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Herding Through Uncertainties – Principles and practices.
Exploring the interfaces of pastoralists and uncertainty.
Results from a literature review

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Abstract

This paper has been written as a background review for the European Research Council-funded PASTRES project (Pastoralism, Uncertainty, Resilience: Global Lessons from the Margins, www.pastres.org). Lessons from pastoralists, we argue, may help others working in other domains to develop more effective responses to uncertain contexts. Following prof. Scoones' paper *What is uncertainty and why does it matter?* (<https://www.ids.ac.uk/publications/what-is-uncertainty-and-why-does-it-matter-2/>), this is one of two papers developed with a view to analyse and reflect on the interfaces and interrelationships between pastoral societies, the uncertainties that embed their livelihoods, and the related coping/adaptive principles, strategies, and practices.

Through a structured review and a meta-analysis of existing literature, the environmental, market, and governance dimensions characterizing uncertainty for pastoralists are explored in six different settings: a) Central and southern Asia, with specific references to the Tibetan plateau in China and to Indian pastoralists; b) the northern and southern shores of the Mediterranean, with a focus on Morocco in the Maghreb-Mashreq region and a wider perspective on pastoralism in Mediterranean Europe; c) the eastern and western flanks of Sub-Saharan Africa drylands, with a specific focus on the Fulani and Borana pastoral groups inhabiting these regions.

This paper assesses the practices and strategies pastoral communities adopt in responding to the stresses and shocks generated by the uncertainties that surround them, with a view to understand and appreciate the underpinning inspiring principles. The responses displayed and applied by pastoral communities in the different settings show in fact relevant and intriguing degrees of similarity across the regions. This helps identify a common framework and a set of overarching principles and patterns for pastoralists in dealing with risk and uncertainty. The paper concludes by indicating potential ways we could learn from pastoralists, as part of a wider conversation about embracing uncertainties to meet the challenges of our turbulent world. This endeavour is complemented by another paper that explores the diverse and constantly changing uncertainty frameworks characterising different pastoral regions of the globe.

Keywords

Pastoralism, uncertainty, risk, drylands, resilience, insecurity, margins.

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Introduction*

We live in times of ‘crisis’. Crisis is the word that characterises debate in most domains, be it in finance, migration, climate, environment, or security, among others. The control paradigm that has informed our cultures and societies in the post-war decades seems to be over. Although probably not included in the definition and vision of ‘modernity’, uncertainty is now the prevalent dimension embedding daily lives. Societal evolutions seem to increase the levels, scale, and degrees of uncertainty. And we have to learn to live with these.

PASTRES departs from the idea that indications and lessons that could provide new stars to direct our navigation can be found amongst cultures and societies that are typically tailored and tuned to *living with and through uncertainties*. Such ‘windows of opportunity’ can be found amongst pastoralists for whom uncertainty is a resource; it is integrated in the lives and society of people inhabiting remote drylands and mountain plateaux, as it is essential for livelihoods, and is at the core of rangeland and livestock management (Scoones, 1994; de Bruijn and van Dijk, 1999; Krätli and Schareika, 2010). If we accept that pastoralists are neither wrong nor ignorant in managing range resources characterized by limitedness, variability, and unpredictability (cfr. Behnke and Scoones, 1992), we could further extend this to the belief that pastoralists can instead provide principles and lessons to the wider society that is increasingly engaged with degrees of variability and uncertainty that offer little room for control. These are the principles inspiring PASTRES endeavours.

With a view to providing background information to PASTRES activities and reflections, we propose a systematic review of existing literature linking pastoralism, uncertainty, and coping/adaptation. This is hoped will contribute to an overall understanding of the ways pastoralists interface and interrelate with uncertainty in different regional contexts. Two papers have been developed accordingly in ways that complement each other. The first addresses the uncertainty dimensions and dynamics affecting local livelihoods in six regions where pastoralism represents a significant activity, the regional ‘*uncertainty settings*’. The second paper explores the ‘*inspiring principles*’ underpinning the practices and the strategies pastoralists display with a view to evolving their livelihoods. These endeavours are believed to fill a scientific gap and provide an important contribution to academic knowledge about strategies to enhance adaptation and resilience in face of shifting and accelerating uncertainties

The first paper provides an understanding of the constantly changing frameworks generating risks, needs, and constraints as well as opportunities for pastoralists inhabiting different geographical areas. Specific regional analyses have been undertaken in central and southern Asia, on the eastern and western flanks of Sub-Saharan Africa, and on the northern and southern shores of the Mediterranean. The ‘*uncertainty settings*’ in each region are defined according to three main domains, as they relate to environmental, market, and governance dimensions (Nozières *et al.*, 2011; Scoones, 2019). Pastoral resource management as well as livelihood practices have in fact shaped and adapted through time to fit ecosystems characterized by an inconstantly variable resource availability, whereby their capacity to access and utilize resources and opportunities is today increasingly articulated through unstable policy and market dimensions. These factors and domains vary and diverge in the different regions and thus create fluctuating regimes of risks and constraints, but also of resources, possibilities, and opportunities according to shifting conditions.

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The second paper assesses pastoralists' adaptive strategies and livelihood practices in responding to the stresses and shocks generated by embedding uncertainties, with a view to teasing out the underpinning, inspiring principles. In fact, the responses displayed and applied by pastoral communities in the different settings show relevant and intriguing degrees of similarity across the regions. This helps identify a common framework and a set of overarching principles and patterns for pastoralists in dealing with risk and uncertainty (de Bruijn and van Dijk, 1999). This analysis is believed to contribute to further the understanding of pastoral societies as much as to inform potential responses to wider societal challenges—relevant pieces of the puzzle in search of ways to tackle the uncertainties that increasingly characterize society as a whole.

Like the two-page spread of an open book, one informs and completes the other in telling a story from the margins that might become central to our societal understanding.

What is pastoralism and who are the pastoralists?

But let's start by establishing what is pastoralism and who are the pastoralists? Pastoralism is a specialised form of natural resource management adapted to ecosystems defined as marginal because their potential for agricultural intensification is structurally limited by soil, water, and climate conditions. It is important to highlight that 'marginality' is defined according to a specific mode of production and development paradigm, and that this eventually translates into the social and political marginalization of the communities inhabiting these territories. Extensive pastoral production occurs in some 25 per cent of the global land area in territories around the world, from African drylands to Central Asian steppes, from European mountains to Andean plateaux. In order to make use of these territories and live through these ecological dimensions and the related risks and opportunities, pastoralists critically rely on *mobile livestock rearing*, a distinguishing factor amongst rural communities (Blench, 2001:6; Johnsen *et al.*, 2019).

Pastoral resource management relies on the centrality of livestock as the main 'technology' for converting available grasslands into human food—animal protein in the form of milk and meat—and other products (hides, skins, fibres) and also for transferring them from one place to another and from one season to another. Besides being a primary means of production, livestock is also a service provider for transportation and ploughing. Animals are also important as means of transaction as they represent the primary source of exchange, income, loan, gift, and often the main instrument for saving, investment, and insurance and an asset that ensures access to primary services. Diverse pastoral societies are characterised by different animal species, according to agro-ecological conditions. These, in turn, carry specific socio-economic implications (IFAD, 2018) (Table 1). Household members are involved to different degrees in animal care and management practices, as well as in other activities that support pastoralism, as it will be assessed.

Table 1 - Pastoral systems and trends in the world's regions

<i>Zone</i>	<i>Main species</i>	<i>Status</i>
Sub-Saharan Africa	Cattle, camel, sheep, goats	Important environmental changes and shifting policy framework; patterns of sedentarisation and insecurity
Mediterranean	Small ruminants, cattle	Societal transformations reconfiguring mobility and growing territorial polarisation with under- and over-grazed pastures
South Asia	Various small and large ruminants	Declining due to advancing agriculture, though still relevant in mountainous settings
Central Asia	Various small and large ruminants	Expanding following de-collectivization that characterised Soviet and Chinese experiences
Arctic	Reindeer	Expanding following de-collectivization in Siberia, but under pressure in Scandinavia
North America	Sheep, cattle	Declining with increased enclosure of land and alternative economic opportunities
Andes	Llama, alpaca	Diverging llama and alpaca systems due to infrastructure expansion and modern livestock production

Source: adapted from Jenet *et al.*, 2016.

Mobility is a factor central to pastoral resource management and livelihood patterns. Pastoralists move in order to make the best use of a limited and variable natural resource base while also enhancing its reproduction. Apart from its productivity aspects, mobility is also a strategy for accessing and exchanging products and services, seizing opportunities, or evading animal diseases or other trouble. The geographical dimensions of mobility vary according to conditions and cultures, as it will be assessed (Niamir Fuller, 1999).

Attachment to land thus varies from one group to another as do land tenure and access rights, which are often quite strict in principle but flexible in implementation as they are often subject to adjustment and negotiations. The capacity to access resources when needed in order to support mobile livestock represents a most critical asset for managing risks and seizing opportunities in pastoral areas. Maintaining and reproducing the resource base is another pillar on which pastoral resource management rests. Experience shows that patterns of access to resources in pastoral societies cannot be simply framed and labelled 'public', 'private', or 'open access' as a number of rights and claims co-exist and compete through livestock, water points, grazing, forest, salty areas, and other range resources, as it will be assessed. This is why social capital is particularly relevant in pastoral systems as it determines the capacity to negotiate or enforce access to critical resources (Flintan, 2012).

Apart from their relevance to local livelihoods and the national and regional economies, pastoral systems are also increasingly acknowledged for the social and ecosystem services they provide to the wider society by managing natural resources and maintaining biodiversity. The capacities of properly-managed pasturelands to absorb carbon and water also provide a most effective support for ecosystem functions that are increasingly important from a climate perspective (Caballero *et al.* 2009; Nori and de Marchi, 2015; Franca *et al.*, 2016; Jenet *et al.*, 2016.). Important socio-cultural and political roles are also associated with pastoralism. By supporting local livelihoods, pastoralism ensures that a human presence is maintained in harsh terrains and remote communities, thus helping avert socio-economic desertification, with relevant implications for the cultural heritage and territorial identity of local communities (Moreira *et al.* 2016; Nori and Farinella, 2019). Herding also represents the best way to safely occupy and secure vast, remote territories where the costs of any other form of producing, controlling, monitoring, and patrolling would be significantly higher (Nori and Baldaro, 2018; FAFO, 2016).

The conditions, risks, stresses, and opportunities characterizing and shaping pastoral livelihoods increasingly depend on a number of factors, processes, and variables beyond the environmental domain. As it will be assessed, the market and governance dimensions contribute importantly to accelerating, expanding, and diversifying the nature and degrees of uncertainties surrounding and embedding pastoral communities. Integration of pastoral economies into wider market dynamics, State interventions aimed at development or modernisation or both, sedentarisation programs, rangeland and wildlife protection, armed conflicts, insecurity at the local or regional levels, as well as technological development shortening and re-connecting distances, places, resources and communities all contribute to the reconfiguration of the uncertainties pastoralists experience in the various settings.

Review Approach

This is a systematic literature review of existing literature exploring the links and the relations between pastoralists and uncertainty in different regions of the globe. Through a qualitative analysis of bibliographic materials, this work undertakes an aggregation of findings of local studies with the aim of revealing general trends and a tentative global mapping. In this respect potential factors, patterns, and pathways that typify the connections and relationships between pastoralists and uncertainties are assessed, together with the ways these are framed in the different contexts.

As indicated above, six regions where pastoralism represents an important livelihood strategy have been chosen. In accordance with PASTRES areas of activity, a specific area/group where there is a concentration of literature and documented case studies has been selected in each region for a focused analysis. The regions include central and southern Asia (with specific focus on the Tibetan Plateau and on Indian pastoralists); the eastern and western flanks of Sub-Saharan Africa (with a specific focus on the Fulani and Borana groups); and the northern and southern shores of the Mediterranean. Other relevant pastoral regions such as the Arctic and the Americas have not been addressed in this review.

The implementation of the systematic review followed three main steps: a) characterisation of the research question; b) systematic selection of review materials; and, c) analysis through the consolidation of a qualitative database. With a view to translating the research question concerning pastoralism and responses to uncertainty into operational terms, criteria for selecting relevant bibliographical materials were defined. The criteria was the presence in the text of the following search criteria (*pastoral* OR herd**) AND (*uncertain* OR risk OR insecur**). The terms risk and insecurity were deemed more appropriate as proxies to uncertainty as the concern is more on socio-cultural patterns rather than ecosystem dynamics.

According to these criteria, literature materials specifically containing primary and empirical information on pastoral responses and adaptation to degrees of uncertainty were collected through snowball sampling by multiple sources. Primary data sources were produced or provided by PASTRES colleagues; additional bibliographic materials were then generated from the references of those initial materials through snowball sampling. With a view to collecting in a systematic way the information contained in the papers reviewed, an operational table has been developed for each paper. In each table, evidence of pastoralists' coping/adaptive responses according to the three Pastres operational domains (Environment, Markets, Institutions) have been collected in order to develop a qualitative database for analysis in comparative terms (Table 2).

Table 2 – PASTRES table for classifying pastoral strategies

Sources of uncertainty	Region / group	Period of study	New pressures/ challenges	Impacts/ implications	New/emerging responses Short term	New/emerging responses Long term
Environment / resources						
Markets/ commodities						
Institutions/ governance						

With a view to broad geographical global coverage and specific regional characterization, a minimum of 15 bibliographical materials were selected for each region. Most of the papers were published in various scientific journals but the analysis also leaned on scientific studies, reports, and grey documentations from national and international agencies as sources of information. Other selected documents have been included in the review in order to enhance the representativeness and comprehensiveness of the regional analyses. This is the reason the same bibliography applies to both papers. Amongst academic publications, the sectoral *Nomadic Peoples* and *Pastoralism* provide an important portion of contributions, but other cross-disciplinary journals have also been referenced in order to embrace a range of perspectives on pastoralism and pastoralists. These include social, agriculture, economics, and veterinary science, among others.

This review is systematic yet differs from those adopted in other disciplines, such as the 1997 Cochrane guidelines. On the one hand, information related to pastoralists’ responses and adaptation strategies depends, to a significant extent, on the observer, with variable degrees of quality and subjectivity. On the other, the quantity and variety of literature reviewed, and their different origin and nature, would not allow for anything structured in a formal sense. Furthermore, the systematic review of a limited number of papers and the snowball sampling methodology cannot be representative of such complex dynamics in huge and vast areas. But as in Scoones (2019:10), the aim here is more to suggest an approach for further enquiry by bringing together diverse perspectives and encourage an onward conversation rather than to offer anything resembling a synthesis.

This work is thus neither meant to provide statistical evidence nor generate an exhaustive database of existing knowledge concerning pastoral livelihoods in their facing environmental, market, and governance uncertainties. Rather, it tries to unveil and analyse existing connections and relationships amongst these and describe them for different regional cases. It also tries to infer some broader understanding about the principles informing pastoralists’ strategies and practices deployed and mobilised accordingly.

This work reports on a tentative analysis of the principles inspiring and informing pastoralists’ strategies and practices in adapting to and living through uncertainties. In another, complementary document a tentative assessment of the uncertainty settings that characterize pastoral livelihoods in the different world regions is provided. Five main domains are here explored, namely 1) the herd and its management, 2) wider pastoral livelihood strategies, 3) trends and evolutions of mobility patterns, 4) configuration and organization of pastoral territories, 5) social networks and socio-political capitals.

Picture 1 – Shepherding on the Bolsena lake, Italy (credit: PASTRES)



1. Herd Management

1.1 Centrality of livestock

In regions characterized by extreme climates, human presence is almost inextricably linked to the presence and management of animals. Accumulation of a stock of living animals is a major means of livelihood security that pastoralists use to cope with their constraints, including high environmental variability (Manoli *et al.*, 2014). Even where other assets or activities could generate better income opportunities, livestock represents the fundamental form of pastoral capital aside from functioning as a means of subsistence, production, storage, transport, and transfer of food and wealth (Tag, 2007; Behnke, 2008).

On the Tibetan plateau, the pastoral household's dependence on the yak economy is overwhelming as people relied almost entirely on yak for their livelihood needs: milk and meat for consumption and income; dung for fire and fertilizer; leather and wool for clothes and housing. Similarly, human reliance on camel in the Somalia and Mauritania drylands is absolute; in addition to providing meat and milk even during dry seasons, camels are also widely used for transporting goods and persons.

The centrality of livestock and herd remains strategic also for most pastoral households that diversify their economy into other activities. The cash earned in other sectors - including remittances, trade, and sale of cash crops - is typically ploughed back into extensive livestock keeping, which continues to represent a major capital asset (Kreuer, 2011; McPeak *et al.*, 2012; d'Elie, 2014a; Gonin and Gautier, 2015; Lind *et al.*, 2016). Daoud *et al.* (2016) report that in parts of western Egypt where huge water investments have fostered intensification of crop farming, agriculture developments have been linked to support livestock breeding, which has itself been the target of considerable investment by farmers despite the opportunity to further invest in crop irrigation.

Some family members are thus kept in pastoralism in order to maintain the extensive livestock breeding within the overall household portfolio even when the livestock economy is not currently expected to provide more than a subsistence income (Goodall, 2004; Boubakri and Mazzella, 2011; Manoli *et al.*, 2014; Gonin and Gautier, 2015; Mahmoud, 2016). The reasons are many and diverse, but they mostly attain to:

a) support the pastoral economy, especially in times of stress or through shocks. Drought represents a main example in case, as it results in immediate shocks as well as in medium to long term forms of economic stress. Revenues generated elsewhere often support the purchase of animal feed and water for the herd or avoid culling or selling animals or both. Preventing excess offtake and herd destocking in the event of crises seems to represent a strategic priority to which funds generated through other means are devoted to (FSNAU, 2013; Manoli *et al.*, 2014).

b) invest in pastoralism with a view to maintaining a social and territorial attachment; as reported in different cases and settings, extensive livestock breeding might provide employment opportunities for poorer, younger, or older, retired members of a family (Boubakri, 2005; d'Elie, 2014b; Farinella *et al.*, 2017).

c) maintain the pastoral option as an economic contingency within the family livelihood portfolio, an effective fall-back option when other investment options fail (d'Elie, 2014b; Ragkos *et al.*, 2018).

Livestock also represents the main asset for diversifying the household economy out of pastoralism. The income from pastoral women's petty trading in products generated by livestock pays school fees and allows for children to be fostered by urban relatives. Similarly, it is the money from livestock that finances emigration processes of pastoral family members. In the MENA context, the relationships between pastoralism and migratory processes are quite intimate and reciprocal: pastoral money supports emigration projects while, in turn, money from emigration projects supports and reinforces local

pastoralism as shown by cases from southern Tunisia to eastern Morocco (Boubakri, 2002; Mahdi, 2014; Chattou, 2016).

Livestock is also important for cultural and political identity. In the different regions pastoral communities rearticulate their social, cultural, and political aspects through their strong association with animals. Aside from the intimate links between cattle and the Dinka, Nuer, and Maasai communities of Sub-Saharan Africa, pastoral life is also inextricably linked to the cultural identity of many groups in India such as the Van Gujjar association with buffaloes and the Raika belief that they were created by the Hindu god Shiva to take care of the camel (Köhler-Rollefson, 1992).

Amongst Western Sahara refugees, recovering camel husbandry as a livelihood strategy represents a critical element in their struggle to assert their new national identity because they feel that through camels they regain access to their traditional territory and reaffirm their shared nomadic cultural heritage. Indeed, the camel has become one of the symbols of the Polisario Front, the Sahrawi's formal political institution (Volpato and Howard, 2014).

Cases have been reported whereby livestock-rearing represents in itself a means for landmarking and imposing a group's presence and seen as somehow securing their individual or collective claims over their territorial domains (Bourbouze, 2000; d'Elie, 2014a). This could be the case even if livestock production is largely detached from rangeland resources; for example, some Bedouin and Berber groups identify themselves with their livestock and the related production system to differentiate themselves vis-s-vis other groups (IFAD, 1995; Gertel and Breuer, 2007). In the Indian context, livestock products and services are strategic in establishing collaborations and synergies with farming communities (Sharma *et al.*, 2003).

Overall, livestock remains the most efficient option for both wealth accumulation and reinvestment in pastoral regions, as well as a most effective strategy for accessing and exploiting market opportunities. Extensive livestock rearing is thus increasingly valued even by non-pastoralists such as farming communities, entrepreneurs, and traders using rangelands for speculative, commercial purposes (Sharma *et al.*, 2003; Nori *et al.*, 2009; Moritz *et al.*, 2011; Nunow, 2013). The continuous redefinition and renegotiation of herd composition, structure and management strategies and practices are critical in enhancing the effective use of available resources and opportunities.

1.2 Adaptive herd management

As livestock is clearly central to the pastoral economy, a diverse range of practices seek to enhance and adapt livestock performances under shifting conditions, according to the capacities and means of the pastoral household. The drivers shaping and enabling the different herd management strategies may stem from environmental changes or market and policy frameworks, whereby herders' decision-making processes are influenced by cultural values, consumer preferences, societal demands, or policy incentives. These all vary and change from one place to another and provide diverse triggers for local uncertainty scenarios.

The herd itself is considered a dynamic and differentiated entity that can be divided, subdivided, discarded, reassembled, and reorganized according to contextual conditions. Reliance on dividing and reassembling the livestock capital and applying different management patterns to various sub-herds is a typical pastoral strategy for adapting to shifting conditions, including profiting from economic opportunities or adapting to family cycles or community social dynamics (Ragkos, 2018).

Amongst Borana and Maasai in the Horn of Africa, herds and ranges are divided and arranged in sub-units according to production needs and household capacities, including cultivation on partially subdivided private ranches. Bedouins in western Egypt adopt destocking and restocking strategies to shrink or expand the herd according to access to land, water, labour, and money (Daoud *et al.*, 2016).

Box 1 – Traditional herd management amongst Horn pastoralists

The Borana distinguish between two forms of livestock-keeping. One is home-based herding, which involves the herding of milking cattle with calves and smallstock close to the encampments. The herds in this category are usually referred to as *worra*. The other is satellite herding, including bulls and immature stock herded further away from the encampments. This group of herds is known as *forra*. They usually range more widely and have access to better forage. Rangelands are usually divided into three categories: *qaye*, *kalo*, and *matatika*, and are governed through two broad levels of traditional administrative structure. These are referred to as “administration from above” (*gada*) and “administration from within” (*tula*).

The Maasai vary the species mix of their herds, with the number of cattle, sheep, goats, and donkeys changed in order to maximize production and use of forage. As well as moving seasonally, they also adjust their livestock’s daily grazing patterns so as to find the best forage available for each grazing area. This is done by carefully examining animals at the end of each day to assess their condition and milk yield.

By dividing and handling the herd through a modular system based on entities with diverse features and purposes, pastoralists enhance flexibility in allocating and managing land and labour resources while distributing risks and seizing available opportunities provided by ecological or market dimensions.

Specialized herd management often implies the establishment of an ‘élite herd’ with specific productive, commercial, or reproductive purposes and which is detached during some seasons from the rest of the animals and managed accordingly. An ‘elite herd’ might include milking animals that remain near the homestead during transhumance, animals devoted to milking or fattening schemes for marketing purposes, or a nucleus herd that holds a strategic role in terms of herd reproduction or survival through difficult events (Elloumi *et al.*, 2006; Catley, 2017). Amongst (often poor) pastoralists living in peri-urban areas this implies the maintenance of few smallstock close to towns (Robbins, 1994; Cincotta and Pangare, 1994; Krätli and Swift, 2013).

According to De Haan *et al.* (2016:81) “the main opportunities in pastoral systems, lie not so much in further increasing productive efficiency, but rather in putting in place systems that will enable buffers and rapid adjustments to the “boom and bust” cycles characterizing the system”. This resonates with the emphasis of Roet *et al.* (1998) on the importance of embedding flexibility by keeping options open and increasing the role of *real-time* management as the key factors in management of variability and uncertainty in high-reliability systems (i.e. air-traffic control, power grids, etc.). Along these lines Nozières *et al.* (2011) analyse in detail how the herd contributes to the capacities of farming systems to adapt to and evolve under shifting uncertain conditions by providing important sources and degrees of flexibility that are critical in managing perturbation.

Adaptive herd management necessarily implies a strategic reorganization of livestock but also of land and labour. Splitting the herd into different units can imply individual or collective patterns aimed at modifying the workforce and management structure as labour or economic needs evolve. While these schemes indicate forms of intensification and specialisation, they rely on patterns that are quite flexible and adaptive to the specific times and needs, and represent important means of livelihood security in the different pastoral regions (Ancey *et al.* 2007; Corniaux *et al.*, 2006; Wane, 2006; Abdullahi *et al.*, 2012; Manoli *et al.*, 2014).

Dynamic herd management also characterises situations and contexts where the pastoral economy is detached from pure range resources. Fréve (2015) describes in detail how pastoral practices are continuously tailored and tuned to different European societal demands expressed through public subsidy schemes to the point that the shepherding work is itself reconfigured along lines that are only marginally related to herd performance. A similar situation of detachment is described for Bedouin or Berber communities in Jordan, Palestine, and Morocco for whom the quality and quantity of rangeland pastures have become “irrelevant” in the business of producing sheep due to the availability of subsidized feed and mechanized water (IFAD, 1995; Sinjilawi and Nori, 2005; Gertel and Breuer, 2007; Bourbouze, 2017).

1.3 Restructuring herd composition

The composition of the herd might vary opportunistically in terms of size, structure, species composition and different breeds adopted for each species. Typically a the combination of different types of livestock in pastoral herds serves to enhance complementarity of resource utilisation, by providing a wide array of different animal products, and reduces risks of production failures associated to just one specie (Al-Najim, 1991; Catley, 2017). Together with herd parting and livestock mobility, herd diversity represents a key asset for the most effective use of widespread, differentiated, and seasonally available pastures. It provides, in fact, for managing and adapting to the large and dynamic variety of the stresses, shocks, and opportunities offered by the hugely diversified climate, topography, and vegetation that characterise rangeland ecosystems (Takayoshi, 2011; Nozières *et al.*, 2011; Singh *et al.*, 2013).

Reshaping herd structure and composition rests on two main, intertwined pillars: herd productivity and adaptability (NBAGR, 2017). These principles have to be operationalised in a setting that is continuously shifting according to environmental change, technical options, market opportunities, societal demands, and policy frameworks. It remains difficult to ascertain to what extent the different domains influence pastoralists' choices from one case to another; it has, however, been indicated that environmental changes—including climatic dynamics, access to water, and modifications in vegetational cover—represent major drivers behind herd composition shifting from grazers to browsers in certain regions to enhance adaptation to changing rangelands conditions and better cope with more frequent drought conditions (Al-Najim, 1991; Krätli *et al.*, 2013; Shanatibieke, 2016; Fokou and Bonfoh, 2016).

This situation is often reported in literature on Asian and Sub-Saharan African contexts: some Borana groups swinging from cattle to camels (Coppock, 1994; Watson *et al.*, 2016; Volpato and King, 2018); southern Somalis shifting from camels and smallstock to cattle (Al-Najim, 1991); the Afar and Maasai (Eriksen and Marin, 2011; Bilha, 2015; Berhe *et al.*, 2017) as much as the Fulani/Peuhl (Turner, 2011; Eriksen and Marin, 2011; Kima *et al.*, 2015) changing from cattle to smallstocks. The phenomenon is also visible in parts of north-western India, whereby the move into smallstock, especially goats, should be seen as an adaptation by the rural poor to utilise the ecological and institutional niches and interstices available to marginal social groups (Robbins, 1994).

Market opportunities and policy frameworks are often intimately intertwined and strongly influence pastoralists' herd-related choices. Sheep figures for Mediterranean Europe rose after direct CAP subsidies, while herders have turned towards cattle when the subsidy regime has changed (Nori and Gemini, 2011; Ragkos *et al.*, 2018). Similarly, in Tibetan areas the sheep-to-yak ratio has been changing across time according to the Chinese policies and the related incentives. In MENA region the growing proportion of cattle in national herds is also attributed to State subsidies aimed at enhancing cow milk production in order to satisfy rising consumer demand (Daoud *et al.*, 2016).

Box 2 – Yak: sheep ratios in Yushu prefecture (Nori, 2004)

The prevalence of sheep in Yushu reached a peak in the early 1980s, with a downward trend since then. Yak numbers, conversely, have slowly risen in recent decades to almost equal sheep numbers by the big snow disaster of the mid-Nineties that struck the region. A very likely explanation for these trends is that sheep were favoured by Chinese government policies rather than by local herders. Once the de-collectivization process started and households were given the responsibility and freedom to restructure their herds, sheep numbers have been declining while yak presence has been on the rise on local ranges. The relevance of goats is also growing for market-related reasons as they often come to replace sheep, especially among poorer households. Even in a seemingly constrained setting, where rules and prices are centralized, herders show important capacities to navigate through the inconsistencies or changes in institutional settings and find the interstices and opportunities to deploy their strategies to live through shifting conditions.

Typically, some options exclude others and are dictated by the diverse roles livestock may play as a local source of employment and income, as well as by the effective capacities of the diverse households or groups in terms of access to capital, land, and labour. In the Alpine and Pyrenees mountains in the

Mediterranean, sheep husbandry suffers from competition with cattle, which usually occupies the better pastures due to cattle herders' capacity to pay higher rents. Instead, sheep husbandry is marginalized to higher elevations and pastures with difficult access and steeper grazing slopes that are also lacking in cheese-making facilities (Lopez-i-Gélats, 2012; Nori, 2017). In southern Algeria, Tuareg shift the ratio between goat and camels in their herds according to drought versus tourism cycles (Chatelard, 2005). Increase in smallstocks in family herds might be associated to children taking care of them.

When it comes to herd size, it is difficult to ascertain changes in longitudinal and diachronic terms as data are scant and often unreliable. In the EU where data collection is somehow more structured, indications are that in recent times pastoralism has seen a large drop in the number of farms paralleled by a consistent rise in their size due to shifting policy and market conditions. Herders that have decided to remain in livestock production have been forced to expand their herd consistently and reorganise land and labour resources accordingly (Hadjigeorgiou, 2011; Meloni and Farinella, 2013; Nori, 2017; Mattalia *et al.*, 2018). In MENA countries as well, the growing and diversifying articulation between State policies and market mechanisms pushes pastoralists to continuously adapt their flocks' size, including through mechanisms whereby the benefits of selling some animals offset the costs of maintaining others (Rachik, 2009; Chattou, 2016).

Forms of genetic maneuvering and the move towards specific breeds is also reported according to different conditions, often with a view to enhancing disease resistance, drought tolerance, or production levels. The Sarda sheep has substituted for Merino-like breeds in the shift from a wool-based to a milk-based pastoral economy in central Italy. In these same areas nowadays the Lacaune breed is encroaching due to its productive performance in more sedentary, stall-based systems in order to reduce risks related to the growing presence of wild predators in the Italian Apennines (Nori, 2018). Overall, herd composition represents a strategic asset for tackling pastoral uncertainties as it provides ample operational ground for herders to opportunistically tailor and calibrate technology for the most effective use of available resources.

1.4 Integration with farming

The trend towards integrating farming and herding activities is reported across pastoral regions, albeit with different patterns and trends (Kassam, 2010; Turner, 2011; Meloni and Farinella, 2015). This combination materialises in terms of exchanges of services or products or both, but also as a mix of production and livelihood strategies of different, apparently specialised, ethnic groups (Köhler-Rollefson, 1994; Moritz *et al.*, 2011). The degrees and patterns of convergence, complementarity, integration, or competition amongst these practices vary according to the region and determine the reconfiguration of managing land, labour, and livestock accordingly.

In north-western India the trajectories of crop and animals are today closely intertwined, following the dramatic territorial transformations generated by the green revolution, with options alike for new conflicts and synergies (Rangnekar, 1994; Singh *et al.*, 2013). In the Sahelian context the convergence of the two rural systems increasingly takes place along a continuum whereby herders incorporate farming practices and farmers include livestock in their farming systems (Gonin and Gautier, 2015).

While from the cultivators' perspective integrating livestock into their farming systems provides opportunity for enhancing access to family milk and directly avails farming inputs, it also represents integrative forms of insurance and investments. In the Sahel, where conditions are enabling, either farmers' livestock is incorporated into pastoralists herds or herders from pastoral communities are contracted to take care of these animals (Thébaud and Batterbury, 2001; Kreutzmann and Schütte, 2011; Mitra *et al.*, 2013). On the other hand, from the herders' perspective, setting up farming activities links to their need to supply themselves or their animals or both with products they would otherwise source through market purchases. These can be cereals that increasingly shape diets even in pastoral communities or animal fodder that often complement grazing resources (Kavoori, 2007; Kima *et al.*, 2015).

In most cases crop farming activities undertaken by pastoralists complement rather than substitute for livestock production. Farming schemes amongst pastoralists are often aimed at producing animal feed through agriculture, and eventually feed processing, storage, and marketing develop accordingly (Little, 2013; Mburu *et al.*, 2017; Fenta *et al.*, 2018). The practice of diversifying agricultural output to produce animal feed is common in agro-pastoral systems in Europe; in large parts of Sardinia and the Pyrenees, the demise of crop farming has provided opportunities for producing forage for animals on farmlands (Barrachina, 2007; Meloni and Farinella, 2015; Ragkos *et al.*, 2018). While dispossessing large tracts of rangelands, irrigation schemes in India have nonetheless extended opportunities for livestock to feed on crop residues and stubble as well as to directly produce hay and animal feed throughout the year. These crop-livestock synergies have eventually supported herds during drought events and also underpinned their capacity to benefit from growing market-related opportunities for animal products (Köhler-Rollefson, 1994; Robbins, 1994).

In MENA region the encroachment of crop farming in rangeland areas might pursue different objectives and strategies. Cases exist whereby the productive performance does not necessarily represent the primary objective of labour investment, and crops may be opportunistically farmed to provide for grains, hay, and forage or for grazing resources, according to the prevailing climatic conditions (Lazarev, 2008; Tache, 2013; Borbouze, 2017). Cases are also reported whereby agricultural practices—crop farming as much as arboriculture—are applied as a means of claiming portions of communal lands aimed at securing (or operationalizing) rights of use to a specific group. This is not necessarily a process through which élites grab land from collective properties; rather it seems to be a widespread and accepted practice across social strata, also ‘from below’, without, in many cases, complaint from the community (IFAD, 1995; Elloumi *et al.*, 2006; Tag, 2007; Lazarev, 2008; Borbouze, 2012; Tache, 2013).

Table 3 – Livestock-farming integration in the reviewed pastoral regions

<i>Region</i>	<i>Pattern</i>
India	Different interactions following huge encroachment of farming in rangeland areas.
China	State farms importantly provide for animal feed, hay and forage to local herders with a view to enhance their market capacities and reduce their exposure to climatic events.
MENA	<i>Céréaliculture-élevage</i> model, with degrees of synergies.
Mediterranean Europe	Growing degrees of farm production of animal feed and cultivated pastures.
Sahel	Historical patterns; recently mixed agro-pastoral strategies, with mutual encroachment of agriculture and livestock systems.
Great Horn of Africa	Crop farming is one of the drivers contributing to the fragmentation of rangelands, triggering conflict in some areas.

To tackle the uncertainty settings embedding their livelihoods, pastoralists strategically adapt their range, herd, and household resources and continuously reconfigure use as much as the interrelationships amongst land, livestock, and labour according to conditions. This dynamics and constant recombination creates a mosaic of strategies where concepts such as intensification, diversification, and the individual, public, and collective fade and combine according to places, seasons, and periods in what d’Elie (2014b:4) describes as “patching up” (Van Wageningen, Wenjun, 2001; Takayoshi, 2011; Hadjigeorgiou, 2011; López-i-Gelats, 2013; Manoli *et al.*, 2014; Moreira *et al.*, 2016; Ragkos *et al.*, 2018). Connections with other societal actors—including urban dwellers, market agents and farming communities—help expand available opportunities and contribute to an overall diversification of livelihood patterns to complement and support their livestock-centred economy.

Picture 2 – inter-generational flock management in Sardinia, Italy (credit: PASTRES)



2. Livelihoods

2.1 Mosaics of livelihood strategies

Though pastoralists still favour livestock as a means of subsistence, diversification of their livelihood and revenue sources, both inside and outside pastoral activities, is evident in most regions. An enormous array of diverse livelihood practices are applied by pastoralists in different regions to cope with constantly shifting conditions.

In many regions, growing populations on shrinking rangelands are an important trigger for diversifying the pastoral economy; this seems particularly the case for the Sub-Saharan African and Indian contexts, where the quest for alternative livelihood sources to complement herding is particularly strong (Saberwal, 1995; Saleem, 1996; Wane, 2006; Turner, 2011; Moritz *et al.*, 2011; Kreutzmann and Schütte, 2011; Hertkorn *et al.*, 2015; Berhe *et al.*, 2017). Segments of the pastoral population move to other livelihoods that eventually complement and integrate into the livestock-centred economy.

Indeed, pastoral households tend to increasingly redirect some of their members toward activities outside pastoralism by transferring labour into other economic sectors (Little, 2001; Wane, 2006; Boubakri and Mourad, 2014; Catley *et al.*, 2013; Mahmoud, 2016). Apart from more typical options for diversifying the pastoral household workforce including trade and petty business (often related to livestock products) and engaging in agricultural practices, the mobility that characterises pastoral communities could also affect their members; outmigration of some household members to other areas, sectors, or countries represents in this framework an increasingly relevant practice for members of pastoral households—with important consequences on pastoral household structure, composition, and functioning (McPeak *et al.*, 2012; Mahdi, 2014; Lind *et al.*, 2016; Zuccotti *et al.*, 2018).

Agrawal and Saberwal note that “[m]uch recent research points to the fluidity within certain herder societies and the fact that individuals move in and out of herding, in response to a wide variety of factors—market conditions that may alter the profitability of herding, the availability of alternative options including cultivation and jobs in existing or emerging markets, and the very real problem of accessing forage owing to competing interests staking a claim on land resources” (2004:41).

Box 3 - Herders on hire

A growing presence of hired herders or shepherds is reported across all pastoral areas. Hired herding labour is not new among wealthier households but this phenomenon is intensifying across pastoral settings. The shift from household labour to an external, salaried workforce in herding activities is reshaping pastoralists' responses to uncertainties.

Hired labour is part of a wider process of commoditisation of pastoral resources first seen with the renting of land and livestock. It stems from the social stratification and differentiation of rural societies, resulting in a degree of proletarianization of some pastoral groups (Anderson and Broch-Due, 1999; Kassam, 2010; Moritz *et al.*, 2011; Kreutzmann and Schütte, 2011). Working as herd labour provides an opportunity for members of impoverished pastoral households to generate income through the sale of their skills, time, and services. Examples can be seen in many cases such as Fulani cattle herders in the Sahelian region or Somali camel herders in the Horn (Coppock, 1994; Al-Najim, 1991; Toulmin, 1986; Moritz *et al.*, 2011; Manoli *et al.*, 2014; Kima *et al.*, 2015; Volpato and King, 2018). Cases are also reported in India where members of pastoral castes that do not own livestock sell their services tending and grazing others' animals (Provenza and Ralph, 1990; Mitra *et al.*, 2013; Singh *et al.*, 2013).

Livestock owners hiring herders can be absentee landlords, remotely-based or just living nearby and supervising herd management by mobile phone. Absentee ownership is particularly reported in the Middle East and North African (MENA) region, Sub-Saharan Africa, and Central Asia. Purchasing livestock and hiring herders might represent a form of commercial investment by wealthy individuals from non-pastoral settings who are then able to exploit rangeland resources for their own profit. Cases exist where absentee owners are speculative investors; they keep their herds for profit, investment, or just as a secure asset. At times payment is not entirely monetised and herders enjoy rights over the milk from the herd (Moritz *et al.*, 2011; Catley *et al.*, 2013). In other cases, the herd's offspring can also be part of the deal. Similar dynamics are reported for the Horn (Little *et al.*, 2008; Schilling *et al.*, 2012a; Little, 2013), as well as for the Sahelian context (van Driel, 1999; Turner, 2011). In MENA region, absentee ownership can result from the emigration of male members of pastoral households and the phenomenon of 'substitutional' pastoralism (*nomadisme par bergers interposés*), whereby the emigrants' herd is tended by salaried herders paid with remittance money (Boubakri and Mourad, 2014; Mahdi, 2014; Chattou, 2016).

This phenomenon is indicative of wider social and cultural shifts. As in any other domain of the agrarian world, some local youth are not necessarily interested in following their family's footsteps. Younger members of pastoral households may prefer looking into alternative livelihoods for their future while retaining a connection to their pastoral homes. In some areas, such out-migration takes place at high rates, giving rise to difficulties in finding skilled and motivated shepherds. As labour is a main input for this extensive production system, this results in a major problem of generational renewal for certain pastoral areas or groups.

Hired herders may also be migrants. There are cases of Sub-Saharan African herders working in Maghreb countries; in Mediterranean Europe an important component of the shepherding workforce is from abroad. Shepherds often originate from Romania, Albania, Macedonia, and Romania, bringing with them direct experience with extensive livestock production systems. Economic and administrative problems for migrant hired herders are substantial. Remaining in their new countries and integrating into the sector—and so eventually evolving from workers/shepherds to livestock owners in their own right—is frequently difficult. However, remittances from migrant shepherds often contribute to the reconstitution or expansion of flocks in the origin community, often in association with other relatives (Boubakri and Mourad, 2014; Chattou, 2016; Nori, 2018).

A skilled immigrant workforce, which often provides labour at a low cost, is part of a shift in strategy as pastoralists face new uncertainties. Mobilising labour means using marginal resources, thus pastoral territories remain recognized. As an approach to navigating marginal contexts and a way to live with and through surrounding uncertainties, hired herders in pastoral areas are increasingly important.

Diversifying household capacities into activities outside but linked to livestock production could materialize in different ways, which often include the 'split and diversify' strategy whereby different household members undertake different activities in different time and space scales. How household members and resources are dynamically allocated in integrated patterns provides a relevant understanding of the principles underpinning pastoralists' coping and adaptive capacities. Such multiplicity is reflected into multi-sited and multi-season patterns for household members who remain economically active and employed in a number of seasonal pursuits that link and connect rangelands to urban areas as well as to other economic sectors and geographical settings—including abroad for certain communities—in order to meet the diverse needs and capacities of household or herd (McPeak *et al.*, 2012; Bauer, 2015).

This *multiple livelihood* system or *dynamic portfolio*—and the different time and space scales involved—seem relevant in expanding pastoral household capacities to simultaneously tackle longer-term stresses and short-term shocks and live through the uncertainties affecting the different settings (Gertel and Breuer, 2007; Manoli *et al.*, 2014). Within this framework the pastoral household decides which children will go through schooling, who will undertake a migratory project, what part of the family becomes urbanised, who remains with the herd, and who seeks other opportunities in the rural setting. It is noteworthy that while diversification out of pastoralism is a necessary strategy for poorer households, it is often also a strategic choice for wealthier ones as even families with large herds often have members in other sectors or areas (McPeak *et al.*, 2012; Lind *et al.*, 2016).

2.2. Reconfiguring households

Splitting households thus represents an opportunistic strategy for reorganizing available resources, with a view to either benefitting from a temporary opportunity, or facing an emergency, or managing household cycles aimed at creating separate and independent economic units—or a combination of all these options.

Daoud *et al.* (2016) report that to cope with the 15-year drought (1995–2010), some extended Bedouin families separated into nuclear families with their own productive assets as a means of managing economic deficits. Similar examples are offered by de Bruijn and van Dijk (1999), who indicate that operating through small-scale social and political units was the most rational way of finding one's way under high-risk conditions that followed the drought events of the 1970s. Tibetan nomadic households split after the Chinese government's ecological resettlement program was implemented: some family members moved to town to take possession of the new house, while others remained in the rangelands with the livestock (Ptackova, 2011). Eventually the houses provided through the program proved to be a valuable household asset as their seasonal rental to tourists offered an additional income option (Shanatibieke, 2016). More broadly, in several pastoral settings tourism-related opportunities represent an interesting option for diversifying the local economy and reinvesting in rangelands (Chatelard, 2009; d'Elie, 2014b; Lopez-i-Gélats *et al.*, 2016; Bourbouze, 2017). Cases have been noted in which some family members are sent to refugee camps or urban relatives or even join militias or engage in other forms of illicit activities (OECD and CSAO, 2014; see also Box 4).

Box 4 – Diversifying pastoral economic and political assets (Nori and Baldaro, 2018)

Although pastoralists cannot be considered as a homogeneous and single group and acknowledging that more than one strategy can be adopted at one time, Nori and Baldaro (2018) propose a classification of the transformations of livelihoods along the pastoral belt spanning from Afghanistan to Yemen and from Somalia to Mauritania with a view to developing a further understanding of these dynamics. Three main patterns, at times complementary and intertwined, seem to characterize the rationale driving pastoral strategies and behaviours when facing crisis and conflict: *migrations*, *markets*, and *militias*.

1. Emigration and shifting out of pastoralism provides the opportunity to support herding households by spreading out community members and diversifying the livelihood base, also providing economic support from remittances and establishing extended social networks.

2. Enhancing the pastoral economy's market integration through intensification, diversification, or both, and developing strategic exchanges and ties with urban settings and regional and global markets provides important sources for income and employment.

3. Engaging in illicit activities—including trafficking, smuggling, and hosting or joining guerrilla/militias, illegal organizations, and networks—have repositioned areas on nations' margins at the core of regional networks and global pathways.

These dynamics offer varying opportunities for different groups as they might enable pastoral youth or women to diversify their livelihoods and engage in new activities, networks, and social structures.

The case of a multisite household with members separated and living in different rural and urban settings during some seasons is quite widespread. From the Moroccan Atlas to Sub-Saharan Africa to the Tibetan plateau, the need to split in order to undertake transhumance and the growing interest of pastoral households in sending (some of) their children to school leads to different forms of multisite conformations; younger children are often fostered in town by some relatives so that they can attend school, while some family members stay 'outside' with the animals and others may engage elsewhere in petty trading or market-related activities (Kreuer, 2011; Ptackova, 2011; FSNAU, 2013; Mahdi, 2014; Bauer, 2015).

Household diversification could also take place along generational or gender lines, with different household members undertaking different economic projects, also as part of specific phases of household cycles. In certain Muslim societies, particularly in MENA, because of the potential to have more than one wife, some pastoralists maintain two distinct families with distinct lifestyles (IFAD, 1995; Lazarev, 2008). According to Little (2001), gender plays a significant role in diversification options as men and women take different paths when diversification is pursued.

Several studies indicate that flexibility, sharing, interchangeability, versatility, and complementarity in gender roles are relevant mechanisms in enhancing pastoral households' resilience and adaptive capacities (Wane, 2006; Hertkorn *et al.*, 2015). These features extend to the reconfiguration of household dynamics, pastoral labour, and related market and off-farm income-generation opportunities. Women play a particularly relevant role in evolving market activities at different levels—from local charcoal to milk, dairy, and range products and to wider regional trade for *khat* and livestock (Nori, 2010; d'Elie, 2014a; Mahmoud, 2016).

Particularly in areas affected by emigration, either forced or economic, the growing role of women in the local social, economic, and also political setting is reported (Nori *et al.*, 2008b; Boubakri, 2005; Zuccotti *et al.*, 2018). In Mediterranean Europe the restructuring of pastoral farms throughout recent crises has frequently taken place through a repositioning of women within the management of the farm (Pitzalis and Zerilli, 2013; Farinella *et al.* 2017). Apart from maintaining vital roles within the house and in herd management (such as caring for newborns and sick animals), women may set up complementary activities such as dairy processing or tourism services to support the household economy. Shepherds' spouses also increasingly come to control the farm's bureaucratic tasks, while also managing contacts with relevant actors such as veterinarians and local authorities (Mattalia *et al.*, 2018; Ragkos *et al.*, 2018).

All these patterns represent evolutions of strategic behaviours and pastoralists' longstanding efforts to extend, diversify, and integrate their economies in order to cope with and adapt to a shifting context, with a view to defending and evolving their livelihoods and the very existence of their communities. The effectiveness of such strategic approaches seems to be consistent with findings that livelihood resilience can be better achieved through a mix of income sources rather than a larger number of similar income-generation activities prone to the same types of risks (IFAD 1995; Lind *et al.*, 2016). Furthermore, multilocal families and diversified economic activities are also strategic in extending and reinforcing social networks.

When examining how household resources are managed vis-à-vis the uncertainties embedding pastoral livelihoods, three principles stand out in the reviewed literature: a) seasonal complementarity of the different activities undertaken by household members/portions to shield from exposure to shocks that might come at the same time; b) diversification over intensification through the variety of options rather than specialisation that households expand their room for manoeuvre; c) these strategies and assets tend to reinforce each other, either by complementing or converting or generating resources that are inter-exchangeable (food, feed, or revenue) or by establishing consistent networks and trusted relationships that might prove strategic in times of need.

2.3 Engaging with markets

Similar principles seem to inspire pastoralists' growing engagement within trade-related dynamics. The degree of market integration of pastoral economies varies widely in different contexts and according to existing opportunities. Overall, the demand for animal protein is growing, and this provides important room for expanding the commercialization of pastoral products (Kerven, 2006; Sharma *et al.*, 2013; Nori, 2017a). Although synthetic fibres have overtaken natural ones in most areas and sectors, cases exist, especially in Asia, where quality fibre production and commercialization provide further options for pastoralists to generate income (Agrawal and Saberwal, 2004; Monisha, 2004; Kerven, 2006; Singh *et al.* 2013).

Livestock marketing strategies are inspired by cultural pragmatism and local ethos—including religious values and societal goals for wealth and security. In cases where pastoral societies show limited integration into commercial approaches, the herd is not seen in terms of its exchange value but in terms of subsistence security; financial needs, rather than profit-making opportunities, are the major trigger for the sale of livestock products. In non-drought times livestock marketing decisions are largely driven by the type and magnitude of expenses that pastoralists need to cover with the cash obtained from livestock sales (Pavanello, 2010). Animals are sold to meet basic needs, and complementary economic activities are often oriented at avoiding losing animals or destocking during the difficult periods (d'Elie, 2014a). Overall “reluctance to sell animals adopting a market rationale may stem from the livestock's social insurance function, which facilitates important social networks that are especially helpful in times of need” (Mburu *et al.*, 2017:984).

Box 5 - “Trading Up” in Karamoja, Uganda (excerpt from Catley, 2017)

Typically, pastoralists in Karamoja are not price-responsive when they sell livestock. “The amount of money needed, not price, is the primary consideration when animals are being sold to meet cash needs. When the price is high, fewer animals are sold; when the price is low, more animals are sold. In other words, the supply of animals being sold to meet cash needs is price inelastic” (Rockemann *et al.*, 2016).

However, some pastoralists were adapting their marketing practices and “trading up. [...] In this case Karamojong pastoralists take advantage of high livestock prices to sell slaughter bulls (high value/low potential growth assets) and buy heifers (high value/high potential growth assets). This is most apparent at the end of the rainy season, when slaughter bulls are in excellent condition and command relatively high prices. In summary, Karamojong livestock marketing practices, including decisions on which animals to sell and when, represents fully rational economic behaviour” (Rockemann *et al.*, 2016).

Pastoral economic diversification might well evolve through patterns of growing commodification of livestock by-products, especially dairy (butter, milk), but also dried or processed meat—a typical food pastoralists prepare, store, and exchange to face drought times. Value-adding activities related to the processing of milk and meat represent a vital source of employment and income for members of pastoral households as well as important ways to engage with market networks and connect with urban and farming communities, with relevant implications in socio-cultural terms alike (Nori, 2010; Mahmoud, 2016; Ragkos *et al.*, 2018). Range products other than livestock could also provide significant local options for alternative income-generation. Resources and markets change widely from one region and group to another—from caterpillar fungus in Tibet to frankincense, charcoal, or collection of grasses in the Somali ecosystem, *terfèze* or *truffe du désert* in Morocco, dates or fish in Soqotra, Arabic gum, and “*pain de singe*” in Sahelian areas (Eriksen et Marini, 2001; d'Elie, 2014b; Berhe *et al.*, 2017; Chies, 2018).

Market-related options have indeed provided pastoralists throughout the different regions with important opportunities for expanding their economy and tackling environment-related threats and risks. Integrating market dynamics challenges the degree of autonomy of pastoral systems and exposes herders to the volatility of market pricing and transactions (Simula, 2015). Pastoralists have demonstrated exceptional skill in managing trade dynamics in difficult conditions—and with limited assistance from other societal sectors, including the State, whose interventions often aim at exploiting pastoral economies to serve the needs of a growing and demanding urban population (Little, 2001; Gooch, 2004;

Monisha, 2004; Farinella *et al.*, 2017). The high transaction costs, distortive measures, asymmetric relationships, and related uncertainties generated by the market dimensions to pastoral economies are typically dealt with through substantial investment in collective actions, whereby social capital provides the financial and socio-cultural assets to navigate trade dynamics that increasingly transcend local and national boundaries (Agrawal, 1998; Gooch, 2004; Chattou, 2016).

Picture 3 - Marketing small ruminants in Isiolo, Kenya (credit: PASTRES)



3. Mobility

Livelihood strategies in pastoral areas are constantly engaged in playing differently with mobility as pastoralists move in order to exploit the variability and diversity characterizing their environments and economies. A critical understanding of the triggers, modalities, and implications of mobility patterns is deemed vital to understanding how pastoralists tackle shifting and accelerating degrees of uncertainty. Apart from herd productivity aspects, mobility is also a strategy for accessing markets and services, connecting to other societal actors and sectors, or evading threats and trouble. Mobility is a key strategy for efficiently using resources and relations, scaling down risks, and seizing opportunities (Nori *et al.*, 2008a).

3.1 Pastoral mobility patterns

The geographical dimensions of mobility vary according to the scale and regularity of movements. These range from highly nomadic pastoral systems found in areas where ecological conditions are extreme to transhumant pastoral systems that exploit ecological complementarities to agro-pastoral systems where livestock are sent short distances to pastures and animal feed produced through agriculture. More recent approaches describe a *continuum*, whereby herders and herds move or do not move opportunistically according to risks and chances posed by ecological, economic, or social domains (Niamir Fuller, 1999; Flintan, 2012). Different patterns imply diverse reconfigurations of the livestock, land, and labour relationships, and are underpinned by the embedding socio-ecological and political realities of the different settings to which they continuously adapt to (Bonnet *et al.*, 2010).

Box 6 – Adaptive mobilities in India

A comprehensive review of the literature suggests mobility patterns have scaled up and down to adapt to changing conditions. Following the Green Revolution in India, herders have less access to extensive rangelands, although animals may now feed on the residues of irrigated crops throughout the year. This has important consequences for the economy and drought-coping capacities, as well on their mobility patterns as some groups have extended their transhumance routes in search for available natural grazing, while others have been reducing or changing movements to enhance access to farm residues and fallow lands (Agrawal, 1998; Gooch, 2004; Mitra *et al.*, 2013). While on the one hand opportunities for natural grazing have been severely limited by agricultural expansion and encroaching farming, on the other, farmlands have offered important alternative sources to livestock feeding. By extending crop production in space and time scales, irrigation schemes have provided opportunities to feed animals on by-products as well as for directly producing hay and animal feed (Kavoori, 2007; Rangnekar, 1994). In Rajasthan, the opening up of grazing opportunities on the stubble of newly-irrigated fields in neighbouring states has indeed represented an important pull factor for herders who have seen their rangelands shrinking (Köhler-Rollefson, 1994).

All in all, pastoral mobility continuously adapts to reconfiguring constraints, risks, and opportunities in order to maintain the most effective connections and relationships with the diverse territories, economies, and actors.

As suggested by Turner (2011) pastoral mobility should be seen as a means to reach clearly-articulated management goals in terms of rangeland ecology, livestock productivity, and agropastoral risk management. Together with critical ecological dynamics, these terms must also include the political, organizational, and institutional infrastructure within which pastoralists operate (Chakravarty-Kaul, 1997; Majekodunmi, 2014). Pastoral mobility is a real social, political, and economic construction, constantly renewed and readapted, with a number of involved activities, costs, relationships, and opportunities to develop and manage accordingly (Gooch, 2004; Bonnet *et al.*, 2010; Turner, 2011; Mitra *et al.*, 2013).

Through caravan trading and strategic marketing (salt, wool, fibres) pastoral economies have been historically integrated into larger regional economies. More recently, pastoral livelihoods have further expanded and increasingly integrated into international trade and politics. Mobility patterns have evolved accordingly to support the articulation of the pastoral economy to other resources, actors, and opportunities. Apart from a strategic reconfiguration of pastoralists' economic strategies and socio-political capital, the reconfiguration of mobility patterns has been critically supported by technological

developments underpinning an important reorganisation of pastoral territories. The impact of these processes on evolving pastoral mobilities and the implications for reshaping uncertainties and the related capacities to tackle them is analysed below.

Mobility as an adaptive strategy for pastoralists today has to be reconceptualised in the processes that see pastoral territories, resources, communities, and networks shrinking and expanding after intense societal changes. Parallel to the extended rangelands and social webs that typically characterise pastoral societies, resources and opportunities are also increasingly drawn from territories and processes that unfold outside the realm of animal production and very often also outside regional boundaries. Access to rangelands and natural resources shifts due to environmental change including growing demographic pressure, range encroachment from various agents, and changes in climatic patterns. Livestock mobility patterns reshape accordingly, as herd composition responds to emerging demands, capacities, and opportunities; seasonal moves account for accessible resources that no longer depend just on traditional ecological factors such as forage, water, and animal health.

3.2 Technological innovations

Technological advances have been a major contributor to the reconfiguration of mobility patterns and pastoral territories in recent decades. From mechanized transport to mobile phones, ICT devices, and decentralised energy provision, evolving infrastructure and technological developments support new forms of mobility, contributing to deeply restructuring patterns of resource availability and accessibility. Most recent technological developments have in fact aimed at facilitating, supporting, and enhancing mobility at different levels, helping connect and interrelate different resources, actors, and networks through new patterns. Innovative forms of connecting and interrelating, in turn, contribute to redefining the rules governing such relationships and exchanges.

Mechanised transport and water pumps had already importantly extended pastoralists' capacities to access and manage distant resources and opportunities, from dryland pastures to faraway settings and sectors. Roadways, trucks, cars, and motorbikes have dramatically shortened distances and facilitated links between herding households, range resources, and market opportunities, triggering a complete reconfiguration of pastoral mobility. While this 'transformed mobility' is particularly addressed in the MENA literature, the phenomenon is common throughout pastoral regions (Gomes, 2006; Thébaud and Hesse, 2008).

Box 7 – New mobilities in the MENA region

In the Maghreb and Mashreq, new forms of mobility have evolved through the use of mechanised transportation in response to shifting and diversifying ecological, institutional, and market uncertainties. These include patterns of 'inverse mobility' or 'mobile sedentarisation' where livestock movement is limited; instead, water and forage are brought to livestock by mechanised vehicles (Bourbouze, 2000; Gertel and Breuer, 2007; Rachik, 2009; Vidal-González and Nahhass, 2018). 'Boxed-in mobility' is where formalised borders confine pastoralists' movements within administration perimeters (IFAD, 1995; Lazarev, 2008). 'Substitutional herding' occurs instead where emigrated herd owners act as absentee landlords, hiring shepherds and paying them through remittances (Boubakri, 2014; Mahdi, 2014; Chattou, 2016).

New energy systems have also helped reshape livelihoods in pastoral areas, including the evolution of rural settlements and the development of rural towns in remote areas and difficult settings. Particularly in the Asia and African contexts, recent development in photovoltaic systems have made it possible to bring electricity to many pastoral areas, with relevant implications for household life and livestock production, including water provision, delivery of basic services (distance learning, mobile clinics), and the capacity to store products (i.e. dairies, vaccines, etc.) (Cervigni and Morris, 2016; Jenet *et al.*, 2016)

More recently developed information and communications technologies (ICTs), particularly mobile phones and the internet, have dramatically contributed to shortening space and time scales, strengthening connections, facilitating information exchanges, and reducing transaction costs with relevant

consequences for the pastoralist's material and social life (de Bruijn *et al.*, 2014; Vidal-González and Nahhass, 2018). It is mostly through these technological evolutions and the related extended connections through space and time scales that new mobility patterns are operationalized, multisite and multiscale household strategies develop and materialize, and social networks and territorial organisations reconfigure and expand. These practices are all critical for pastoral strategies for tackling growing degrees of uncertainty, better managing risks, decreasing costs, and saving time as well as for exploiting opportunities.

Amongst the varied and diversified uses pastoralists make of mobile phone and related technologies, the following are particularly relevant in scaling down risks, transcending physical constraints, and seizing opportunities in uncertain settings:

- the ability to checking conditions of range resources, eg. rainfall, insecurity (Gentle and Thwaites, 2016)'
- safe and reliable money transfer internationally as well as locally, for instance, through the *m-pesa* system in Kenya (Bilha, 2015);
- enhanced hiring contracts as livestock owners can better control shepherds' work from a distance (Vidal-González and Nahhass, 2018);
- improved marketing through market information systems, including monitoring sale prices and procuring water and animal feed (Wane, 2006);
- security alerts in conflict areas (Schilling *et al.*, 2012a);
- ICT-related animal health services (Kima *et al.*, 2015);
- new forms of economic activity and entrepreneurship (i.e., tourism) (Chatelard, 2005).

Box 8 - *M-pesa*: electronic money

Thanks to an enabling policy environment as well as an entrepreneurial culture, Kenya proved to be an important platform for testing and elaborating innovative technologies that adapt well to pastoralists' needs and circumstances. A well-known example is the expansion of financial inclusion for low-income and marginalised populations through innovative financial products in branchless banking. The *m-pesa* system (*m-* for 'mobile', *-pesa* is Swahili for 'money') allows money to be sent and received over the mobile phone network. This enables users to complete basic banking transactions without visiting a bank. It also reduces the transaction costs of servicing remote communities and helps tackle risks related to carrying cash in insecure environments. *M-pesa* has been adapted to a variety of alternative uses, including microfinance services (e.g. fast and secure repayment of micro-loan instalments). It has also been extended into a more comprehensive package, *m-kesho* (*kesho* means 'tomorrow' or 'future' in Swahili), which gives access to an interest-bearing savings account and other services such as micro-insurance.

In Somalia the extension and relevance of mobile phone banking has helped bridge institutional and financial gaps, thus playing a pivotal role in enabling pastoralists to navigate through insecure territories, contested resources, and volatile opportunities (Nori, 2010; Abdullahi *et al.*, 2012; FSNAU, 2013).

Furthermore, ICTs importantly contribute to reconfiguring societal rules and roles, including through ethnic, social, gender, and generational divides. The 'mobile' identity of pastoralists is reinforced through the use of inter-connecting technologies through which social networks extend and evolve (Catley *et al.*, 2013; Nori and Baldaro, 2018). Social cohesion is enhanced through connections amongst distant groups and individuals traditionally dispersed or on the move whose links ICTs maintain by reducing distances, isolation, and marginalization (i.e., during transhumance or emigration) (Vidal-González and Nahhass, 2018). ICT use can also support decreased dependence on elites and be instrumental in gaining higher degrees of independence for 'marginalised' groups such as women and youth (de Bruijn *et al.*, 2016).

Technological developments are complemented by physical connections, social networks, and personal relationships that are critical for ensuring the reliability of connections and information as well as for establishing mechanisms of trust and accountability and the related socio-political capital that constitutes the necessary software to effectively utilize and exploit technological advances (Pavanello,

2010; Bilha, 2015). These will be assessed in the following sections, with a critical view on the specific implications these hold for pastoralists' capacity to tackle uncertainties.

Picture 4 – Rural urban transhumances in northern Italy (credit: PASTRES)



4. Territories

The development of mobile-supporting technologies, together with the growing exposure of pastoral economies and networks to wider geographical scales, have opened up new opportunities as well as risks and threats for herding communities. Recent pathways of pastoral livelihoods have evolved along patterns underpinning an important reconfiguration of the territories they insist on.

4.1 Reticular territories

Following the important changes and innovations that have reconfigured pastoral livelihoods, rangelands are being reorganized accordingly as mosaics of different but functionally interconnected landscape units. In order to exploit existing and fluctuating opportunities (e.g. seasonal rainfall—but also market pricing related to religious festivities or localized subsidy schemes)—rangelands and more generally pastoral territories are reorganized accordingly as webs of linked nodes. These webs serve to connect and articulate resources, actors, and opportunities at different levels and scales through ‘reticular’ dynamics that make these mosaics manageable and governable (Tache, 2013; Gonin and Gautier, 2015; Nori, 2010; Apolloni *et al.*, 2018).

Nodes are strategic hubs that concentrate specific resources and opportunities, including strategic range resources, money, information, services, people, and social connections. In rangeland settings these are typically water points (Lewis, 1961), market places, hot grazing spots (Motta *et al.*, 2018), wetland pastures and dryland farming plots, communal range enclosures (Tache, 2013), urban settings and rural towns, milk collection areas (Nori, 2010), and animal health facilities.

Links are lines that cut through rangelands providing for interstitial, albeit relevant, resources and critical connections. These are typically transhumance routes, market channels, range corridors, main roads, and river banks.

The connections between diverse territorial assets and their articulations in the wider reticulum are governed by tailored sets of rules and regulations that define roles and responsibilities. The reiterated and regular presence and passage through certain territories is key to generating and stabilising herders’ territorialities and ensuring tight links between a group/clan/community and its range territories (Gautier *et al.* 2005; Bonnet *et al.*, 2010).

The reconfiguration of pastoral resource management in this reticular fashion and the related governing institutional arrangements play a relevant role in supporting herders’ capacities to tackle uncertainties. These webs, in fact, provide direct and continuous access to primary services, marketing options, small business, petty trading, alternative sources of income, options for investments or migration, wage or casual work, loans and credit, remittance and insurance schemes, skills, and animal health support. Accessing these resources and opportunities supports the pastoral economy’s integration into the larger societal framework and provides important buffers for the livelihood of pastoral households and communities.

Box 9 – The Somali ecosystem (Nori, 2010)

The ‘Somali ecosystem’ does not only reflect similar ecological conditions but also a continuum that characterizes the man-made networks and relations that make Somali populations integrated and interdependent throughout the region despite inhabiting different countries. This ecosystem is crossed by and interlinked through corridors; complementary movements of livestock, people, food, commodities and finances often take place through territorial patterns. Corridors typically develop from the Somali coasts to the Somali-inhabited regions in Djibouti, Ethiopia, and Kenya. They serve to interlink the seemingly-isolated inner drylands with coastal areas and—through the ports—the international arena.

By allowing continuous exchanges between pastoral products, imported goods, and the interrelated flows, these corridors serve the disparate needs and activities of groups living under different environmental settings. A corridor is constituted by the interaction between a hard and a soft component, a physical and a social infrastructure, which are both critical to ensure its functioning. The institutional setting that governs such infrastructure is critical as well, as it regulates access to and utilization of resources, regulates and secures movements and transactions, and provides the enabling environment for such flows, exchanges, and opportunities to materialise.

These evolving networks also serve to enhance the capacities to avail, access, and use marginal resources by reorganizing land and labour accordingly. Through webs of social relations acting in the interstices of mainstream society and navigating marginal contexts, herders access a wide variety of grazing grounds, fallow, abandoned, or harvested farmlands (Robbins, 1994; Volpato and Howard, 2014; Mattalia *et al.*, 2018).

This reticular territoriality enables a structural continuity between rangelands, urban settings, and the wider regional and international arena. This process accompanies the spectacular rate of sedentarisation of pastoral populations in urban settings (through the establishment of rural towns), settlements (through shifts to agro-pastoralism), or refugee camps. A similar pattern and related processes could be reported for the intense market integration pastoral societies have undergone in the different regions.

One main driver of the reconfiguration of pastoral territories is no doubt represented by the investments and development of water resources. In most dryland areas water enables animal grazing and human survival; it is around water availability that pastoral societies have established and evolved their institutional setting, socio-political structures and power relations (Lewis, 1961; Cotula, 2006; Gomes, 2006). As a main strategic economic asset, water availability represents a critical concern for herding households, local authorities, nation-states and International agencies alike. Ensuring continuous availability of water in drylands typically reshapes patterns of livestock mobility as much as those of human settlements. (Robbins, 1994; Gomes, 2006; Kavoori, 2007; Lazarev, 2008; Berhe *et al.*, 2017).

Box 10 – Evolving institutions around water (Staro, 2013)

Garri communities in northern Kenya have drawn from their neighbouring Somali and Borana pastoral cultures in forging an evolved institutional setting that enables regulating water distribution and commoditizing its access in ways “*that are contextual, highly flexible, and adapted to a changing social and ecological environment*” (Staro, 2013:244). The property regime adopted by the Garri is “*neither purely ‘private’ nor ‘communal’; rather, it is a combination of public and private interests, and of communal and individual features*” (Benda-Beckmann, 2001 quoted in Staro, 2013). (...) “*Furthermore the new system of private water points is characterised by information that is shared horizontally among herdsmen without the interposition of the elders, and cannot be easily accessed from outsiders: this contributes to counteract limits in herders’ decisional flexibility in the relationships with government officials and development organizations*” (Staro, 2013:260). The new setting enables herders to shape a fresh room for manoeuvre and carve out new degrees of freedom vis-à-vis internal (elders) and external powerful actors (government officials and development organizations) and out of traditional hierarchies.

The development of rural settlements and towns has often been part of a process of land occupation and marking that is also associated with the expansion of agricultural practices in many rangelands. These have become the hubs of new channels, routes, and corridors where connections and relationships

amongst pastoral groups, households, and individuals have scaled up, favouring the evolution of extended social networks and arrangements (Lewis, 1994; Staro, 2013; Karanja *et al.*, 2016; Nori and Baldaro, 2018). Drought, insecurity, and political rivalries have also contributed to such processes, as many pastoral households and people have been forced to move from rangeland-based livelihoods into urban areas or refugee camps; the latter are shown to have a positive impact on regional economies by functioning as commercial hubs for local pastoralists (Volpato and Howard, 2014).

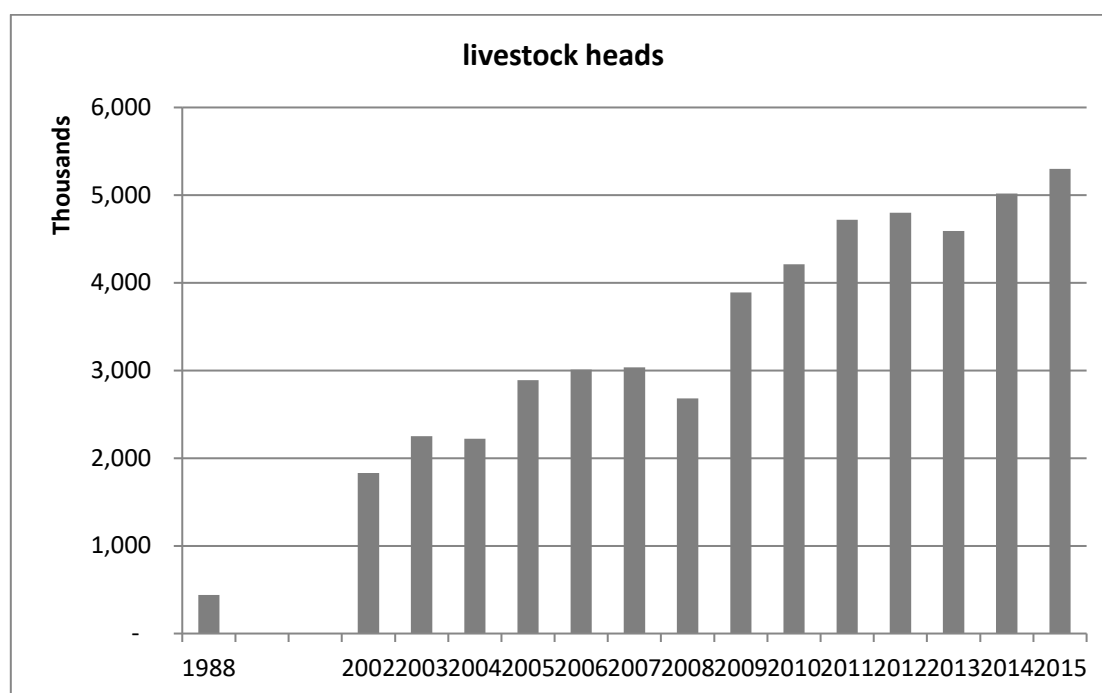
According to Lazarev (2008) this territorial organization which has taken place in recent decades has enabled the shaping of a “new pastoral socialisation, whereby households and groups that used to seldom meet and interact are now residing in the same towns, meeting constantly in the same markets and sharing common services. (...) The pastoral space thus appears in the form of a constellation of social mosaics that group together, ‘neighborhood units’ where rights amongst the different groups are established in more inclusive ways” (Ibidem:21). In other areas this process is reflected in the ethnicization of certain spaces, services, and activities according to the different groups, with the phenomenon of informally-redrawn ethnic boundaries within urban settings in dryland areas (Nori, 2010; Mutsotso, 2018).

The important transformations that have characterized pastoral territories in recent decades have triggered a deep reconfiguration of the socio-political and economic assets as well as of the strategies that pastoralists rely on to tackle environmental changes and ecological uncertainties. Rangelands have been reorganized, and so have the physical infrastructure and institutional landscapes that govern their access and utilization.

4.2 Global exposure

Together with technological advancements and a reorganization of rangelands, the growing integration of pastoral economies and societies into larger regional and global dimensions represents an important aspect to consider when analysing the unfolding of livelihood strategies into new uncertainty landscapes. The tighter articulation into wider market and political dynamics provides opportunities for expanding pastoralists economies, extending their networks, and diversifying their livelihoods while also generating new dependencies, risks, challenges. Main drivers of such articulation are trade dynamics and market channels, geo-political agendas and interests encroaching onto rangelands, and international emigration and diaspora networks.

In the Central Asian setting, the Soviet experience for some countries and the exposure to Chinese markets for others have represented the main drivers of this process. In the Sub-Saharan Africa context, pastoral engagement with regional, trans-border, and wider trade dynamics is favoured on the Sahelian side by the complementarity between inner dryland pastures and the heavily-populated coastal areas (and increasingly also northern Africa shores) (Apolloni *et al.*, 2018; Motta *et al.*, 2018). On the other flank, the Somali trading infrastructure provides important opportunities for herders of the Horn to access and serve the growing Arab demand for animal proteins (Little and Mahmoud, 2005; Lind *et al.*, 2016). The Somali experience indicates that in an enabling setting, herding communities and networks display outstanding degrees of efficiency and effectiveness, as these have been operating in an institutional vacuum generated by the collapse of the Somali state in 1991. Figure 1 shows how export figures have risen consistently since then (Nori, 2010). In all these regions, smallstock trading often follows the calendar of Muslim festivities, which shifts from year to year, with important implications for pastoralists’ production and marketing patterns.

Figure 1 – Growth in Somali exports since the fall of the central State

Source: elaboration from FSNAU, 2016

As outlined earlier, the important expansion of livestock trade and the related exposure of pastoral economies have been heavily supported by the development of physical as well as institutional infrastructure facilitating market arrangements in difficult and risky settings. Robust, complex, and diverse social networks have evolved and strengthened to better manage risks and uncertainties imposed by poor transportation and market infrastructure, policy and institutional problems, high transaction costs, insecurity, and volatile pricing in an effort to seize existing trade opportunities at different time and space scales (Little and Mahmoud, 2005; Mahmoud, 2008; COMESA, 2009). The aspects related to trust and credit are particularly relevant in these trade networks, whose understanding must lean on factors related to socio-economics as well as ethnicity (Mahmoud, 2001; Nori, 2010). “In this uncertain business environment, the social ties based on personal relationships, clan affiliation, and kinship that bind livestock marketing actors together become important risk management mechanisms” (Pavanello, 2010:18).

International mobility and migration are also important means for widening the exposure and outreach of pastoralists into the broader, global arena. Global diaspora networks are instrumental in providing financial support through remittances as well as in extending networks for business, trading, employment opportunities, and further migratory projects (Boubakri, 2002; Moritz *et al.*, 2011; Mahdi, 2014). Refugee camps have also in places enabled the expansion of social, financial, and political networks (Horst, 2006; Volpato and Howard, 2014).

Box 11 – Patterns of international emigration and remittance

Migration increasingly represents an important option for pastoral households to receive economic support through remittances as well as establish networks and extend their social capital. Especially in areas affected by political and economic instability (which eventually fuelled diaspora phenomena), remittances from family members living abroad represent an important source of livelihood and oftentimes a key strategy for tackling livelihood shocks. Access to remittances carries several socio-economic implications—especially in pastoral areas where they represent a source of economic support during droughts. Such remittances in pastoral areas are often redistributed through local networks; this serves in turn to expand and reinforce social networks (Goodall, 2004; Tag, 2007; Mahdi, 2014; Chattou, 2016; Zuccotti *et al.*, 2018). In northern Somalia pastoral remittance recipients are heavily involved in secondary distribution of remittances to support poorer relatives (FSNAU, 2013).

In wider geo-political terms, land grabbing and insurgent militias have also encroached deep into pastoral territories with important implications for pastoralists' livelihoods and socio-political settings (Simonise, 2005; Cotula, 2006; Sagawa, 2010; Schilling *et al.*, 2012a; Kioko, 2017). Conflicts, insecurity, fragile statehood, and weak border regimes characterise certain pastoral settings. While insecurity affects pastoralists' production and exchange partners to a great extent, some groups opportunistically play the insurgent card to secure access to trade routes and illegal trafficking or to claim political visibility. Some may even join a militia to secure revenue, thus translating a global insurgency discourse to a local context that reflects social and political demands (De Bruijn *et al.*, 2016; Benjaminsen and Ba, 2018) (also refer to Box 4).

The development of trans-national production, exchanges, and mobility patterns—and the related regional expansion and integration of pastoral networks and economies—have evolved simultaneously with and through the loosening of State presence and border regimes in some pastoral regions. Participating in transnational networks enables (portions of) pastoral communities to redefine their economic functions and political power. A new 'entrepreneurial class' thus develops across borders, pursuing both economic business and political agendas (Meddeb, 2012; Apolloni *et al.*, 2018; Nori and Baldaro, 2018; Benjaminsen and Ba, 2018).

As examples indicate from the Tuareg areas in the Sahel and the Afar areas in the Horn, crossing borders becomes a 'value-adding' activity thanks to the administrative, economic, and political differentials characterizing the different national territories. The intertwined relationships between the pastoral economy and more recent trans-frontier economic activities materialize in several ways; networks, infrastructure, geographical know-how, and socio-political alliances are being reinterpreted to serve new flows, needs, and interests. It's not just that the routes utilised by 'modern' traders, smugglers and traffickers very often retrace those forged and traditionally utilized by caravan traders and nomadic pastoralists: the same vehicles that transport livestock, hides, and milk to a market regularly transport non-livestock commodities on the way back, including illegal goods and humanitarian assistance. Regional migratory flows are also embedded in existing networks and routes that traditionally link areas on different sides of frontiers and often complement and nourish other parallel trades and transactions. Some groups find interstices and opportunities in the instability and insecurity generated by international tensions and local conflicts.

Pastoralists thus respond to growing, shifting, and accelerating uncertainties by expanding their territories and extending their networks, as well as by sourcing and exchanging resources and opportunities through wider and deeper integration into trans-border, regional, and global arenas. This integration is managed by a reconfiguration of the socio-political institutions and alliances and the reorganization of social assets and networks at new scales and levels.

5. Social Capital and Networks

The growing exposure, extension, and expansion of pastoral livelihoods through technological developments, international trade, migratory flows, rangeland encroachments, and shifting policy and governance frameworks have underpinned—and have been reflexively underpinned—by an important reconfiguration of pastoralists’ socio-political and institutional territories. New connections, networks, structures, institutions and arrangements have developed to tackle and adapt to the ever-generating uncertainties in larger and wider contexts where risks, as well as opportunities, display newly and differently.

5.1 Institutions grounded on rangelands

Pastoralists’ institutional setting, including their organisations, information networks, and decision-making systems are tailored to control, manage, and govern a limited, variable, and unpredictable resource base through vast territories (Nori *et al.*, 2008).

Box 12 – Land and Us in Boran conversations

According to Cotula (2006, quoted in Flintan, 2012) “Land” is a political space where different groups of actors negotiate, conflict, or reach agreement over access and also use and manage the physical land and its resources. Through negotiations and reciprocity required for resource-sharing, the use and management of rangeland resources play a key role in the development of social capital and a strong social fabric among rangeland communities. In Borana, for example, words such as “we” and “our” are prevalent in Boran conversations, expressing the philosophy of collective resource ownership (Boku Tache and Irwin, 2003 quoted in Flintan, 2012). This is key to ensuring access to resources in an unpredictable environment. Even the poorest members of rural communities, such as those without land or too little land to live on (the “land poor”), share the customary ownership of these estates with other, richer members of the community. This may be their only real “property” (Flintan, 2012:16).

Box 13 - Maasai land classification systems in northern Tanzania

Maasai herders classify seasonally-grazed landscapes using socio-cultural folk systems, soils, topography and vegetation, management knowledge, and grazing seasons. Herders characterise grazing lands as degradable (*orpora*) or non-degradable (*orkojita*) with reference to soil (*ngulupo*) and vegetation type. This categorisation is used for regulating seasonal grazing across diverse landscapes. According to herders, degradation occurs in the Selela landscapes when traditional grazing systems are altered by crop cultivation. The disappearance of key forage species and an increase in species less desired by livestock are used as indicators of degradation. The overall effect of land degradation is inferred from a decline in livestock productivity (Flintan, 2012:43).

The features of the natural resource and its capacity to produce and reproduce are critical in establishing the related social attributes as well as access and use rights. Maintaining the resource base represents a primary concern for pastoralists, whose livelihoods is critically dependent on those attributes.

Two main principles seem to inspire pastoral institutions charged with managing and governing rangeland resources: one is the broad inclusivity of the access rights, which consider the specific needs of potential users; the other is a genuine concern for the preservation of their productive potentials. The governing rules seem to put greater emphasis on the resources and their quality, accessibility, and maintenance than on the rights of individuals.

Pastoral groups traditionally show strong internal ties (binding relationships among members of a same sub-clan), while their bridging and networking capacities (linking to external groups or forces in the wider societal frame) are often weaker (Nori *et al.*, 2005:20). However, this has been changing over time, and in many regions the capacity to translate strong internal social capital into a wider, political one is critical in enhancing connections and relationships with other societal groups, policy actors, geographical areas, and economic sectors. This is relevant for pastoralists not only as their livelihoods increasingly depend on such relationships and exchanges, but also because members and portions of pastoral communities are themselves diversifying out of livestock production into those areas or sectors

(Gertel and Breuer, 2007; Little, 2013; Boubakri and Mourad, 2014; Hertkorn *et al.*, 2015; Berhe *et al.*, 2017).

5.2 From the land to the globe

The social capital that evolved and developed to govern range resources has through time scaled up, adapted, and reconfigured to tackle the market and governance dimensions that are increasingly relevant for pastoral livelihoods in the different regions. New resources, actors, arrangements, and rules have emerged through the expansion and diversification of pastoral territories; pastoralists' social capital has thus evolved to enable communities to articulate their livelihood mosaics within the wider societal framework (Agrawal, 1998; Levine, 1999; Auclair *et al.*, 2011; López-i-Gelats, 2013; Lind *et al.*, 2016).

While in some literature a weakening of customary social institutions is reported (Eriksen and Marin, 2011; Kreuzmann and Schütte, 2011; Mwamidi *et al.*, 2018), in others a more nuanced approach attests to a reconfiguration where customary arrangements have reorganized along lines of modern economic practice, with a view to integrate and complement a more formal institutional setting in tackling new uncertainties related to the ecological, market, or institutional dimensions (Lazarev, 2008; Staro, 2013; Karanja *et al.*, 2016; Ragkos, 2016; Palden, 2018).

Box 14 – Civil society in the aftermath of the Soviet experience

Communist revolutions in Asia have probably been the largest attempt to change property regimes on vast pastoral territories. In the immediate aftermath of the collapse of the Soviet regime, people and livestock numbers on rangelands grew dramatically as a result of the deteriorating livelihood conditions in urban settings and most economic sectors. In pastoral areas, poverty and social differentiation has grown over time and internal social support mechanisms have weakened (Wibke, 2015).

Pastoral communities in parts of Asian rangelands reorganised with a view to adapting access use on land and livestock to the new uncertainty scenario generated by the weak post-Soviet formal institutional setting. User groups were formed to recover prior customary institutions in support of their livelihoods, through reproducing patterns of mobility, flexibility, informality, and inclusive access typical of pastoral systems to manage highly mobile grazing systems on State pastures (Fernández-Giménez *et al.*, 2012; Robinson, 2016). In Mongolia, following the collapse of the authoritarian government and the central command economy in 1990, community organizations engaged the challenge of providing both security and flexibility to herders, with important implications for the ecological and social spheres (Fernández-Giménez, 2002; Schmidt, 2006).

In the midst of new uncertainties after centralized control systems collapsed, pastoral communities in parts of Asia have reinvested in customary principles and collective actions to protect and evolve their livelihood systems

In some cases, community-based, pastoral grassroots institutions have been established with a view to organising pastoralists under formal associations such as CBOs, NGOs, and national or regional networks. These have provided an opportunity for communities to share information, gain easier access to markets and service deliveries, raise funds, and enhance local security (Yeh, 2005; Lazarev, 2008; Bilha, 2015). In Sub-Saharan Africa these efforts have been instrumental in improving land governance and managing related conflicts; in Asian and Mediterranean regions, these have focused more on supporting economic activities and service provision in (Axelby, 2007; Auclair *et al.*, 2011; Catley *et al.*, 2013; Chattou, 2016; Gentle and Thwaites, 2016)

Cases exist where these claims have been brought to a higher political level, where the role of civil society has been relevant in raising awareness and advocating for pastoralists' interests and concerns in regional and national agendas (Van Wageningen and Wenjun, 2001; Gooch, 2004; Chattou, 2016; Palden, 2018).

In the Sahel, formal pastoral associations have had some success in triggering collective action at the regional and national levels for setting a '*Code Pastoral*' in some West African countries (Niamir Fuller, 1999; Cotula, 2006; Nori *et al.*, 2008; Bonnet *et al.*, 2010). Similarly, in India pastoralists have displayed interesting and important capacities to get their voice heard and their interests taken into account in the local as well as national policy arena (Köhler-Rollefson, 1994; Sharma *et al.*, 2003; Gooch, 2004). The

impacts of such initiatives and efforts, however, usually differ in the diverse groups and portions of the pastoral population.

In other contexts, forms of institutional hybridisation or ‘bricolage’ amongst diverse institutional settings (religious, customary, formal State) have evolved to establish formalized institutional arrangements that draw from the customary setting. By supporting the incorporation of different actors and interests these have been instrumental in tackling sensitive matters related to land governance, conflict management, or funds utilization. The blending of customary with more formal governance structures has represented an important step towards the integration of pastoralists into the wider political setting and their participation and contribution to the policy debates, as this provides for socio-cultural and political niches that could support local negotiations and arrangements (Bauer, 2015; Simula, 2015; Fokou and Bonfoh, 2016. Gongbuzeren *et al.*, 2018).

Successful reported cases include community policing programs in Afghanistan (ODI, 2013), or transboundary integration of basic social service provision informally shared with cross-border citizens along the frontier between Mali and Burkina Faso (Nori and Baldaro, 2018). IFAD has remarkable experiences in countries of MENA region, where the official *coopératives ethno-lignagères* were designed to coincide with existing lineages. By providing these cooperatives with a certain degree of authority over the collective rangelands, these organisations have proved quite instrumental in articulating private and public interests through formalized community-based organizations (IFAD, 1995; Lazarev, 2008). Other less flexible and more structured forms have proved less effective in adjusting the diverse interests and stakes (Lazarev, 2008; Kreuzmann and Schütte, 2011; Nori and Gemini, 2011; Fréve, 2015).

Risks and problems might arise when this process is captured by one group or when customary structures and local leaders are co-opted by State structures and formalized into more official political-administrative structures (Kioko, 2017, calls this *neo-traditional*). Reported cases include cooperative arrangements in post-socialist countries or the embedding of customary elites into State structures as local leaders have seen their authority undermined as they became viewed as biased towards State interests, thus losing the trust and support of their pastoral constituencies, as has been reported in parts of the Horn of Africa (ODI, 2013), the Mashreq (de Haan *et al.*, 2016), and the Sahel (Benjaminsen and Ba, 2018).

Problems also arise in cases where competition prevails over collaborative engagements within or amongst communities. The concentration of resources and interests in certain nodal areas—such as water points, urban settings and farmable plots—may represent the reasons behind the escalation of exclusionary patterns or conflictive relationships or both (Thébaud, and Batterbury, 2001; Benjaminsen and Ba, 2012; Bilha, 2015). Local conflicts could escalate to higher levels or, conversely, local conflicts might erupt as a result of competition at higher ethnic or clan levels (Sagawa, 2010; Catley *et al.*, 2013; Majekodunmi, 2014; Lind *et al.*, 2016). Forms of ‘ethnicization’ of economic activities or service provision along such lines have been reported in places like northern Kenya, “with the phenomenon of informally redrawing ethnic boundaries reflecting new forms of local ‘nationalism’” (Mutsotso, 2018). The State-building process in Somaliland represents a unique example in this respect. Here, an original and locally-tailored hybrid system of democracy mixes customary systems with the precepts of the nation-state in an Islamic context. The customary setting reportedly provided an enabling framework for accommodating a clan-based social structure and a representative democracy; such institutional arrangement did not come to complement or supplement, but rather to replace the (non) existing central State. Pastoral institutions, civil society, the diaspora, and international agencies all contributed to the process through the display of new forms of identity and organization (Walls and Kibble, 2010; Nori and Baldaro, 2018).

The Sahrawi case evolved along similar lines. While kinship continues to have considerable importance among contemporary Sahrawi, the newly-declared nation-state banned tribes. In the reorganised setup, the tribal affiliation gave way to a new allegiance and the Polisario Front assumed de

facto the functions previously performed by tribes, extending this to incorporate other functions of the modern nation-state (e.g. international political representation) (Volpato and Howard, 2014:15). The *Movimento Pastori Sardi* in Sardinia provides another good example for understanding how strong social capital supported by an engaged collective action could turn into political action, also touching upon social, cultural, and identitarian aspects (Simula, 2015).

The political relevance of (some of) these processes should not be underestimated. Aspects of self-esteem and identity represent an important component of such endeavours, showing pastoralists' capacity to reshape their social capital to project themselves into higher political battlefields (Gooch, 2004; Staro, 2013; Ragkos, 2016; Pitzalis and Zerilli, 2013). Evolving socio-political capital might be particularly relevant for pastoralists to engage in the ongoing reconfiguration of institutional and governance frameworks through processes of decentralization and power devolution on the one hand, and regional integration, on the other.

Uncertainties in pastoral settings are typically tackled through joining forces, networking communities and collective actions. Different groups might, however, enjoy different networks, capacities, connections, and support at diverse scales. Groups that hold members having gone through international emigration and or diaspora might enjoy wider financial and political support due to more extended networking and stronger socio-political capital compared to groups that have most members living in the same territory. The binding or bridging capacities of these groups might also differ accordingly.

Picture 5 – Evolving landscape on Tibetan rangelands (credit: PASTRES)



Conclusions

The world is changing fast; communities, territories, and societies connect and interrelate in new ways and through novel links, principles, and modalities. Interdependency is growing, and so are the related adaptive strategies and patterns. Ever-changing political conditions, technical innovations, institutional arrangements, and evolving economic spaces and connections continuously generate new risks and possibilities.

Pastoralism changes as pastoral territories and communities have become part of wider networks, with implications for the reshaping of pastoral spaces, economies, and societies, as well as for the reconfiguration of the uncertainties underpinning their livelihoods. Pastoralists continuously adapt in order to secure their livelihoods through shifting and accelerating uncertainties across environmental, markets, and governance domains. The embedding risks, challenges and possibilities generated by these processes are experienced differently by diverse groups and so are distinct strategies and trajectories developed accordingly.

While, on the one hand, rangelands have become an arena where global actors increasingly propel and display their interests, on the other, pastoralists themselves expand their territories and resource bases through perimeters and networks that overcome rangelands and regional settings. The complex interplay between global trends, regional arrangements, and local transformations is determining the rise of new livelihood patterns as well as new models of economic integration and social and political governance for pastoralists across the globe. Pastoral resources are managed through new patterns: institutional settings reorganize along lines that account for modern economic practices and more formal structures; pastoral livelihoods expand and diversify to cope with and adapt to growing and shifting constraining factors and volatile opportunities.

Pastoral mobility undergoes different patterns in the diverse settings in order to juggle the reconfiguring landscapes of resources, connections, and relationships. Everywhere, the principle of mobility is retained as central to the livelihood strategy, although the associated social practices and technologies change continuously. In most regions, transhumance remains the most effective strategy for scaling down risks and seizing opportunities by connecting different territories, sectors, and actors. The human-environmental interactions that inform pastoral movements in responding to uncertainties are extended and reconfigured by environmental changes as much as by technological, economic, and institutional devices, relationships, and arrangements.

Rangelands are shrinking, encroached and fragmented, or abandoned while pastoral territories extend and expand through new and tighter links and connections to other sectors, actors, and regions. The mobilities of pastoral livestock as well as people and products engage through wider flows and networks of information, commodities, money, and connections that characterise growing interconnections and interdependencies at regional and global scales. The emergence of migratory flows, mobile phones, mechanised transport, and other factors shape new patterns of mobility in the different regions, always aimed at responding to uncertainties while improving livelihood chances.

Pastoral economies evolve in the midst of shifting habits, societal demands, and policy reforms. International trade, social and environmental changes, technological advancements are opening up new interests and markets for the products as much as for the services of pastoralists—if not for their lands. To take advantage of arising and shifting opportunities, herders adapt their land use, adjust their herd composition and management, and also engage through extended networks whereby new skills, capacities, and practices are shared thus diversifying their livelihood base in different time and space scales. Parallel and complementary patterns of intensification and specialisation of livestock production are accompanied by important processes of livelihood diversification.

The governance of access to land, market value chains, political representation, and connections to the wider institutional and trade arena is managed through expanding social networks and evolving institutional structures and arrangements. Collective action remains pivotal for most pastoralists in wider

and diverse time and space scales. Political engagement is ongoing across the different regions through very diverse means. Cases exist where customary principles are merging and blending with more formal organizations at the local, national, or regional levels. In other regions, conflicts and violence indicate the failure in negotiating mutual arrangements.

Social and political networks are also continuously reconfiguring. As fast demographic growth contributes to expanding and diversifying community membership, emigration has extended its outreach and interconnections. Relationships with the State and national and international organizations and interests mutate according to evolving political agendas. Mechanisms aimed at redistributing resources and risks, roles, rights and responsibilities also shift in the different settings, helping generate room for tensions and alliances along ethnic, social, gender, and generational cleavages, and contributing to the dynamisms of the socio-political domains overall.

While it remains difficult to provide a representative characterization of pastoralists and pastoral strategies, some inspiring principles underlying ongoing dynamics show relevant and intriguing similarities through the diverse settings. A set of emerging overarching themes are highlighted here for further analysis, investigation, and understanding of the principles, strategies, and practices informing pastoralists *'living with uncertainties'*. And from them to inform wider and larger societal debates and policy decision-making on how to navigate through new, shifting, and expanding forms of uncertainty.

Picture 6 – Milking camels in Puntland, Somalia (credit: PASTRES)



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