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HERDING IN A SHIFTING MEDITERRANEAN CHANGING AGRO-PASTORAL LIVELIHOODS IN THE MASHREQ & MAGHREB REGION

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MEDITERRANEAN PROGRAMME

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Abstract

Pastoralism is a characteristic livelihood system for the whole Mediterranean basin. From Morocco to Turkey, from Sardinia to Libya, herding societies are a common feature of all countries and civilisations that have inhabited the region.

Though the material and symbolic wealth of pastoral groups is an integral part to the Mediterranean livelihood as well as cultural systems (i.e. milk, lambs, transhumance, etc…), these societies have long suffered various forms of socio-political and economic marginalisation. While the lands and environments herders insisted upon have become a main target for modernization policies, from natural reserve to farming expansion, from mining exploitation to livestock market off-takes, their rights have been seldom acknowledged and their technical skills and institutional capacities hardly recognized.

Recently, low population density, remoteness and political marginality have made pastoral areas the prime targets for state retrenchment under Structural Adjustment Programs and cuts to public budgets. On the other side important potentials exist for a fairer development of these communities, such as the increasing consumption demand for animal proteins, together with the recognition of pastoralism as an environmental-friendly natural resource management, and processes of enhanced autonomy and local participation in political decision-making offered by recent reforms implying decentralisation and devolution. During the last decades, access to and control of resources in pastoral areas have gone through specific transformation processes, which have reshaped to a large extent pastoralists dependence on their natural resource base and enhanced integration into state and market dynamics.

Yet the outcomes of these processes are yet to prove beneficial to pastoral communities, whose sense of marginalisation, disillusionment and resentment towards state or regional institutions is an important element that helps explaining to an extent processes of political radicalisation in many pastoral regions.

As a result, pastoral groups seem increasingly exposed to climatic vagaries, increasingly trapped in the vicious circle characterised by high levels of food insecurity, conflict and environmental degradation. Within the climate change framework the vulnerability of these communities to extremes climatic events, i.e. drought, is being increasingly acknowledged (WISP, 2007).

This paper addresses the dynamics perceived, the problems faced and the applied coping strategies by some pastoral communities inhabiting the Middle East North Africa (MENA) region.

With case studies from Morocco and Tunisia and a wider regional analysis which also include cases from Jordan, Syria and Palestine, this paper addresses the shifting vulnerability of pastoral communities under changing environmental and socio-political domains. An innovative participatory tool, the historical livelihood matrix is presented and brought into discussion as an appropriate tool which enables discussing livelihood dynamics in an historical perspective, taking into account the gender as well as generational perspectives.

The research work has been undertaken within the ICARDA Maghreb and Mashreq program, complemented with some other development works undertaken by the author in the region with the NGO Ucodep.

Keywords

Pastoralism, Mediterranean, rural livelihoods, rangelands

Introduction*

The ICARDA Mashreq & Maghreb program

The overall objective of the ICARDA Mashreq & Maghreb program (http://www.mashreq-maghreb.org/) is 'the development of productive and sustainable agro-pastoral systems that conserve the resource base and support rural livelihoods in the dry areas of the MENA region'.

Its specific purpose is 'to provide technical, policy and institutional options that empower local communities and promote sustainable livelihoods and production systems and the conservation of agro-pastoral resources'. In its effort to shift away from a Transfer of Technology approach, the third phase of the program looks into community-based and participated development trajectories.

This work explores the efforts undertaken in order to analyze existing community livelihood strategies to mitigate drought, in order to assess and promote available technologies and local knowledge to reduce related risk and vulnerability.

This work is based on fieldwork activities undertaken in the M&M communities of Sekouma – Irzaine in Eastern Morocco, Tataouine in South Tunisia during Winter 2008 and in Palestinian communities inhabiting the West Bank during 2007/8 within a project implemented by the NGO Ucodep.

Information and data generated within the M&M components undertaken in Algeria, Jordan and Syria have also been utilized, with particular reference to the M&M community database generated during previous phases and the community-based plans developed in 2007. Consultation of the reports from the locally implemented IFAD programs have also provided important insights and detailed data and information. Cross-sectoral analyses have been also utilized, including climatology, environmental change, market analysis, community socio-economic differentiation.

Figure 1 – The Mashreq & Maghreb regions

* An earlier version of this paper was presented in Workshop 4: 'Competition over Resources, Rural Poverty and Agrarian Policies in MENA' at the Tenth Mediterranean Research Meeting, Florence & Montecatini Terme, 25-28 March 2009, organised by the Mediterranean Programme of the Robert Schuman Centre for Advanced Studies at the European University Institute.

Methodological Aspects

The Historical Livelihood Matrix

The component developed utilizing a number of data and information that has been previously gathered by the National Agriculture Research centers (NARs) through a consistent database of the M&M III involved communities and the information provided through the Community-Based Planning exercise (CBP), which had been developed during 2007, These information and data have been instrumental in framing the physical/material and the social/ organizational dimensions, which are critical to our analysis. In order to organise this information in a comprehensive and participatory way, with due relevance provided to the motivational/ attitudinal aspects of the community members, a Sustainable Livelihoods approach (SLA) was undertaken[1].

A specific participatory tool has been tailored, in order to assess community perceptions about issues related to drought impact and the strategy adopted to tackle it. The tool is defined as 'Historical Livelihood Matrix' (HLM). The HL Matrix represents an interesting tool to undertake a joint analysis of current livelihood system as the result of historical dynamics, while also providing an opportunity to judge and choose between different options at individual as well as collective levels. The strength of this method stays in its capacity to generate and trigger discussion within a heterogeneous group of people.

HLM works in this way. A number of impacting (drought) events in the area is brought into discussion. Main reference indicators are defined by the group, and ranked according to their relevance to the specific episode (vertical ranking). A comparative analysis through time of the different rankings provides elements for community discussion about the dynamics they have undergone and the responses they have adopted through time (horizontal dynamics). Finally, options for future drought events are also discussed to get specific perception about potentials and constraints to cope with drought as felt by the community members.

Table 1. Historical Livelihood Matrix example form

Timeline drought events					**Critical features**
Future	More recent	Other 1	Other 2	Other 3	X
ranking	*ranking*	*ranking*	*ranking*	*ranking*	Y
ranking	*ranking*	*ranking*	*ranking*	*ranking*	Z
ranking	*ranking*	*ranking*	*ranking*	*ranking*	W
ranking	*ranking*	*ranking*	*ranking*	*ranking*	K

The importance of this instruments is not so much in the figures it generates, but rather on the discussion that those figures generate. While people are first requested to rank choices on a year-per-year basis (vertically), they then have to defend the rationale behind the trends defined by interpolating these data (horizontally). What is interesting is that this system builds the confidence and the ownership of participants, thus stimulating interesting unveiling discussions. This overall participatory process allowed thus to bring into the picture the critical elements that trigger local decision-making in

[1] Refer to www.livelihoods.org for the comprehensive SLA framework.

a qualitative way, while also providing room for scoring and ranking that translate into quantitative terms people's perception and ideas.

Two different and specific Matrices have been developed in this way:

1. the first one addressing the impact of drought on local livelihoods,
2. the second one concerning the coping strategies adopted.

Participatory analysis of these two domains have shed critical light upon understanding community drought-related vulnerability. Different discussion groups have been organised to discuss separately with diverse societal groups, men, women, elders and youth – so to gather and combine their different perceptions. In some cases (i.e. Tunisia) the team has further developed a set of questionnaires for individual households based on the HLM results to better address specific issues of interest.

The HLM instrument represents thus a good interface between the diverse assessment needs of utilizing a qualitative approach, while also generating a number of quantitative data that could support and strengthen the analysis. The so-called attitudinal / motivational aspects of locals' vulnerability to drought events and related decision-making processes have been uncovered and openly discussed within the focus group. Through this framework adequate consideration was given to local stakeholders as 'active agents', rather than passive witnesses (of drought episodes) and receivers (of assistance). As the participatory matrix elaboration followed groups discussion, the teams could clearly assess the capacity of the matrix to 1) involve most participants in the discussion, rather than having few characters leading the talks, and 2) get rid of the wish-list syndrome most people bring as a canvass to group meetings (especially in areas where investigation efforts are closely linked to important development programs, such as those of IFAD are in M&M research areas).
Examples from the field experience:

Figure 2. Drought Historical Livelihood Matrix (Impacts and strategies matrices) (Sekouma Irzaine, Morocco)

Impact Matrix

Impacts	Drought episodes				
	Episode 1	Episode 2	Episode 3	Episode n	Future
Impact 1	8	6	8	...	9
Impact 2	10	9	10	...	2
Impact 3	3	2	2	...	8
Impact n	...	...	...	...	...

Strategies Matrix

Strategies	Drought episodes				
	Episode 1	Episode 2	Episode 3	Episode n	Future
Strategy 1	1	1	3	...	4
Strategy 2	-	2	5	...	2
Strategy 3	3	4	6	...	6
Strategy n	...	...	...	...	...

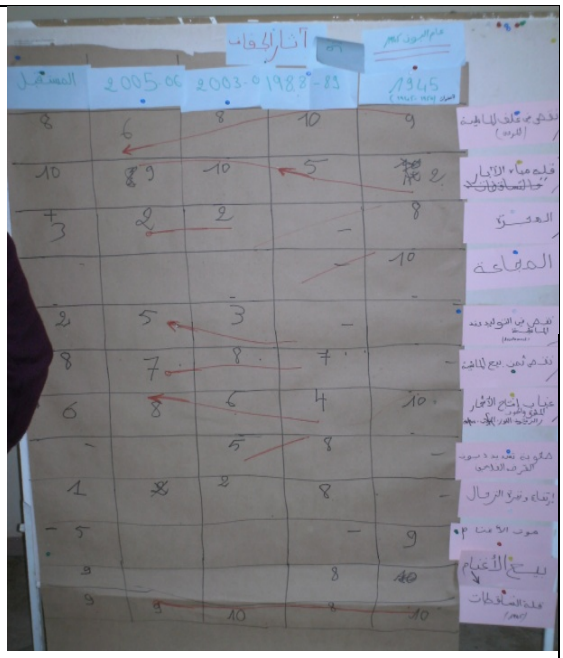
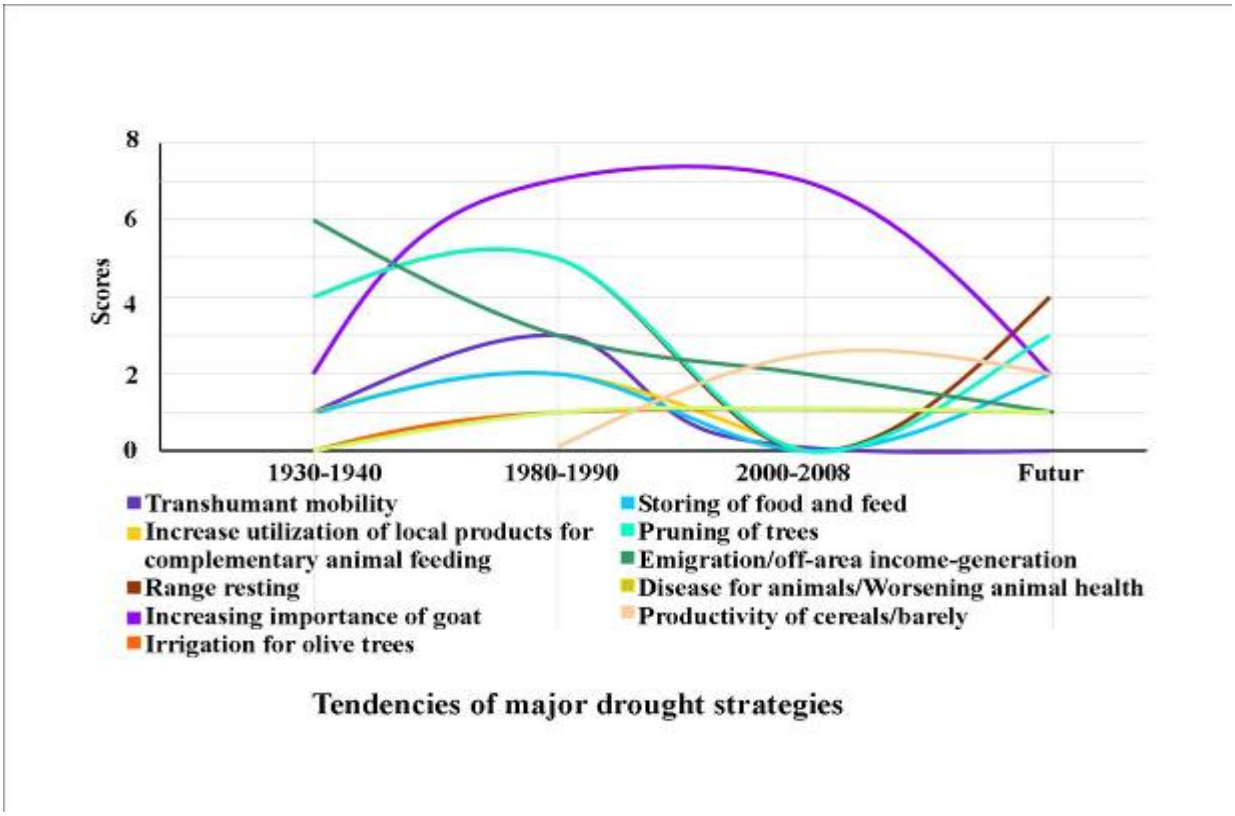


Figure 3. Tendencies of major drought strategies (Tataouine, Tunisia)



Understanding Drought: definitions and perceptions

During the last three decades the world has faced an unprecedented increase in the frequency and magnitude of extreme environmental hazard events with particular relevance to events related to the hydro-meteorological cycle (Brauch et al., 2003).

Drought is a normal part of climate and occurs in virtually all regions of the world. Drought is the most complex but the least understood of all natural hazards, affecting more people than any other natural catastrophe – that is why many definitions (more than 150 according to Wilhite and Glantz, 1985) have been found in the literature. It is a slow-onset natural hazard and its effects may linger for years after the termination of the event. It differs in terms of intensity, duration and spatial extent; consequently, it is often difficult to determine when it begins and when it is over and also to quantify the magnitude of its severity. For this reason, it is often referred to as a creeping phenomenon (Karrou et al., 2007).

Its impacts are spread over large areas and affect economic, social and environmental sectors; and all this makes its assessment and response difficult. Drought has both natural and social components and its impacts are accentuated by human or social factors. In each region, its associated risk is a product of the exposition to the hazard and society vulnerability. In the Middle East and North Africa its impact has become so severe with the regions rapidly growing population pressures – as discussed below.

Indeed, it is a hard task to provide for a comprehensive and consistent definition of drought in areas where drought is at home, but in different terms and at different degrees, from a place to another showing different though recurrent drought patterns. In the definition provided by Pratt et al. (1997), *droughts occur when rainfall falls below half the long-term average, or when rainfall in two or more*

successive years falls 75 % below average. The question is which average are we meaning ? – given the fact that rainfall patterns seem to change vividly even amongst decades (as in the picture below for the Sahelian region).

Figure 2. Rainfall index variation in the Sahelian region (Yann l'Hôte et al., 2001)

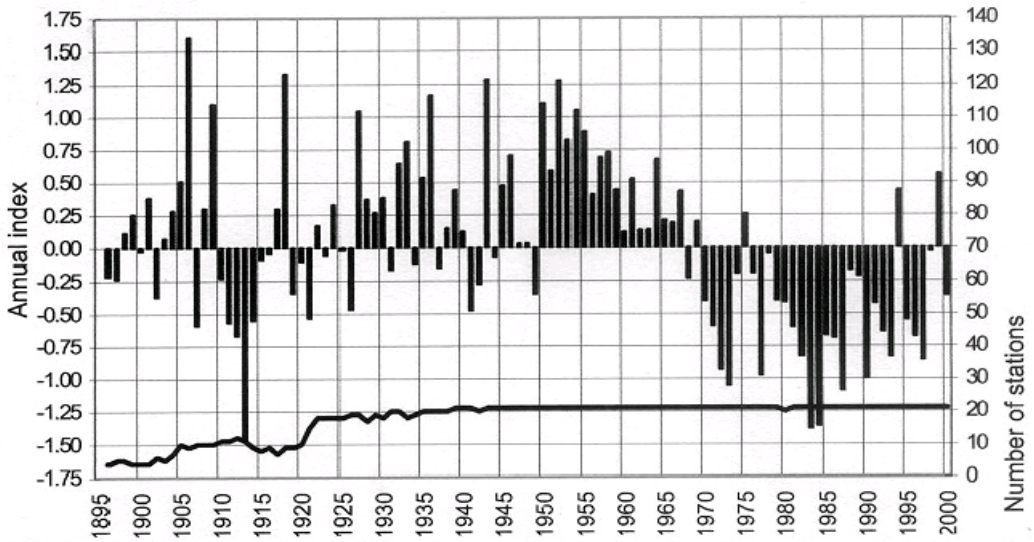
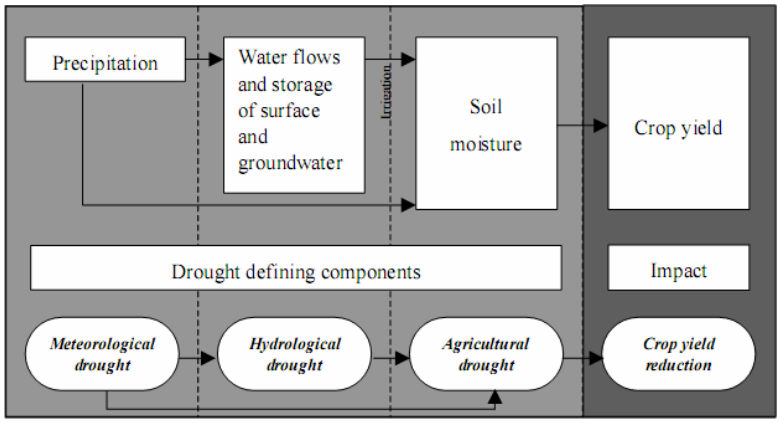


Fig. 2 Sahelian annual rainfall index variation (top) and number of stations (bottom) by years.

Working at community level necessitates a more operational definition and it makes then more sense to define drought according to its impact, rather than as a climatic phenomenon per-se. In this perspective the scientific domain normally provides different forms of drought definition - the meteorological drought, agricultural drought, hydrological drought and some also include the socio-economic drought.

Figure 3. Drought defining components (excerpt from the Algerian report)



These **different dimensions and perspectives utilised** to disentangle a drought event represent an important step towards a dialogue with local communities, who are also focused and keen on the impacts of drought – rather than by its definition. Field activities have shown that most communities have specific indicators that relate their livelihoods to the environment and the climate patterns in their specific local setting. The main four dimensions indicated in the investigated communities involve:

a) agricultural production - specifically drought is perceived by the community as decreasing crop harvest (or failed grain harvesting),

b) range conditions - reduction of feed for livestock as range conditions worsen,

c) water availability - diminution of water availability and dryness of wells,

d) household incomes – changing opportunities for household income.

Data from the Sekouma-Irzaine community in the Moroccan case show that the community attaches special importance in descending order to the following impacts: 1) the decrease of rainfall, 2) the reduction of rangeland forage supply, 3) the fall of sale prices of animals, 4) the decrease of cereals and fruit trees production and 5) the decrease of the water in wells.

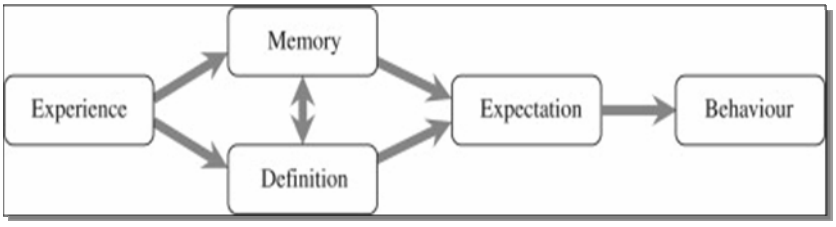
As assessed rainfall amount is only one amongst the **number of indicators locally utilized to contextualize a drought** event. Other factors include the timing of the rains, their distribution and extent and the duration of dry conditions. The timing the first rains come represents a critical factor to most communities, as attested by the cases in Algeria, Syria and Morocco; this is closely linked to cereal sowing and thus to the successful chances for cropping: '*if we manage to reach cereal harvesting, then there has not been a drought*'. In some communities it was indicated that barley is utilised as a reference for measuring drought conditions. In such cases assessing barley cropping maybe critical in understanding drought from a community perspective - the amount of plots ploughed representing an easily detectable indicator of incoming drought conditions as it is perceived by the community.

In Tataouine (Tunisia) communities reportedly utilise the following indicators to assess drought incidence: the dessication of olive trees, the decrease of olive trees production, the degradation of *Stipa tenacissima*, the appearance of specific livestock and plant diseases, the increase of land conflicts, the reduction of the demand of animals on the market.

Space distribution and coverage of the precipitation are also critical as these provide or preclude opportunities related to marketing or to move animals to distant pastures. The scale of the drought is thus important; cases are reported when drought was recorded as a national event, but some parts of the country did not suffer from it - and indeed market conditions were very favourable for those communities in such times. Some investigated communities reportedly fear more the drought at national rather than that at local level because in the former case, the rises in price of the animal feeds are more impacting to their household economy. Rainfall distribution is also a critical factor as transhumance to further pastures is a relevant strategy to cope with drought events – although critically shaped and defined by the wider socio-political setting.

According to Taylor et al. (1988)[2] past drought experiences shape the individual memory and critically influence its perception drought; the way drought is defined combined with how it is remembered determine one's expectation of future drought and behaviour. The four elements shaping the perception of drought include thus:

Figure 4. The Four elements of the perception of drought (Taylor et al., 1988)



Although drought is considered as a *divine will*, this does not mean that the communities have not found their own ways to predict it. Community knowledge is in fact also rich in **indicators utilized to forecast the weather**, from stars, to dew, to wind (lack of wind during some specific days in December means good rainy season), and fog (lower fog layers indicated poor forthcoming rains). Frost episodes, epidemics, conditions of previous years (which define the amounts of available stocks) are also utilized somewhere.

Two popular sayings learnt in the Moroccan case recall:

- "The year of the freeze, you have to labor and persevere"
- "The Year of dew, plow or resigns"

Ways to predict rainfall and climate patterns in the Syrian communities involve four camels, which in September are brought on and oriented westward for one week; should the hands passed on camels get wet the year will be rainy.

Reportedly knowledge from technical bodies, media or government agencies are somewhere also taken into account, but for limited purposes, which hardly include drought prediction.

Investigations undertaken through the HLMatrix as well as through questionnaires have shown interesting results when it comes to **the gender dimension of drought perception**.

While in some cases it is reported than '*women have a lower knowledge of drought'*, it seems in fact that women's perception of drought is different from that supposed and proposed by scientists / technicians. Women look at things differently from men and scientists, as their role within the local livelihood frame is peculiar and diverse from others. Their resulting perception is thus diverse, as it hinges on factors which are central to women's role but less relevant to others. As it is often the case in most rural societies, men and women seem thus to have and play complementary roles, rather than replicating the same ones but to different extents (Nori, 2009). Similarly elder and younger generations perceive drought differently and tend to rely on different coping and adapting strategies.

When assessing drought events at community level, it cannot clearly circumstantiated to an isolated phenomenon, but rather the combination of different factors that compound rainfall deficiencies and define its impact at community level – such as

a) the duration, the extension, the timing and the intensity of the drought event,

b) the chance to move animals to other areas (regarding laws and regulations, transport availability, relationships with neighbouring communities, conflictive relationships, etc…),

c) the market price of agro-pastoral inputs and outputs and related terms of trade, which might be influenced by number of factors to local, national and global levels (such as a global rise in cereal prices or the growing demand for animal proteins in the world),

d) gender-based opportunities for alternative income generation of livelihood opportunities.

A multifactorial and multiscale analysis is thus needed to disentangle the impact of a drought event on a community. What has been tried with our work is framing this complexity within the Sustainable Livelihoods approach in a participatory way.

(Contd.)

[2] quoted in the Algerian drought report

A Livelihood Perspective

Livestock-centred livelihoods

For a comprehensive assessment of the relevance and the impact of drought on the M&M communities, it is critical to understand **the role of small ruminants in their livelihood systems**.

Smallstocks not only represent the primary source of employment, food and income - but they also embody insurance and credit opportunities, materialise prestige, loan and gift and provide the main investment for local savings and remittance. Moreover the flock represents an important entry point to the wider society, either through its commercialisation or through its social value as bearer or indicator of wealth, prestige, identity, respect and connectedness within and outside the community.

Understanding **the seasonal feeding cycle of small ruminants** is important in this context[3].

- In winter, from early October to February, reliance on mainly on available feed stocks. Subsidized feed rations and/or previously stored feed are critical in this period, although a large portion of feeds is obtained through market purchase;
- By the end of the rainy season (March to May) smallstocks considerably rely on grazing in marginal lands and undertake transhumance to greener area if drought has occurred; rangeland availability is matter of utmost concern in many cases through the region, from areas where population density is high, to areas where statutory/administrative borders limit animals move, to areas where military activities make important grazing resources inaccessible (i.e. the Palestinian Jordan Valley);
- By end May pastoralists move their flocks to irrigated or good rainfall areas where crop production takes place, for the animals to graze on crop residues – such as barley, wheat, sugar beet, cotton, maize, vegetables depending on the area. In addition, grazing in these times might also take place on marginal rangelands in coastal and/or mountain areas.

Recent trends indicate a shift from range-related animal feeding, towards an increasing relevance of cropped forage, to the market purchase of fodder. In most communities rangeland grazing covers about half of smallstock feeding needs, ensuring only 40% of the animal requirements in dry years up to about 60 % in wet years. Capacity to store feed depends obviously on crop productivity during good seasons, availability of cash related to income generation opportunities and price of feed. Overall animal feeding represents more than half of the total cost of the small ruminants production and in dry years breeders are forced to sell important portions of the flock to keep up with feeding expenses (according to the '*a sheep eats a sheep*' refrain).

In perspective also agricultural activities hinge around smallstock husbandry. Barley is the most grown cereal in the region, and its attachment to smallstock is very relevant. Barley is critically related to animal feeding, in its many forms: barley in green, straw and as pasture when production fails in bad years. The number of existing strategies and options to diversify the animal diet all hinge around barley (i.e. barley + wheat flour, barley + straw, bran + wheat flour and barley + bran + wheat flour), which is no doubt the prevailing and preferred animal feed in targeted agro-pastoral communities. Providing good production of barley for animal feed is often a key priority of rural enterprise in the region - while this was not the case about 60 years ago, when cereals where mainly produced for people's consumption needs. Moreover the revenues generated through agricultural production are often reinvested into livestock.

Most agricultural investment schemes – such as the expansion of crop production on marginal lands - often represent a way to encroach onto communal grazing lands; the same might be said to apply with water harvesting and irrigation schemes and enlargements of tree plantations (i.e. Olive,

[3] Inspired by the Syrian drought report.

but also Fig, Almond and other species) which are indeed ways of securing water for longer term – but represent also a strategy for better off households to secure their own access and control to (what used to be) a community rangeland. Together with increasing (people and animal) population pressure, this is undoubtedly a main reason behind shrinking rangelands accessibility and decreasing pastures availability reported everywhere – leading to growing reliance on feed ratios and concentrates, also during years of 'normal' productivity. The social implications of this process of individualization of range resources are important and should not be underestimated, as they also impact on the vulnerability of different social groups vis-à-vis specific events and trends.

Income generated off-farm in diverse forms represent a growingly important livelihood asset in most households. Communities residing close to urban environments show a wider portfolio of livelihood strategies and more opportunities to expand it at times of need, due to a higher degree of options provided in terms of 1) close market for own products, which enhance livestock off takes or agricultural diversification, 2) temporary income-generation alternatives in towns and cities, 3) access to services and facilities /and governmental support at times of need. Also for off-farm generated income, livestock represents an important source of capitalization and reinvestment.

As it can be thus noted, smallstocks embody all livelihood assets (natural, physical, financial, social and human) and are a key component of local livelihood strategies. Any technical, policy and institutional option must fit within this frame - where smallstock considerations are primary concerns to community households livelihoods.

Transforming Structures and Processes

Shifting perception of drought events and their impact in the communities is embedded in a environment that is changing in its different dimensions. In the Sustainable Livelihoods approach these are defined as the Transforming Structures and Processes, which are of particular relevance in shaping local livelihood strategies and thus framing vulnerability to drought events.

People, Climate, Environment

In most communities **Climate Change** is mentioned and perceived, although differently. The overall perception is that the climate is behaving differently from the past: less rainfall, increase in temperature, higher variability, increasingly hieratic onset of the rainy season, more frequent likelihood of sandy wind (generally associated with drought) and a general feeling that drought occurrence is more frequent nowadays than the past. Meetings and interviews conducted with local population and local authorities have cleared that since two decades drought is not regarded anymore as a temporary climatic phenomenon but rather as a structural factor which should be integrated in the strategies of development of the area. Drought has thus become a structural characteristic of the region; degrees of changes in weather conditions and rainfall patterns are recalled in terms of growing variability and instability in agricultural production, diminished water flow in the *wadis*, and drying of some tree species (e.g. Fig and Olive trees).

Scientific indications would back this community feeling to an extent, as climate might has changed towards longer dry periods (sequences of years), although within an overall historical trend of oscillation.

While uncertainty might still pervade the Climate Change debate, there seems to be little doubt on the role of **large growth in overall human and animal populations in the region** in triggering major shifts in local natural resource management and related institutional and ecological environments. The relevance of farming activities within the local agro-pastoral system has increased, and so has the integration to market-related dynamics. Overall consistency of the regional herd has also been growing outstandingly, at different rates for the diverse animals and areas. Rough indications at regional scale

are of human population increasingly yearly at over 3 % while livestock numbers have risen by about 50% over the quinquennium leading to 2001 (Hazell, 2001).

In this context, as assessed, crop and livestock productions show increasingly degrees of complementarity and integration.

Traditional transhumance mobility patterns through the region is nowadays confined within defined administrative boundaries, and communities inhabit settled villages and are highly dependant upon commercial exchanges with other regions and countries. Due to increasing population on one side (which results in less land available) and increasing political and administrative limitations on the other, the space and time dimensions of pastoral mobility have decreased largely. Government policies have further contributed to inflating livestock figures on local ranges, favouring the building up of precious but vulnerable flocks (mainly ovine) thus triggering overall communities' dependence on policy and market dynamics for production inputs as well as outputs.

As a result of these trends nowadays a decreasingly mobile, growing amount of increasingly fragile animals insist on a shrinking land resource base. Overall these trends have collapsed the people-livestock–environment balance which characterises pastoral systems, contributing to installing dependency on external resources for the livestock sector. This has also weakened the social and institutional mechanisms behind pastoral resource management.

The resulting **individualization of natural resources** has undermined the customary institutional environment, as mentioned above on the land encroachment practices. As one participant in Tataouine put it to explain the problems related to range management and animal feeding implications: '*once we had less animals and we were much better organized, now we have many animals and very little organization*'. The shift from a predominantly social livelihood asset base to a material one might have improved rural life to some extents, but it also carries important consequences on the longer term sustainable development of the whole community. Shared concerns and joint efforts are vital in ensuring sustainable management of pastoral resources and effective response to drought events in such changing environment.

BOX 1. Effective Collective Action

In Tataouine, Tunisia, *Stipa tenacissima*, an important plant resource in the area, was at risk due to its intense use by small ruminants as well as by people. Community people used to collect it for storing and contingency feeding purposes; its collection was done through eradication rather than cutting, which had implications on its regenerative capacities.

It is reported that in 1950 a community decision was made to ban direct eradication of this plant. It was decided that groups should have been organised for its collect, through appropriate cutting which would have preserved the plant roots and thus enhanced regrowth. Group collection implied that one-to-another control mechanisms were applied. This decision was eventually endorsed and formalised by the government and thus became formal regulation.

This simple episode shows how communities can play an active role in organising and enforcing a rule aimed at preserving the natural resource base, and how they can involve higher institutional levels in their strategy. Should the need be there, thus, collective action is a feasible response - as the the IFAD Prodesud activities related to range '*mise en repos'* seem to attest.

Degradation of rangelands is a clear phenomenon in some areas, with range steppes resulting in low natural productivity, and some plants (e.g. *alfa alfa*) almost disappearing. In the Algeria case physical indicators reveal that the capacity of the steppe rangelands decreased by half in 15 years. This results not only from increasing population pressure, but also critically from decreased capacities to organize and plan resource management at community level. Pastoral ecosystems show in fact areas of

overutilisation (such as around water points and close to inhabited areas), and areas where abundant grazing resources are utilised to a limited extent (such as those in the Dhahar zone in Tunisia).

The implications these changes in resource management patterns carry in both the natural and the socio-political environment cannot be overemphasized. A set of indicative domains have been mentioned during the fieldwork. Reportedly **animal health problems** which mainly appeared during the rainy seasons (exception made for extreme drought events, such as in 1946) seem now to be more frequent during dry periods, possibly in relation to the shifts in mobility and nutritional patterns. **Occurrence of conflicts** is also perceived as an increasingly worrying problem for the future. This is likely to be linked to issues of access to and ownership of land – not only from croplands but also for relevant grazing areas, leading to an overall shrink of opportunities for transhumant mobility in latest decades. The process of intensification of land use is likely to further stratify the local community, with winners and losers and possible conflicts accordingly. **Social stratification** and absentee stock-lordism is a rampant problem in some areas, where wealthy stockbreeders inflate their flock numbers through purchases of animal feed and investments in water storage, thus overusing rangelands and depriving less endowed households from accessing adequate grazing.

During the HLMatrix sessions most people agreed that environmental degradation and drought vulnerability are more the result of inappropriate management of local resources, rather than the outcome of changes in climatic patterns. Whether these are truly related to climatic changes or to changes in resource management is to be further ascertained.

The State and the Market

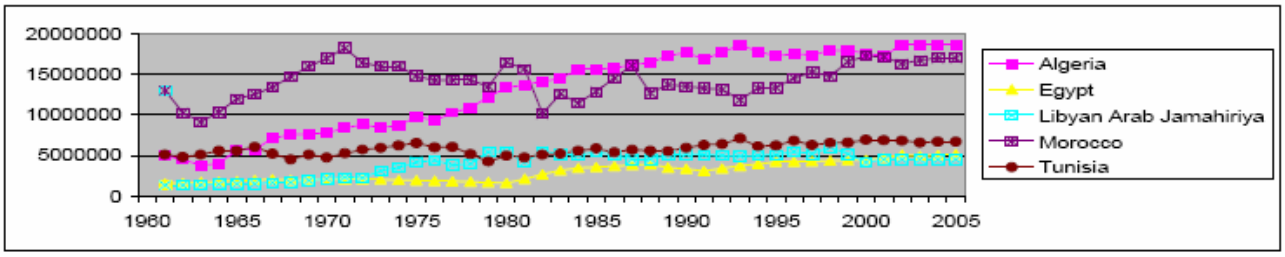
State-led interventions have also been critical in triggering and shaping these processes. National policies aiming at sedentarising pastoral groups have provided huge incentives for people to settle by developing agriculture in non-suitable areas (i.e. through irrigation), while also providing support to a decreasingly-extensive livestock production, through investments in water provision and animal health services.

Land policies have played a key role win this respect. Traditional land tenure systems that aimed at protecting pastoral resources and enhance their regeneration were revised by governments with the objective to sedentarise groups, creating opportunities for people to appropriate land, through new land regulations that favour privatisation. Fragmentation of grazing resources, breaking of transhumance routes and constraints to migration corridors undermined traditional natural resource management, with administrative and international boundaries further constraining traditional livestock mobility.

Food and feed policies have also been pivotal in reshaping rural livelihoods, as the problem of feeding a growing herd with limited mobility and access to remote pastures has been tackled through subsidies to the transportation and purchase of complementary feeding materials – while food policies on the other side depressed the price of animals products in urban markets – thus distorting overall relationships between rural communities and the market environment.

Specific state interventions aimed at supporting communities to tackle drought events have indeed safeguarded their livelihood in the shorter terms, though having contributed to hampering their capacities to cope with these events in the longer term. There seems to be little doubt that governmental policies subsidising animal feeding in normal as well as difficult times have led to unsustainable increase in animal numbers and shifts in herd composition and structure. State support in tackling drought events represents nowadays an important component of communities strategies, which have been reshaped accordingly. As an example in case, the restructuring and recomposition of flock through time have favoured highly valuable but also highly vulnerable animal species and varieties.

Figure 5. Sheep population trend in the North African region (1962-2005) (Dutilly-Diane, 2006)



Data from the surveys indicate a prevalence of sheep against goats (about 3 to 1) in Morocco, a 112% increase in sheep figures in the 1990-2001 decade despite drought events in Tunisia, while figures from Algeria record an increase from 7 millions heads in 1980 to 19 million heads in 2006. Bovine figures are increasing in the arid zones of Morocco and flocks are switching from a mix composition (ovine, caprine, camel) to a unique specie and race (Abdelguerfi et al., 2000), while the relevance of camels in South Tunisia seems decreasing as transhumance to distant areas becomes more difficult, and also due to their diminishing role for transport and land ploughing.

In such conditions natural and man-induced selection of best performing animals under conditions prone to drought has lost significance; productivity rather than drought-coping being a main criteria to improve flock genetics.

BOX 2. Produce or cope: the genetics debate

Population is responding to the intensification driven by governmental subsidies and market demand by reshaping the genetic base of their flocks and herds. Herders sedentarization in South Tunisia has led to a switch in the ovine race used from the Barbarine (fat tail, resistant to drought) to the Bergui or Queue Fine (thin tail, more exigent in feeding) (Dutilly-Diane, 2006). In Algeria, the Barbarine population has decreased by 60% between 1990 and 2000 and the D'man population by 50% in the same period (Laaziz, 2005), while the Ouled Djellal race is taking the monopole and is being crossed with other local races. Similar dynamics are reported by IFAD in the eastern Morocco case. This is also occurring in a way to fit the changing urban demand for these animal species' products (Alary et El Mourid, 2005).

Governmental interventions have often addressed simply curative measures for existing drought events, while strategies to enhance sustainable productivity of agro-pastoral systems in the longer term have not been undertaken in a consistent manner. The overall **institutional incorporation** has thus weakened communities capacity to cope with drought – by expanding the vulnerability of their livelihood asset base - rather than improving their reactive capacities to critical events. According to Hazell (2007) governmental interventions should instead be built upon motivation of farmers and pastoralists using appropriate methods to follow practices of sustainable risk management through improved productivity and income.

BOX 3. The missing lambs

The following story interestingly explains the relationships between local communities, the state and the market, and provides an interesting picture of how local communities play an active role in shaping these relationships.

During the year 1983 due to deep drought conditions in the country the King Hassan II requested Gov agencies to investigate the extent of the problem. State agents moved through the countryside to ask

breeders about the consistency of their flocks. Breeders obviously did not provide true figures about the animals they had; possibly fearing tax exactions they reported much lower figures than the animals they actually had. The collection and the upscaling of such distorted figures generated an overall picture which worried Moroccan authorities.

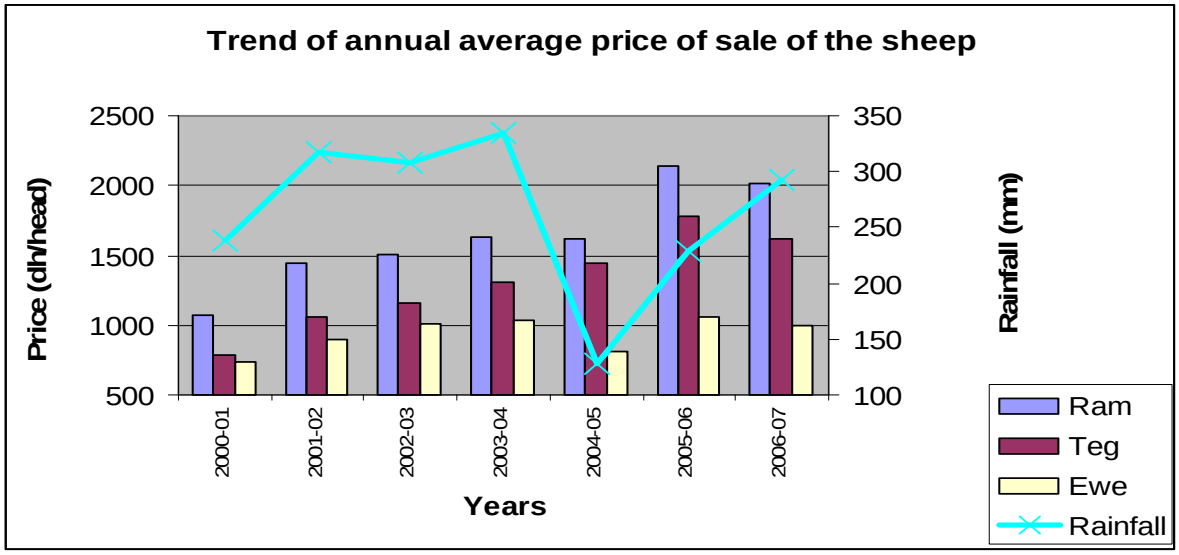
Based on those figures the King Hassan II decided to call its countrymen to avoid traditional slaughtering of lambs at Eid al Khabir festivity, so to preserve the national herd. That religious feast provides local herders the most important marketing outlet during the year, which helps fuelling the agro-pastoral economy and enables agro-pastoralists writing off the debts they relied upon during hard times. The lack of such market opportunity impacted heavily of the rural economy, and herders found themselves with increasing debt volumes and very limited income-generating opportunities. They thus organized through their traditional networks and associations and lobbied in a way that a number of their representatives finally managed to get a meeting with the King in Fes. They could not gain back the lamb marketing as times have passed by, but they nevertheless managed to have consistent revisions in the credit arrangements vis-à-vis state agencies.

This story tells us about the diverse implications a drought event might carry, the relevance of state and market structures for rural livelihoods and the active role these latter play in shaping their strategies.

Integration of local livelihoods in market dynamics and of local economies in the wider global society also greatly contribute to reshape the livelihood systems of local communities and redefine their vulnerability levels (Nori, 2007).

On one side there are clear indications of the **wider Livestock Revolution** taking place in this part of the globe (refer to Delgado et al., 1999), with more and affluent people crowding urban environments demanding increasing amounts of animal proteins. This contributes to push up prices for livestock products, thus expanding the opportunities for local communities to generate an income through the sale of their livestock products. The Moroccan team reported that since 2001 until the 2007, overall, there was an upward trend of the selling prices of animals for slaughter (ram and teg) with a notable variation of 90% for the price of the rams whereas the price of teg, it more than doubled during the same period.

Figure 6. Variations in the sale price of sheep (as reported by the Moroccan team)



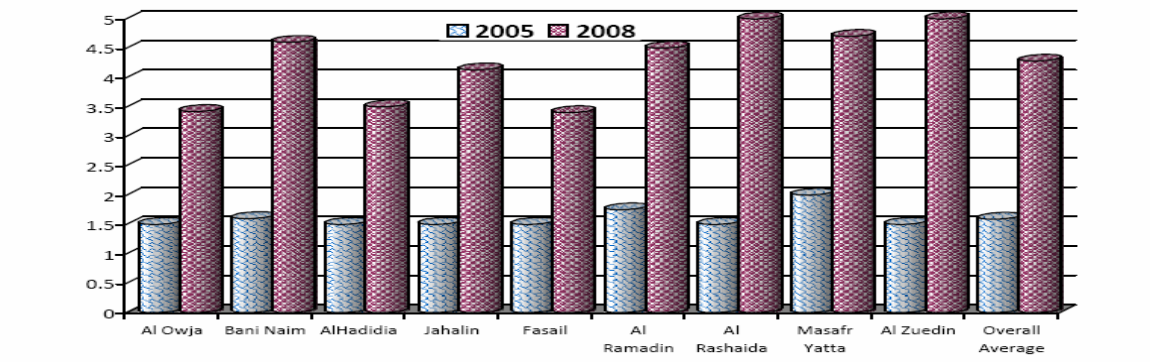
The growing integration of livestock production into market dynamics has had important implications on the structure and composition of local flocks in recent years, with a reportedly large and growing relevance of sheep, which are in higher market demand, either locally, or regionally or globally – as reported above.

On the other side global market dynamics also indicate recent **important increase of the prices of basic food products** (i.e. corn, soyabean meal and barley) in the international market environment.

The Tunisian team reported that between 2005 and the beginning of the year 2008, the prices were more than tripled (3.69 times) for durum wheat and more than doubled for common wheat (2.56 times) and barley (2.4 times). The rapid increase of the prices started in the beginning of 2006. In 2007, the durum wheat prices increased of 50% as compared to that of 2006 and in 2008 it reached more than 4 times as compared to that of the year 2005. In the same way, the prices of common wheat and barley passed from 19.8 TD towards 50.7 and from 20.1 to 48.1 TD respectively for the same period. This difficult economic conjuncture is explained by the instability of the international market and the unbalance between supply and demand. It may also be attributed to the fall of the productive potential of food products at international and national scales mainly in the countries characterized by a high aridity.

This has obviously held important implications in the household economy of stockbreeders, as terms of trade between own outputs and purchased inputs have changed dramatically.

Figure 7. Trends in Terms of trade between lambs (3/4 months) and barley (1 tonn) in the West Bank, Palestine (ICRC, 2008)



The HLMatrix exercise showed that overall this process that has led to the establishment of more valuable but also more vulnerable flocks has accelerated during 1980s. Official figures attest that it was during those years that local herds consistency almost doubled and shifted towards increasing sheep predominance. Incentives and opportunities provided by the policy and/or the market environments have no doubt provided an interesting alternative to the hardship of pastoralism, enhancing new styles of life associated to new forms of resource management – thus providing important potentials as well as threats to local livelihoods.

It seems that the interpolation of these different dynamics has generated a short-circuit amongst three critical factors: the increase need for animal proteins in the market, state efforts to support their related availability through subsidy schemes (but keeping market prices low so to enhance accessibility for urban consumers), the restructuring of local flocks towards increasing dependency on purchased feed inputs. This system seems now on the verge of collapse, as grain prices are on the increase and the state cannot support anymore breeders' economy as it used to.

These elements are all critical to understand the present and foreseeable vulnerability of targeted communities to drought events.

Vulnerability levels

According to Bouayad & al. (2001) it is mainly due to drought and secondarily to the phenomenon of settlement that the region has turned to feed supplementation in the region in recent years – thus standardizing to a degree the behavior of breeders, especially for sheep. The same phenomenon was noted by Bourbouze (2000) which stated that the decline of mobility and settlement led to a new kind of animal husbandry. As a participant highlighted in Tataouine '*it is difficult for an olive tree to survive without water once it gets used to irrigation, and it is difficult for an animal to get properly fed once it gets used to fodder*'. Indeed it results dramatically difficult nowadays for a community to cope with drought without the government assistance and the market facilitations they got used to. This is what in scientific/ academic terms is defined as *path dependency* problem: once you've taken the wrong road, it might take a lot of time before realising that, and that might be costly to turn from that.

The growing number of animals, the recomposition of the regional herd, the changes in land tenure and in mobility patterns and the overall redefinition of local natural resource management have largely contributed to increase herd and community vulnerability to drought events. This phenomenon has been hidden by government costly assistance at critical times, through subsidies for transport and purchase of critical products, but it is not anymore sustainable in the present and future times, neither in socio-economic nor in environmental terms. What was previously a dependency upon climatic factors, such as rainfall levels and timing, has been transferred to a dependency upon political and financial mechanisms, thus including different degrees of exposure and risk, ultimately a 'modern' form of vulnerability.

In this context communities seem prepared to face short term drought but less capable of managing the impact of longer term events. Existing strategies allow only survival during a few days or a few months during the drought periods, whereas government strategies (mainly through subsidies) represent the primary tool against drought effects in the long term. Should this support decrease and communities be unable to tackle longer term downward trends a main perceived fear, in the event of a possible drought, is the complete liquidation of the flock and the abandoning of small ruminants breeding activity. This perceived threats keep the youth away from agricultural activities, according to most eleders.

Social differentiation and access to diverse economic opportunities are important factors that define vulnerability at household level. As it is often the case among pastoralists, large flock size might represent different livelihood strategies – and related vulnerability levels. Large flocks might in fact pertain to wealthy households that reinvest income from other activities into livestock or it might indicate households with limited capacities to diversify the income source. Impact on drought on these households is opposite, together with their coping capacities.

Community Drought Coping strategies

Within this complex, diversified and dynamic context it is difficult to understand which livelihood strategies directly address drought-related problems and which are more comprehensive – as drought itself is deeply embedded in a number of other processes, factors and trends that largely influence its impact at community level. Within the larger picture that has contributed to reshaping local agro-pastoral production systems and rural livelihoods in M&M, main strategies adopted to tackle drought and its consequences from a community perspective can be classified in two main groups[4]:

Reactive / Shorter term coping mechanisms

- Storage of fodder and animal feed,
- Diversification of feed purchase methods and mechanisms,

[4] As suggested by the Algerian team

- Reduction of flock size and animals distress sales to feed remaining flock which can vary to different degrees depending on the impact of the drought - from the fast sale of the young lambs and kids to the sale of the reproductive ewes – with different important implications
- Provisional indebtedness with feed sellers or milk producers,
- Shifts in animal and also people diets to lower price / lower quality inputs, with important nutritional and health implications,
- Reliance of subsidized feedstuffs,
- Multiplication and deepening of wells digging,
- Consideration for animal health improvements so to make best possible use of available feed resources,
- Temporary migration.

Proactive / Longer term adaptive changes:

- Privatization of communal range through irrigation and/or crop schemes, tree plantations or other investments,
- Systematic recourse to the complementation of purchased animal feed,
- Loan and credit schemes between private contractors, either of land, or of other production inputs,
- Collection of grass/hay during the rainy season and storage for use in dry times (although reported to a limited extent),
- Reorganization of transhumance schemes, with mechanised transport and skilled labour requirements,
- Shift in flock composition with continuous increase trend of goats,
- Development of shrub and bushes planting, alley copping, soil rotation (some of these techniques have been brought through IFAD-funded programs, with the specific assistance of INRA and of M&M programs),
- Improved management and utilisation of community forests,
- Increase reliance on feed and grains storage capacities,
- Diversification of income generation activities through migration of some household members. The option of diversifying the source of income seems an increasingly important strategy all over the region.

An important reported claim is that Governmental support at times of need (i.e. during a drought) should be channelled through more equitable and effective ways, which directly address and serve the needs of the poorest. Reports are that households deeply touched by drought perceive the same subsidies as those who have suffered at much shallower degree, thus creating trouble rather than easing burdens at community level. Suggestions are made to bring community institutions in channelling that support, rather than utilising formal statutory structures, which work in rather dispersed and un-coordinated ways, resulting to be inefficient and ineffective.

Reccomendations

The local **agro-pastoral economy** is changing; farming activities seem to be very much instrumental to livestock development, rather than the other-way round (as to Boserup's theories); not only crop production is a function of animal feeding and herd growth but agricultural activities seem to often represent strategies to appropriate and claim rights on land plots. Land and related property rights will increasingly represent critical issue in local development processes, and future assistance in the area should cautiously address these problems.

It is clear that the process of 'modernization' of the area has changed patterns of natural resource management in critical ways - with increasing relevance of government schemes and subsidies, increasing dependency on market-based dynamics and important out-migratory fluxes and reliance on off-farm income, with remittance playing an important role in the local economy, together with revenues from the tourism sector. In the overall reshaping of local livelihood strategies, though, smallstock seems still central to any development strategy of the region, while arboriculture, apiculture and other minor activities are also gaining importance. Growing population pressure is nevertheless an important process largely contributing to reshaping local natural resource management, with emigration and reliance on off-farm revenues representing important supplementary livelihood opportunities. The three main processes characterising the development of rural livelihood strategies indicated by Scoones (1998) seem to take all place at diverse degrees.

Current **degrees of vulnerability** result from dynamics which have happened at mainly three levels:

a) At national levels, State efforts to satisfy urban consumers' demand for animal proteins have been tackled in a way that has distorted price, affecting breeders' overall market benefits. Subsidies and price support mechanisms have increased and inflated access to cereals, fodder and water and somehow contributed distorting livestock production costs, while on the other side incentives to importation of livestock products and other livestock-related policies have also played a role in distorting markets of livestock products. The State in general has thus lowered the effective market price for smallstock inputs (enhancing its access to rural breeders, particularly at times of drought) – while depressing the remuneration breeders got for their outputs through markets (so to enhance the access of urban consumers to animal proteins).

b) At community level this has generated a number of dynamics which has ultimately led to a widened societal gap, with winners and losers – and overall community institutional mechanisms to regulate and control the utilization of natural resources weakened to degrees of ineffectiveness – with all related consequences at social, economic and environmental levels.

c) At household level the income generated through agriculture and rural activities seems increasingly unable to satisfy the economic needs of a family, as much as the labour opportunities provided do not seem inspiring for the young generations. As a result the importance of income sources provided off-farm are becoming of utmost importance. Though rural livelihood strategies in the region are thus changing, still smallstock seems central to the household economy in a number of ways.

The overall impression is that people seem to be little confident that market mechanisms and government interventions could by themselves provide the needed support in times of drought-related crisis in the future. Their request is clearly towards a better and more sustainable management of available resources. Available natural capital is enough to provide for quality livelihoods, should the local animal and vegetal biotypes be properly utilized in the existing agro-ecological conditions. Enhanced organizational and managerial capacities and a stronger social capital are nevertheless needed to shape sustainable livelihood strategies that would contribute decreasing vulnerability levels vis-à-vis diverse occurring shocks – amongst which drought is but the most representative

A number of opportunities centered on livestock exist in order to mitigate the vulnerability of M&M communities, to drought and to the number of compounding trends that make drought increasingly unmanageable for these communities.

Agricultural investments - such as improvement and expansion of water and grain storage capacities in terms of irrigation schemes, tree plantations and grain stocking - seem to represent an important form of investment for local communities to capitalise and diversify their livelihood assets.

Water-related interventions seem quite critical in this context. While water drilling is considered an increasingly unsustainable strategy due to diminishing available resources, recommendations are

that Gov support collective efforts towards improved water harvesting. Strategies for water harvest and proper management involving a collective dimension are an important component of any development strategy in the area; continuous collective-owned structures could be complemented with private contingency sources.

A main failure of modern agro-pastoral resource management is reportedly the limited capacity to self-provide for **adequate stored stocks**, both for people food and for animal feeding. This is perceived as a very weak ring in the rural livelihood chain, as it does not enable proper utilisation of locally available resources, while inducing dependence on market-based dynamics. It is a particularly striking element in Tataouine, in Tunisia, a society which is known and characterised for their *ksour* system, which enabled local communities to store critical staples for up to three years in a very skilled way – and where grain stocking seems a rare coping mechanism nowadays.

Agricultural intensification is a visibly relevant process in the region with increasing interest for practices such as intercropping, rotational schemes, genetic improvements. Diversification of land-based resources, such as *Atriplex spp.* schemes, seems also appreciated although the associated extension package could be improved to expand and enhance the consistency of the impact of such efforts. Other locally-tailored techniques in this respect, such as feeding block with olive cakes/crop residues show important potentials.

Improvements in the animal production system are important; keeping less and more efficient animals seems the way forward for the local community; veterinarian skills do not seem particularly relevant in current context, although their importance might increase if animal rearing intensification takes place; definition and adequate management of drought contingency reserve areas is mentioned as an opportunity. Longer term strategies should look at favouring ways for communities and households to better play with market dynamics, enhancing their capacity to purchase production inputs when prices are lower (and stock them accordingly), while selling their production at advantageous times. Credit mechanisms could play an important role in this sense.

During the survey overall **options for credit** as an institutionalised strategy to tackle drought have not been extensively mentioned. Where it applied (i.e. Morocco), the first Gov schemes proved very ineffective at drought, as people found themselves having to pay more that they could earn during such difficult times. Overall credit recovery was very low and Gov decided to stop the schemes, which today only applies to those with land tenure titles – thus proving inaccessible to most vulnerable groups.

Credit schemes instead exist based on private contracting and often aimed at securing feed purchase at difficult times, such as loan schemes that breeders receive from traders as advanced payment against future productions; these are paid back through the foreseeable production of lambs and/or milk whenever it occurs. These contracts apply despite they seem to contradict some Islamic principles, such as interest rates or sale of futures.

Options to support and **facilitate people and livestock mobility** during harsh times shall be considered and developed, so that drought impacts on livelihood can be reduced. Opportunities might consider:

- Enhance access to basic services such as education, communication and basic assistance to people and animals on the move,
- Adequate care and assistance provided to household members who cannot afford mobility,
- Provide opportunities to tackle disputes and conflicts over land access which increase at these difficult times.

Mobility related to market exchanges is also a reportedly increasingly important livelihood strategy in most M&M areas and options should be explored to facilitate access to alternative income-generation and/or credit opportunities for mobile communities. Opportunities are nevertheless existing for

revamping mobility through investments in the physical as well as human capitals, as both mechanized transportation and skilled shepherding are nowadays needed. Transhumance is becoming a profession, a skilled labour that requires the presence of specialized shepherds who have a thorough knowledge of the resources and their distribution in space and time – for which it would make sense to set up adequate policy frames and training centres; the institution-alization of such activity would also improve pastoralists capacity to raise visibility in institutional contexts.

Opportunities to **diversify the rural economy** are also becoming increasingly important to support local livelihoods. Processing and sale of milk and dairy products will increasingly complement sale of live animals for meat, also due to the price increase of milk powder on international markets following further liberalisation of such markets. As processing and commercialisation of milk products require specific forms of skills and investments, it would be wise to support local communities into this process. A more perspective play with market forces should also inspire effective distress schemes that support the household economy at times of crisis, facilitating smallstock conversion through preventive off-take sales or dry meat production.

Off-farm income - drawn from migration, trade or other economic activities – also represents an important part of the story. In some areas tourism and governmental employment represents important sources of off-farm income, while in others migration seems an unavoidable strategy. In most cases migration and involved income-generation and labour diversification relies importantly on access to opportunities existing at different levels (national, cross-borders, off-region) - and seem more of a structural livelihood strategy, rather than related to drought events. The Moroccan case indicates that the rate of exodus during the drought is the same as in a normal years, implying thus that direct impact of drought on rural migration is lower than could be expected. The space and time scales of this process seem thus limitedly related to the direct effects of drought events.

Overall, migration maybe considered a positive and beneficial livelihood strategy which release human pressure from local resources while also representing an important source of income for the area. The gender implications of such strategy are important, as it seems that it is mainly men that mobilise, while rural women tend to remain alone with heavier workloads. Fear exists amongst elders that the local youth might be more attracted by migration rather than by investing their labour locally.

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