for more interest in goat rearing among the poorer households, therefore, is grounded in generating a higher portion of their income within a shorter period, based on monthly, weekly or even daily selling of the milk instead of waiting for income from selling the livestock after several months. The other side of the coin, however, has to be mentioned too: In the long run goats are much more detrimental to the natural vegetation and the recovery of pastures, the main asset of nomadic animal husbandry.

5.3.2 Long-term adaptation and transformation

- Changing the livelihood strategy: The change in the livelihood strategy as means of responding to resource variation and adjusting the households' vulnerability has been discussed in the previous chapter. The point to note here is that this strategy is being used both as a short-term coping and long-term transformation measure by the Shahsevan. In some cases, the adjustments are slightly changed in managing the available resources and shifting between similar livelihood strategies, e.g. from pasture partnership to shepherding or vice versa. In other cases, e.g. with a shift from the semi-nomadic pastoralism system to herdsman husbandry pastoralism, the changes are so fundamental that the return to the previous livelihood strategy is technically infeasible.

- Shift to agro-pastoralism: In response to an increasing exposure to multiple socio-political stresses, identified and discussed in chapter three, the Shahsevan are combining their traditional pastoral production system with stall-fed animal husbandry. Considering the diminishing availability of rangelands and the increasing socio-economic pressures on their pastoral economy, such integration seems unavoidable. It allows them to survive and continue to utilize the available pastures in the highlands of Sabalan-kuh and the lowlands of Dasht-e-Moghan and compete with industrial animal husbandry.

The nomads in Ardabil province, for instance, where the Shahsevan constitute 93.8% of the total nomadic population, are producing more than 10,500 tons of red meat, 43,000 tons of milk and 1,500 tons of fleece annually (FNA 2012). However, the dependence of their pastoral economy on market fodder and market economy is increasingly making them susceptible. Some of the Shahsevan, therefore, are combining animal husbandry with crop farming, thus producing parts of the fodder required for their animals themselves. This strategy offers them the most effective means of adapting to increasing multiple socio-economic and climate stresses. On the one hand, it protects them from the negative impacts of fodder price fluctuations during drought conditions, which was found to be a major cause of pastoral drought in 2008-9. On the other hand, it increases their flexibility in sending their animals to the market to avoid selling them for lower prices in peak supply during midsummer or drought conditions. They even can purchase some animals from other nomads in the lamb selling season and sell them for a better price a few months later.

The current state policies, however, are not in line with the Shahsevan agro-pastoralism strategy. The arable land in Dasht-e-Moghan is being used for an extension of agriculture, in particular by agro-industrial companies such as Kesht-o-Sanat-e-Moghan or Kesht-o-Sanat-e-Pars, and it is partly taken for the sedentarization of the Shahsevan. The only farming possibility for the majority of Shahsevan, therefore, is limited to illegal dry-farming or quitting their pastoral production system to become sedentary farmers.

- Balancing human population: Adjusting the human population to the carrying capacity of available resources is another long-term strategy adopted by the Shahsevan in response to increasing multiple socio-economic and climate stresses. Particularly with the growing human population and the diminishing rangeland size, the Shahsevan look for alternative livelihood sources within or outside their pastoral life. During the interviews, many nomads stated that they were supporting only one of their male children to continue pastoral nomadism, and the rest had to find other livelihood opportunities. The historical

data are also supporting this argument according to which the Shahsevan population experienced a decline of nearly eight percent during the period of 1998-2008. However, adequate livelihood opportunities beyond pastoral life are not equally accessible for all Shahsevan. The families with higher adaptive capacities, the semi-nomadic pastoralists and those pursuing herdsman husbandry (see figure 4-15), for instance, are more able to move away from the traditional production system and use the new opportunities and resources. Their remaining population, on the other hand, will have more pastures and land for improving their traditional business. Conversely, the competition over resources among the less capable households, e.g. the shepherds and pasture partnership families will increase, because more people are seeking resources and opportunities within their traditional system.

5.4 Shahsevan pastoralism: scenarios for the future

As already indicated in the introductory chapters of this study, pastoralism in its broadest sense is still a practice pursued by millions of people on a worldwide scale. Very often discredited as a backward-oriented lifestyle and economy, reality shows that there is a broad spectrum of adaptation strategies that have been developed as a reaction to specific local or regional stressors. They have contributed to an almost unsurveyable variety and diversity of pastoral forms and practices. As outlined in this study, also the Shahsevan are participating in these adaptation processes by creative adjustments in response to household necessities and expectations for the future.

Before, however, looking into the options that are open to the nomads of northwestern Iran, it might be worthwhile to reflect a few recent publications on pastoralism respectively nomadism, their problems, conflicts and prospects. In a global survey J. Gertel (2011) has discussed "Konflikte im Weideland" (conflicts over pasture) and argues that there are basically four reasons that have contributed to a constant shrinking of pastures on a global scale:

- "the enclosure of the commons, starting in Europe and unfolding globally since the 16th century;
- the European colonial project, violently transforming land property rights around the world according to its requirements;
- the emergence of post-colonial states, consolidating the new powers of nation states vis-à-vis rights via capitalist and socialist property regimes;
- the neo-liberal globalization and the privatization of everything…"(Gertel 2011: p11)

His conclusion that "pastures and local communities are hence exposed to forces largely beyond their control" holds true also for the Shahsevan, especially in connection with the expropriation of nomadic lands through the state. Also the impressive collection and edition of articles on "Pastoral practices in High Asia" (H. Kreutzmann, ed., 2012) shows a broad spectrum of different adaptation strategies on societies' pathway to modernization.

Finally, reference should be made to a publication by A. Nippa, ed. (2011) and to a recent exposition in the Hamburg "Museum für Völkerkunde"(Museum of Ethnology), in which not only the variety of nomadic forms and self-interpretations becomes apparent, but also to which extent mobility and flexibility are part of their specific survival strategies.

Our own analysis of the Shahsevan has demonstrated the increasing vulnerability of the Shahsevan pastoral nomads to multiple socio-political and climate stresses. It has become very clear that increasing vulnerability is growing over time and that it is multi-causal. In the case of the Shahsevan - and this observation holds surely true also for other nomadic tribes of Iran - growth of vulnerability dates back to the beginning of the 20th century: the changing characteristics of political and economic pressures in combination with slowly detectable, however unquestionable climatic changes have been putting pastoral economies under increasing stresses. This scenario is, by the way, fully compatible with earlier attempts to integrate different causes of food vulnerability into a coherent interpretation (figure 5-9). Also the outcomes of such an interpretation, i.e. the continued vulnerability of a society or a

specific group on a higher and therefore even more critical level seems to be transferable to nomadic societies in Iran.

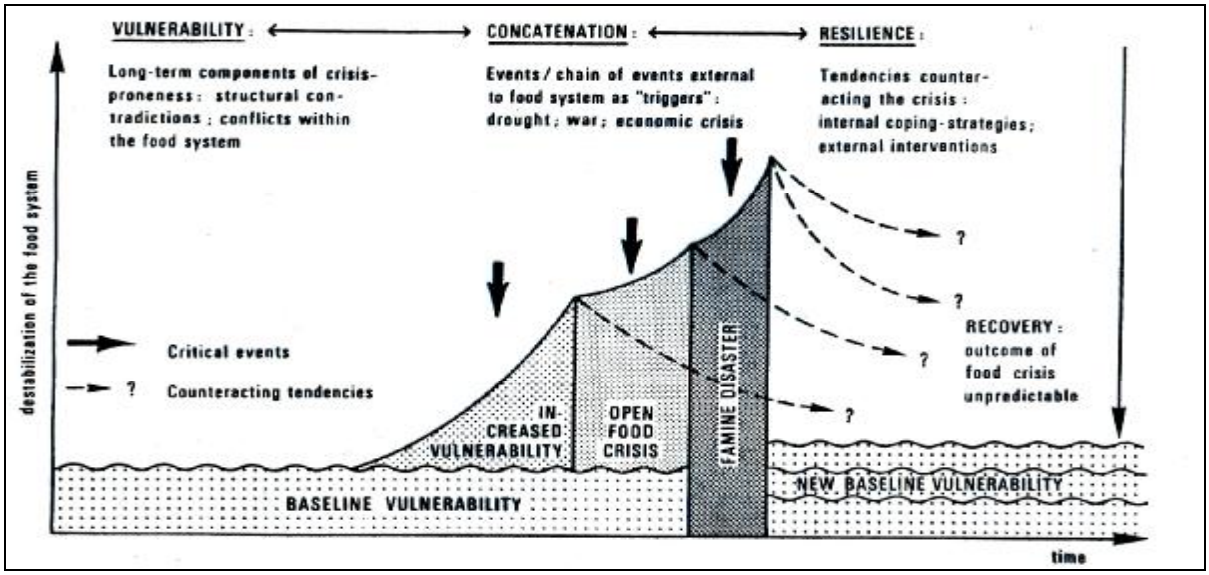


Figure 5-9 Integrating conjunctural and structural food crisis concepts
Source (Bohle 1993)

Our attempt to apply Bohle's concept to the interpretation of our own case study leads to similar conclusions, especially in regard to internal coping strategies and/or external interventions(Bohle 1993). Considering the ecological, cultural and economic diversity and functionality of pastoral nomadism in Iran raises the question and concern over the continuation of their pastoral economy and its possible future. It has been argued that their future vulnerability and capacity depend on current adaptation measures and strategies applied by both the Shahsevan and the state organizations, showing great similarities with what Bohle calls internal coping strategies and external interventions (cf. fig 3-6 and 5-9). On the basis of these considerations, three likely scenarios of the future of Shahsevan and Iranian nomadism in general shall be discussed in the concluding remarks of this study.

Scenario 1: Business as usual

This scenario examines the consequences of the continuation of the current adaptation policies and measures by both the nomads and the state organizations. It is to be expected that the increasing double exposure of the Shahsevan to both socio-political and climate stresses will generally increase their vulnerability. This condition, as has been shown in figure 3-6 (see page 92) as well as in figure 5-9 will gradually increase the vulnerability gap between the nomads with higher adaptive capacities, e.g. herdsman husbandry pastoralists, and those with limited capacities such as shepherding and pasture partnerships. This gap will particularly increase if the external interventions by state organization or NGOs do not target the most vulnerable groups. With other words: the business as usual scenario will favour, at least for some time, a selection process in which some groups may continue their traditional lifestyle for a while whereas others will have to abandon nomadism in its inherited form. Altogether, it will lead to a further decrease of nomads and pastoralists.

The state sendentarization polices for improving the socio-economic conditions of the nomads will continue to marginalize the migratory pastoralists. Consequently, the socio-economic gap between them and the sedentary population will increase. Increasing vulnerability and marginalization of the nomads will definitely lead to the elimination of the most vulnerable groups, i.e. those groups adhering to pasture partnerships and semi-nomadic pastoralism (see graph 4.15). The community, therefore, will most likely be polarized into two main groups with herdsman husbandry and shepherding. These processes will ultimately lead to a considerable decline in Shahsevan pastoral nomadism and its contributions to the local and national economy. A realistic evaluation of this scenario will come to the conclusion that it is a relevant option for some of the better-off and adequately adapted groups of the Shahsevan (and probably also for other nomads in Iran). However, it will be accompanied by a steady reduction of families, households and/or *taifeh* that will be pursuing this tradition in the years to come. The question remains: How long will this option be sustainable and last?

Scenario 2: Agro-pastoralism approach

This scenario builds on the adaptation strategy employed by some of the Shahsevan in integrating agriculture into the pastoral production system. It has been argued that the elimination of their traditional migration routes as well as the permanent diminution of their pasture size have widened the temporal and ecological gaps between the Shahsevan winter and summer pastures. This condition limits their flexibility in responding to the resource variability and market fluctuations. Consequently, the scenario seeks to bridge this gap via integration of agriculture and grazing resources on their rangeland. The arable lands on their pastures are currently being used for either the extension of state-owned agro-industrial cooperatives or for the sedentarization of volunteer nomads. The migrating Shahsevan, therefore, are marginalized to the unfertile and less and less productive parts of their pastures. Based on the empirical evidence from the adaptation strategy of the Shahsevan, this scenario suggests the integration of pastoralism into crop cultivation. On the other hand, irrigated farming capacities on their pastures, particularly in Dasht-e-Moghan, will be an incentive for improving and stabilizing the reduced remains of their pastoral economy. According to the Shahsevan, the households with an average herd size of 100 head of matured sheep and goats will need around 3 hectares of irrigated land in Dasght-e-Moghan to produce the required fodder for feeding the animals in winter. However, the data from the survey sampling show that over 63% of the Shahsevan households had no farming whatsoever and only 8% had over 3 hectares of irrigated farmland or its equivalents9 in dry-faming cultivation to produce their own winter fodder. Without proper state intervention, therefore, the strategy of shifting to agro-pastoralism is impossible for the vast majority of the Shahsevan households. Therefore, this scenario demands a significant shift in state policy, which at present is characterized by the sedentarization of pastoral nomads and their

[9] Based on the average yield from each hectare of irrigated and dry-farming land in the region, every four hectares of rain-fed cultivation is considered as equivalent to one hectare of irrigated land

development as agriculturalists resp. farmers. Instead, our study shows that an agro-pastoral development may prove to be a better option. The scenario shows that the Shahsevan have their *yaylaq*, *qeshlaq* and also farmland in agricultural areas to produce their own required fodder for winter usage. The farm residues after harvesting season will be further used for grazing the animals in autumn. The farmland will vice versa benefit from the natural manure of the herds. As a result, scenario 2 is applicable only to those cases where *yaylaq*, *qeshlaq* as well as (irrigated) farmland is available to the Shahsevan households. It is, of course, a combination that will benefit a comparatively small number of households. It is associated with the maintenance of a somewhat reduced form of nomadic animal husbandry, but annual migrations of part of the families will remain. This, however, is only a second best solution. Instead, our research and the results of our interviews show that many Shahsevan are willing to maintain this integrated pastoral development approach under the condition that the arable lands of the Dasht-e-Moghan, which are traditionally owned by them, should be distributed among them. This would ensure the perseverance of the combination *yaylaq*, *qeshlaq* and farmland.

Scenario 3: Integrated pastoral development approach

This scenario suggests that the Shahsevan will receive very strong governmental support and commitments from state organizations to maintain and develop their pastoral economy and thus to reduce their vulnerability. This scenario is derived from our analysis of their vulnerability and aims to address its underlying root causes through a comprehensive approach. Therefore, improving their pastoral economy, as discussed in previous sections, is a major component of this scenario. It further aims to improve their access and control over different capitals. In terms of nature capitals, for instance, the main priority would be support and promotion of their traditional institutions to possess and exercise their rights on pasture. Some of these institutions, e.g. *sar-pushki and imagi,* were discussed in previous chapters. Enhancing these institutions and replacing them with the complicated official and

bureaucratic institutions, e.g. issuing and controlling the grazing license, is a major part of this scenario. Revitalizing their traditional migration routes and access to their intermediate pastures would be the second priority in regard to a revival of their natural capitals. As discussed earlier, the traditional migration and the use of the intermediate pastureas along the migration routes is still today an important coping strategy for many Shahsevan. The capacity of irrigated farming in Dasht-e-Moghan provides an opportunity to relocate the current occupants of the intermediate pastures (peasants and nomads) and to return these pastures to their traditional land use. Improving and facilitating their access to financial aid and funds is another critical issue for integrated pastoral development. The Shahsevan face a serious cash crisis for purchasing the required fodder during the drought period. The official credit system, on the other hand, is so time-consuming and bureaucratic that the nomads hardly understand it and succeed in getting financial help in time. For instance, the bureaucracy asks the nomads to provide a title deed of properties and land as a guarantee for the repayment of the credits. Mostly, however, the Shahsevan have no official deeds for their pastures and camps. If they need urgent cash, therefore, they have to sell parts of their animals in order to purchase fodder and other goods. Improving the quality of pastoral education and supporting the nomads' access to schooling centers is another essential enhancing their human capital. However, more effort is needed to motivate the involvement of the young generation in the pastoral production system. This can be achieved by incentives such as improving their pastoral economy, easing their access to basic services, including social welfare, procurement of health facilities, water and electricity supply and similar services. Several efforts on providing these services have been initiated by relevant state organizations over the last decades and considerable results have been achieved. The majority of these efforts, however, were in line with the sedentarization of pastoral nomads rather than with the continuation and promotion of their traditional pastoral economy.

5.5 Final remarks

In summarizing the results of our study on "Pastoralism under Pressure: Vulnerability of Pastoral Nomads to Multiple Socio-political and Climate Stresses - the Shahsevan of Northwest Iran" we should, once again, emphasize its major findings and its innovative research results, also and specifically in the light of the existing literature. As mentioned before, scientific literature on Iranian nomads is versatile, and even the Shahsevan have been treated very intensively. Nevertheless, this study argues and investigates from a different angle: a nomadic insider's view on their own recent history, the concerns and constraints of the nomads vis-à-vis governmental institutions and also the so far never researched impacts of climate change on nomadic economy and society - all this has been addressed. Thus, it is fair to claim that this study employed a holistic approach for analyzing the vulnerability of Shahsevan pastoral nomads from both socio-political and ecological perspectives. It examined the integrative and interactive trends of changing socio-political and climate factors over the last decades and their combined impact on the Shahsevan pastoral economy. It may not be surprising that the double exposure of the Shahsevan to socio-political and climate stresses are increasing their vulnerability. This result of our research is surely applicable to other nomadic tribes of Iran, however, they have never been investigated in this respect. The livestock-based economy of the Shahsevan, for instance, is more frequently stressed by pastoral drought due to the combined impacts of climate change, socio-political change and their integration into market economy. At the community level, on the other hand, the Shahsevan households show different adaptive capacities, sensitivities, coping and adaptation strategies. This, then, is another outcome of our study: the segregation and fragmentation of an originally more or less homogeneous society into a great number of differing and increasingly incoherent lifestyles within one and the same society. With other words: the dissolution and disintegration of a tribe!

It has been argued that the manifestation of these adaptive potentials of the nomads can be interpreted as an expression of their supreme capacity to cope with extreme social and

natural pressures. However, such coping and adaptation strategies require also proper institutional arrangements by relevant state organizations. In other words: improper state policies and interventions will contribute to a further decline of their pastoral economy, thus increasing their vulnerability. Besides, they will widen the socio-economic gaps among the nomadic Shahsevan and between them and their sedentary tribal members. Many governmental policies such as the nationalization of the rangelands, the sedentarization of pastoral nomads and the imposed "modernization" of their lifestyles are still playing a crucial role in state interventions. "How can it be that we forced the Shah to fly away but still keep his law?" - this is the question of one Shahsevan respondent while arguing about the nationalization law of rangelands as being one of the main sources of their vulnerability. Throughout this concluding chapter, therefore, considerable emphasis has been laid on the role of state policies and interventions in connection with the Shahsevan coping and adaptation capacities. Particularly the projected scenarios for continuation of their pastoral nomadism insist on changing the state policy towards pastoral nomads and supporting their pastoral economy instead of a further encroachment on and erosion of their traditional and inherited rights.

The adaptation strategies of pastoral nomads in Iran are embedded in the ecological, socio-political and cultural features of their natural and historic environment (Ehlers et al. 1970; Ehlers 1976; Ehlers and Kreutzmann 2000; Ehlers 2001a, 2001b; Ehlers and Schetter 2001; Ehlers 2002; Tapper 1986, 1997). Therefore, many aspects of nomadic vulnerability, sensitivity, adaptive capacity, coping and adaption strategies may be different from the case of the Shahsevan and must be interpreted in the light of the specificities of each nomadic tribe. Developing sound strategies for reducing nomadic vulnerability requires detailed analyses of the individual communities. Nevertheless, all nomadic groups share some of the main underlying socio-political and economic root causes of vulnerability.

In a similar study on the Bakhtiari pastoral nomads of Iran, for instance, Ehlers and Schetter (2001) found that the community is under increasing stress due to state interventions,

population growth, diminishing pasture size and enforced integration into the national economy. They argue that the current trends of worsening ecological and economic conditions, the loss of socio-political importance of pastoral lifestyle compared to sedentary life, the loss of political influence and importance as well as the material incentives from outside sources are transforming the migratory pastoral life of the Bakhtiari to a stationary production system.

In view of these (and other similar) research findings it must be stressed that our own research results may not be surprising. The diagram that Schweizer (1970, 1972) developed already more than forty years ago seems to point into the same direction as our own results. However, these and similar models (e.g. also Ehlers 2002) are merely descriptive and do not go into details of the correctly described transformation processes.

Consistent throughout the scholarship on pastoral nomadism in Iran is that there is a gradual transition from migratory pastoral practices to some sort of transhumance system and towards an increasingly sedentarized lifestyle of nomads. The consequence is the settlement of the nomadic families in one of their camping sites (*yaylaq* or *qeshlaq*) and the maintenance of seasonal migration of the herd to the pasture by some of the family members or a shepherd(Amanolahi 2004; Mizban 2004). Yet, these tendencies are not only connected with the development of different adaptations to the stressors, but also with an irrevocable tendency towards sedentarization - not seldom ending in a total dissolution of familiar or tribal ties and solidarities.

The process of sedentarization is mostly promoted by the state organization and can significantly enhance the settlers' access to basic services and facilities. However, the evidence of this study suggests that sedentarization processes may only be of minor importance in regard to the main root causes of nomadic vulnerability, including the increasing pressures on resources, diminishing pasture size, and dependence on market economy. On the other hand, the integration of the pastoral production system with farming

activities, as it is being practiced by some of the Shahsevan, can substantially contribute to a meaningful modernization and continuation of pastoral practices in combination with agricultural activities. This form of transition is ubiquitous and found among many other high mountain pastoralists in Asia (Kreutzmann 2012).

In the very beginning of our study we have argued that nomadism is worldwide a lifestyle under stress. Our own research as well as that of other authors has shown that mountain nomadism in Asia, Africa and Latin America faces similar problems as those of the Shahsevan. However, socio-economic changes, the increasing embeddedness of national states in global developments and especially increasing population pressures are not only affecting mountain nomads, but also their counterparts in the steppe and semi-desert regions of the world. Thus, it may be appropriate to point to one more recent publication in which the close interactions between population growth, nomadic pastoralism, agricultural expansion, (ground-)water exploitation and the final destruction of natural habitats are depicted.

A study of the Food and Agricultural Organization (FAO), quoted by A. Nippa, ed. (2011), reconstructs the ecological desertification of a Syrian steppe region, not too far away from our own study area (figure 5-10). The mechanisms and consequences of the transformation processes are comparable to our mountain environment, although they do not take into account the additional impacts of climate change. However, also this diagram supports our basic assumption of nomadism as a lifestyle under stress. In spite of all these stresses and handicaps, our study shows the viability of a nomadic economy and society.

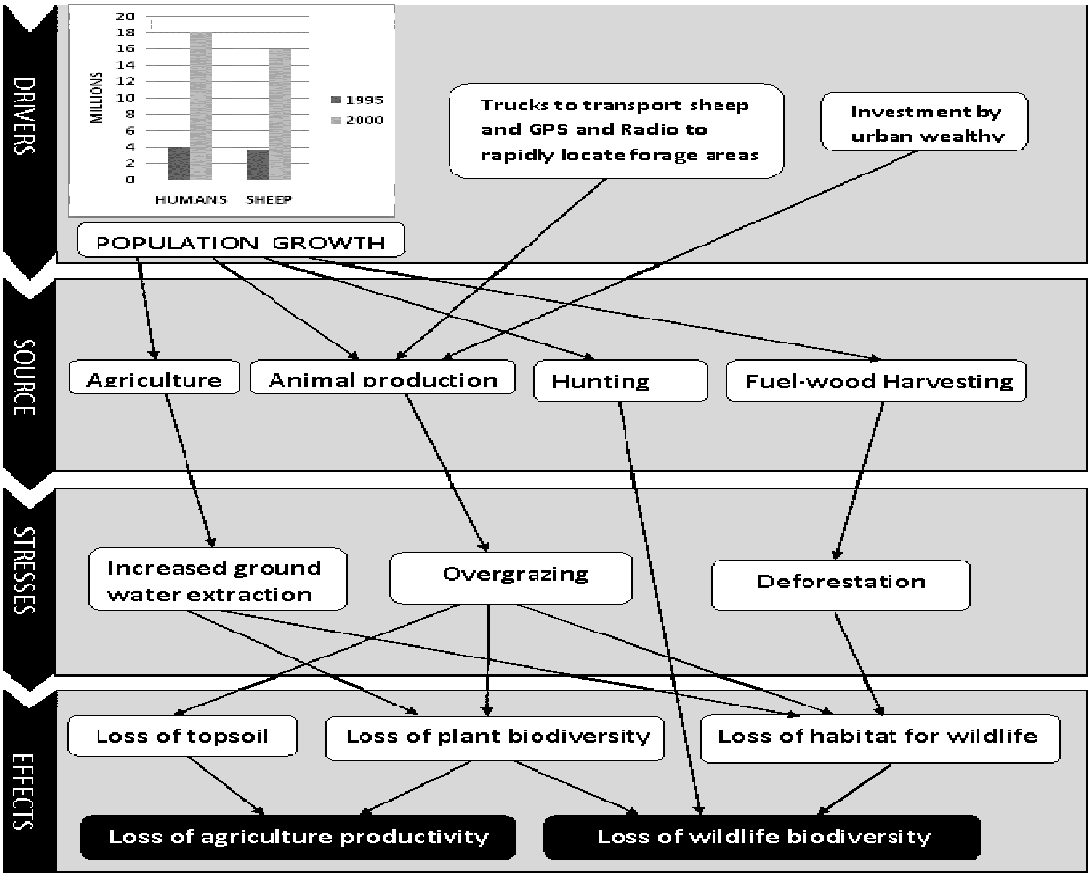


Figure 5-10 The triggers and effects of land degradation in Syrian steppes
Source: FAO (2003) cited from (Nippa 2011)

On the other hand, however, it would be credulous to expect an unchanged continuation of our five livelihood strategies (cf. table 4-2 and fig. 4-1). Instead, we may well expect new adaptation strategies of the Shahsevan in order to cope with the ongoing stressors of political and socio-economic as well as climate and environmental changes in regard to the necessities and preconditions of a viable and sustainable animal husbandry. Whether this continuance will finally lead to a kind of Agro-pastoral transhumance or even to adapted forms of shepherding remains to be seen.

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