

Resource Entitlements and Conflict Management in Common Grazing Lands: *The case of Yerer and Daketa Valleys, Eastern Ethiopia*^{*}

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Introduction

The livelihoods of both livestock-keeping pastoralists and agro-pastoralists in eastern Ethiopian lowlands largely depend on livestock production based on property right systems originated from communal ownership for grazing lands and with exclusive rights of the household to crop lands. Even though these systems served well during low population and livestock density, the debate over common property regimes among development and resource economists is progressively more lively.

Since Hardin's prediction that all commonly managed resources would inevitably end in tragedy, many studies have challenged the overall acceptability of his theory (See for instance: Ostrom, 1990, Bromely, 1992, Swallow and Bromley, 1995, White and Runge, 1995). These studies shed light to the institutions-resource entitlement relationships in ever changing environment and shift in policies in pursuit of new strategies. The notion of entitlement which was first introduced by Amartya Sen to explain how it is that people can starve in the midst of food plenty in the early 1980s and adapted to capture spatial and temporal variability and dynamic processes inherent in environmental goods by Leach et al. (1999) is helpful in clarifying this shift in emphasis. Leach et al. (1999) shows how access to and control over natural resources is mediated by a set of interacting and overlapping institutions, both formal and informal, which are embedded in social life of rural communities.

The management of rangelands in Yerer and Daketa valleys depends on a complex body of rules established by local groups-rules established over time to resolve how best to regulate access to grazing lands. The definition of these rules, their supervision and adjustment depend on local organizations acting under the authority of traditional institutions. These organizations rarely act without having obtained widespread support for the decisions that need to be taken, by seeking the advice of tribal headmen and various local interests. In order to reinforce local management

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capacities, one needs to think it very important to strengthen these consensual decision-making systems.

Therefore, this study will sensitise policy makers, contribute to the policy debate and to the development of actions, which enhance sustainable pastoral and agro-pastoral livelihoods and to help households to cope during conditions of particular scarcity. The research study investigates how conflicting interests to multiple resource use and users are managed and how increasing pressure for resource access affects different communities as soon as pressure on resources increases. The research assesses local institutions, including social networks that mediate resource entitlements and how these institutions (1) are able to resolve conflicts and disputes on resources use and (2) how they mediate distributional issues over resources. We understand institutions as emerging sites of social interaction, negotiation and contestation comprising heterogeneous actors having diverse goals. Given the ecological uncertainties and the variation of resource users over space and time, institutional arrangements for resource governance may be ad hoc, ambiguous and overlapping.

Although limited in scope/coverage, it is expected that this study will identify significant variables in the resource entitlement – conflict management linkage. It focuses on institutional arrangements that prevail in the study area which facilitate mobility of pastoralists for mutual benefits.

Objectives of the Study

Against the background provided in the previous sub-section, we undertake this study as an attempt to answer, with empirical evidence, some of the questions regarding the institutional arrangements which facilitate mobility of pastoralists particularly during drought seasons. Therefore, the specific objective of this study was to obtain baseline information on the institutional arrangements between pastoralists and agro-pastoralists during climatically stressful periods through a community and household survey carried out in Yerer and Daketa valleys of the eastern Hararghe highlands of Ethiopia.

The Study Area: General Description

The study area, the Yerer and Daketa valleys are located in eastern Ethiopia between 17 and 35 kms from Harar on the way to Jijiga. From an agro-ecological perspective, the area can be classified into two zones namely, *woina dega* (mid altitude) and *kola* (lowland). It is characterized by sparse and irregular rainfall, and is highly drought-prone. The valleys are relatively narrow, hemmed in between extremely rocky ranges of granitic mountains. The two sides of the Daketa valley are literally covered with huge granite rocks, and strange looking boulders and rock formations. Both Dakata and Yerer rivers are seasonal. They dry on the surface about the end of October. However, there seems to be plenty of sub-surface supply of water - a well few meters in depth will be flowing with much water.

The soils range from light brown to dark grey brown in color, clay in texture with a sandy strata underneath, 7.8 in PH, 4.40% in organic matter and 0.250% in total nitrogen. It is high in calcium and magnesium and medium in Potassium and Phosphorous. Here and there, from centuries of flooding and mountain erosion one finds sandy layers and mounds. In many places the valleys are badly cut into gullies thus making it absolutely necessary for land improvement undertakings. At some places the valleys are quite narrow and on the steep slopes, soil conservation measures such as terraces should be given priority. The main types of erosion are sheet and gully erosion. All in all, however, the valley bottom is fertile and suited for the production of many lowland products during favorable rain seasons. During the rainy season, there is a lush growth of grass and shrubs supporting thousands of livestock and wildlife. For a long time after the rainy season is over too, the grass continues to grow on the seasonally swampy places. In many parts of the valley, the cactus weeds present a dangerous competition against the grazing grass land.

An Elephant Sanctuary was designated in the year 1970 for the recovery of the remaining endemic to Ethiopia elephant population (subspecies *Loxodonta africana or leansi*) in Yerer vally. The area coverage of this sanctuary was about 6982 km², which was the largest wildlife protection area coverage in the whole country. Although the sanctuary is more than 3 decades since its establishment, its development, in terms of infrastructure and facilities including proper management scheme is very low. Involvement of human activities into the sanctuary is so high that it has already resulted in severe destruction of the habitat designated for the protection of this rare animal in the country. Excessive wood cutting and over grazing as well as encroachment for settlement into the ecosystem were very serious challenges to the management of the sanctuary, which by its very nature was too weak both technically and managerially.

The Valleys are largely used for grazing by the Oromo and the Somali lowlanders. Occasionally, in time of severe drought and grass shortage, the Issas also bring their herds of cattle and graze. The highland residents may also come from the plateau surrounding the valley; they usually have settled communities and at one time or another have tried to grow sorghum and corns further down the valley but abandoned them because of forest birds and wild animals. Besides grazing, these people also drive economic benefit from the valley by selling on the road side fuelwood and charcoal to people traveling between Harar and Jijiga.

Much of the usefulness of the valley is however exploited by the agro-pastoralist. Because of violent occasional armed clashes in the past between clans or sub-tribal groupings, each group or community is supposed to graze at a given space of the valley at certain season of the year. It is not uncommon to see in one place a few armed cattle men among their herds; and when one group tries to encroach on the territorial confines of another, fighting may breaks out resulting in loss of life and abduction of the enemy's livestock.

The agro-pastoral communities represent various clans or sub-tribes including *Girie-Babile, Malingur, Hawiya, Abiskul, Werehume, Rer-Worfa, Ugas Koshin, Rer Isahak and Mekabil*. During the dry season, the agro-pastoralists live almost entirely on sorghum and maize. During the wet season, milk is the main food, except on feast days, not much meat is consumed.

In terms of social status, the village leader (*aba genda*) is the most powerful personality in the

community. The village leaders are the key administrative people for the Government to work with the agro-pastoralists. Initially the title and position of a village leader was mostly hereditary, however, overtime it has become elective-that is if the Government sanctions such transfer of leadership.

Livestock, largely composed of cattle, sheep and goats, and camel, are vital sources of household welfare. Livestock have the ability to withstand fluctuations in weather patterns better than crops, and therefore, provide both food and income security. Hence, there is heavy involvement of the communities in this area in livestock production. The inhabitants of the Yerer and Daketa valleys used to follow a traditional transhumant pattern of pastoralism with regular movement to and away from the valley.

Livestock are watered at the shallow wells and seasonal streams during the wet season and deep hand-dug wells during dry seasons. They are grazed on the densely bushed hillside during the wet season, but allowed to browse along the riverside and on crop lands during the dry season. The possession of large number of livestock has remained to be the ambition of agro-pastoralists in the area. Even in the years of good crop harvest households tend to sell the surplus and buy cattle or goat in return.

The seasonal movement has changed gradually and crop cultivation of the fertile valley bottom has evolved and crop-livestock interaction increased. Within the last half a century, land tenure and land use systems have been transformed from largely pastoralists exploiting communal range lands to settled agro-pastoralists utilizing privately owned crop lands and communally owned grazing lands. Households tend to grow crops when the rain condition permits. The major crops grown in the region include sorghum, maize and groundnuts. Vegetables are also gaining importance with introduction of small scale irrigation technologies mainly by Menschen fuer Menschen Foundation. Among the major food crops, sorghum and maize cover almost 78% of the total cultivated land and contribute 90% of total production of the major crops of the region.

Land productivity is generally very low. Annual rainfall is relatively very low (less than 500 mm on average) and highly variable both in amount and distribution. More over, uncontrolled overgrazing has been the major problem together with the indiscriminate woodland clearing for various purposes. Degradation of resources has been serious problem because of human settlement, fuelwood trade and charcoaling, wasteful use of forest products and free grazing system, to mention few. However, there are cases, where there are management arrangements, which are adjusted to ensure sustainable resource utilization which depends on a complex body of rules established by local communities.

Modeling and game theoretic analysis of mobility of pastoralists

Even though the incumbent traditional agro-pastoral communities have long considered the Yerer and Daketa valleys to be theirs, other pastoral groups from semi-arid areas of the Shilile zone of the Somali Regional State access the common grazing lands, particularly during drought years. The increasing number of migrant pastoralists and their large number of cattle exercise an increasing pressure upon grazing land, particularly, during times when it is ecologically fragile. For external viewers/researchers, it may be of interest to explore and provide theoretical and empirical justification for the tolerance of agro-pastoralist in the Yerer and Daketa valleys regarding migrants from the semi-arid areas.

For the analysis of the decision process, an extensive form of sequential rationality game theoretical model can be adapted, in which case a player's strategy should specify optimal actions at every point in the game tree (Mas-Colell, et al., 1995). That is, given that a player finds himself at some point in the tree, his strategy should prescribe play that is optimal from that point on, given his opponents' strategies.

Consider the following simple game (Figure 1) to represent in a stylized manner the strategic interaction between pastoralists and agro-pastoralists in times of drought and resource scarcity. The pastoralists, who during normal times, inhabit the semi-arid areas of the eastern lowlands of Ethiopia, consider encroaching grazing lands that are situated at the vicinity of the Eastern Highlands, at the transitional region from lowland to highland. These pastures offer more grazing resources even during drought years.

Now, let us assume that the simple game tree as follows: Pastoralists (P) can either remain in their original area (i.e. "stay out" of the agro-pastoralists' grazing land) which may mean accepting the loss in livestock due to feed and water scarcity or they may decide to move into and "encroach" the agro-pastoralists' grazing land, which are already under intense pressure due to the drought conditions. The agro-pastoralists (A) have two alternative strategies to pursue at their disposal in response to an encroachment by pastoralists: they may either (1) accommodate them, accepting a loss in livestock productivity because of increased resource pressure, or they may (2) start fighting trying to defend their territories against the "intruders".

For illustration purposes, we attribute hypothetical payoffs for the two actors which may roughly represent the incremental costs and benefits of the two players (see Figure 1). For simplicity reasons, we take the following reference point: when pastoralists stay out of the agro-pastoralists area, the incremental costs for both actors are zero. These incremental payoffs do not include the costs incurred due to drought, but only the incremental costs that occur if pastoralists change their normal migration patterns. In this stylized situation, when P encroaches and A accommodates P, P will have an incremental gain, because it can safeguard some of its livestock, it would otherwise lose. A, on the other hand, will lose some of the returns from its livestock due to increased pressure on the grazing land. If A fights against the intruders, this might cause human costs (deaths) and may also incur high livestock loss, and loss due to decreasing livestock prices: the area becomes insecure, so few traders will dare to come and buy cattle.

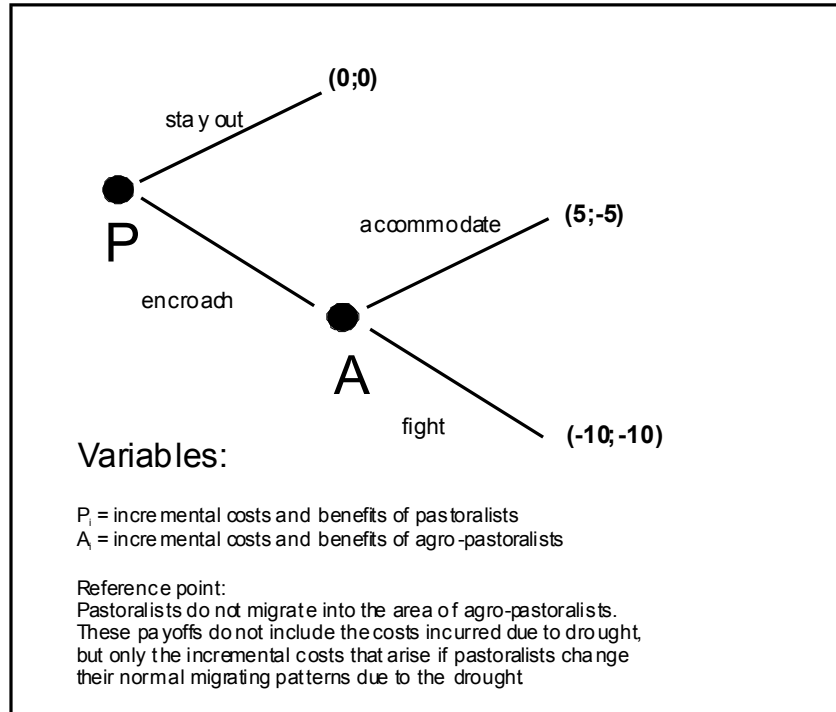


Figure 1: One-shot game

In the situation which we have just illustrated, both players have perfect information. However, P cannot know in advance, whether A will fight or not. Suppose that P anticipates that A will fight with a probability of ρ and $(1-\rho)$ that A will accommodate the pastoralists. In this situation, P will encroach, only if:

$$(1) -10\rho + (1-\rho)5 > 0$$

This is the case, if

$$(2) \rho < 0.33$$

Hence, P will encroach, if it assumes that A's probability to fight is smaller than 0.33. However, we also have to consider that this game may not be a one-shot game, since drought years are endemic in these areas of Ethiopia and may happen frequently. Then, A may have an interest to develop a reputation that it will always fight against intruders, because if it fails to do so, the accommodating behavior may attract further encroachers and this may further increase the pressure on grazing resources. A thus wants P to believe that $\rho \gg 0.33$. However, pastoralists tend to be strong fighters, comparatively speaking, because they are used to have to defend their livestock resources when moving around. Hence, P may be ready to fight, because it can expect to win the fight and then gain regular access to new grazing lands. These expectations and the necessity to make credible commitments for fighting will change the structure of the game and an equilibrium may occur where both choose to fight. Hence, the game shown in Figure 1 may be too simple to grasp the real situation, especially, if we consider that the game may be repeated.

Even though our simple game does not bring us very far in explaining why this is so, what we observe in our study area is that agro-pastoralists accommodate pastoralists during drought years. The reason may be sought in terms of heterogeneity which prevails in the agro-pastoralist society. In fact, in contrast to some popular perceptions (the "community myth"), rural communities are not homogenous entities, but often are heterogeneous in terms of the assets, social status and ethnic origin of households (Guijt and Shah 1998). In our case, we specify the livestock assets which different households hold within the agro-pastoral community as expression of heterogeneity. We therefore distinguish between:

- A^L = agro-pastoralists which own relatively large number of livestock, hereafter referred as those who own livestock, and
 A^0 = agro-pastoralists which do not own or own very few livestock, here after referred as those who do not own livestock

Our game now offers new interactive moves between the different players. From our investigative survey, we learnt that pastoralists may negotiate with agro-pastoralists who do not own livestock about a mutual agreement that allows pastoralists to use the resource entitlements which the agro-pastoralists have as part of their community, but thus far could not make use of. In exchange, the agro-pastoralist families will receive some remuneration from the pastoralists, for example in the form of livestock. This arrangement would allow pastoralists to enter the grazing land with a mutual agreement of the poorer segment of the agro-pastoralist society.

This strategic move is represented in the game in Figure 2: The pastoralists (P) can either decide to stay out of the area or they can start negotiating with the agro-pastoralists who do not own livestock (A^0). In a next move, after either reaching an agreement or not, the pastoralists have to decide whether to enter the grazing resources of the agro-pastoralist community. If the pastoralists enter the grazing area, the agro-pastoralists with own livestock (A^L) have to decide whether or not to confront the intruders and to fight. In the last move, however, the positioning of A^0 becomes decisive, because it determines the relative power of both, P and A^L . This will become clear from a more in-depth analysis of the game tree. In theory, we can distinguish seven possible equilibriums.

(1) Decision path 1 (node 1): Reference case:

We set this as reference case with $(P_1; A^0_1; A^L_1)$ set as (0;0;0). This is the case when pastoralists remain in their normal (usual) grazing area and the incremental costs and benefits are zero.

Furthermore, we can distinguish six different decision paths and then analyze the conditions for a specific equilibrium to arise from the model. Based on information available from our investigative survey in the area, we can theorize about the underlying processes that cause the conditions for specific decision paths to arise in reality. All details are specified in Table 1 below.

(2) *Decision path 2:*

P negotiates with A^0 and reaches an agreement with them. P may then still decide to stay out of the area for any other reason. This move requires negotiation costs for both, and social costs for A^0 , because it loses support from A^L in response to A^0 's willingness to make an agreement with P which may harm A^L .

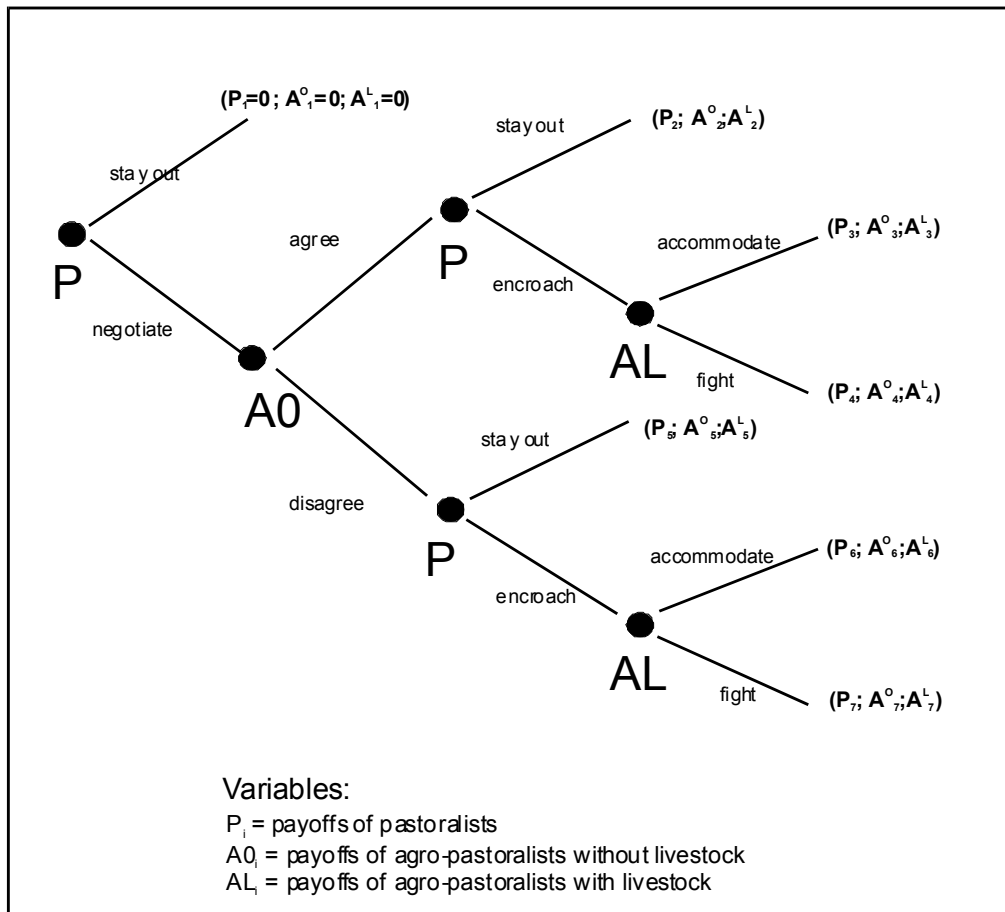


Figure 2: Extended game

(3) *Decision path 3: Assisted intrusion*

P negotiates with A^0 who agree, and P decides to encroach the grazing land, A^L accommodates P. P has negotiation costs, but gains from grazing resources which can maintain its livestock or minimize livestock losses due to drought. A^0 has negotiation and social costs (see equilibrium 2), but gains remuneration from P in the form of livestock or other assets. A^L loses livestock productivity due to increased competition over grazing resources.

(4) Decision path 4:

P reaches an agreement with A^0 and encroaches the grazing land, but in this case, A^L decides to fight it out to keep the intruders out of the grazing area. P has negotiation costs, loss in livestock due to fighting and decreasing marketing opportunities[‡], but may also gain in terms of livestock productivity (L^*) if the fight is successful (which is reasonable to assume, because P has the support from A^0). A^0 has negotiation costs, social costs, but may gain some livestock from P in return for its assistance. A^L has maximum livestock loss both, due to fighting and due to vanishing market opportunities. All three actors may have human costs which affects them negatively.

Table 1: Payoffs of players at different game equilibriums

Equilibrium	Players' moves	Players' payoffs	Comments
1	P stay out	$P_1 = A_1^0 = A_1^L = 0$	Reference point
2	P negotiates with A^0 A^0 agrees P stays out	$P_2 = -NC^P$ $A_2^0 = -NC^0 - SC_2^0$ $A_2^L = 0$	Unused negotiations
3	P negotiates with A^0 A^0 agrees, P encroaches A^L accommodates	$P_3 = -NC^P + L_3^P$ $A_3^0 = -NC^0 - SC_3^0 + L_3^0$ $A_3^L = -L_3^L$	Assisted intrusion
4	P negotiates with A^0 A^0 agrees, P encroaches A^L fights	$P_4 = -NC^P - L_4^P + L_4^* - HC_4^P$ $A_4^0 = -NC^0 - SC_4^0 + L_4^0 - HC_4^0$ $A_4^L = -L_4^L - HC_4^L + R_4^L$	Assisted escalation
5	P negotiates with A^0 A^0 does not agree, P stays out	$P_5 = -NC^P$ $A_5^0 = -NC^0 + SB^0$ $A_5^L = 0 - SB_5^0$	
6	P negotiates with A^0 A^0 does not agree, P encroaches A^L accommodates	$P_6 = -NC^P + L_6^P$ $A_6^0 = -NC^0 + SB^0$ $A_6^L = -L_6^L - SB^0$	
7	P negotiates with A^0 A^0 does not agree, P encroaches A^L fights	$P_7 = -NC^P - L_7^P - HC_7^P$ $A_7^0 = -NC^0 + SB^0 - HC_7^0$ $A_7^L = -L_7^L - SB^0 - HC_7^L + R_7^L$	Unassisted escalation

Notes: These are incremental costs and benefits using equilibrium path 1 as reference point:

NC^J = negotiation costs of player J; (A^0 : J=0; A^L : J=L)

SC_i^J = social costs of player J at equilibrium path i;

HC_i^J = human costs (loss of lives, injuries) due to fighting;

L_i^J = gain (or loss) in livestock assets;

L_i^{*J} = gain in livestock assets through raiding and fighting;

SB^0 = social benefit from strengthening intra-community ties with A^L (only applies for A^0);

$NC_i^P = NC^P$ for all i; $NC_i^0 = NC^0$

R_i^L = Reputation

[‡] When fighting occurs between the groups, the area will be unsafe for traders to travel to, and also owners feel insecure and so prefer to get rid of their livestock. This will put downward pressure on livestock prices.

(5) Decision path 5:

P negotiates with A^0 , but fails to reach an agreement, and P decides to stay out of the grazing area. Here, A^0 has less negotiation costs, but may also have social benefits, because it may strengthen its links with A^L . P has to bear the negotiation costs. A^L has no direct costs or benefits, potentially it may have to afford the costs for financing the remuneration (social benefits) it is willing to grant A^L for its supporting behavior.

(6) Decision path 6:

At equilibrium 6, P negotiates with A^0 , but fails to reach an agreement. In this case, however, P decides to encroach the grazing area anyway. A^L decides not to fight and to accommodate the intruders. A^0 has negotiation costs and may have social benefits, if A^L is willing to concede something. P has to bear the negotiation costs; costs associated with mobility in terms of human labour cost as well as energy used by animals but reaps the benefits from grazing its livestock in the better grazing land, thus avoiding the losses it would otherwise have to bear due to the drought. A^L will have losses in livestock assets due to increasing pressure on grazing resources and it may have to compensate A^0 for its supporting behavior.

(7) Decision path 7:

At equilibrium 7, P negotiates, A^0 does not agree, P nevertheless encroaches, and in this case, A^L fights back trying to keep the intruders out of the grazing land. A^0 has negotiation costs, may have small social benefits from A^L but may also have to bear human costs from fighting. P will have very little scope for winning the contest, because it does not have the support of A^0 and thus lack area expertise and faces a strengthened A^L (allianced with A^0). P will have to bear negotiation costs, livestock losses (due to manifold reasons: death due to lack of pasture, loss during fighting, decreasing marketing opportunities due to insecurity of the area). And, like the other players, P has to bear the human costs of fighting. A^L may have livestock losses due to fighting and decreasing marketing channel, human costs, some costs for remunerating the support of A^0 , but may also gain reputation as a strong fighter willing to defend its territory which may keep other potential intruders away from encroaching the grazing resources.

Now, which conditions must hold for a specific decision path to come into being? For this, we have to apply backward reasoning from the decision nodes. While we could derive the conditions for each equilibrium, we will focus here on a few selected equilibrium paths, which may reasonably occur in reality.

Let us first compare paths 3 and 4. P has successfully negotiated with A^0 and encroached the grazing land. A^L has to take the decision whether to fight or not. For A^L not to fight, the following condition must hold:

$$(3) A^L_3 > A^L_4 \leftrightarrow -L^L_3 > -L^L_4 - HC^L_4 + R^L_4 .$$

It is reasonable to assume that $-L^L_4 - HC^L_4 \ll -L^L_3$, because the livestock losses during fighting are at its maximum and the human costs are to be added and the probability of A^L to loose the battle is high, because P has the support of A^0 . Under the condition that A^L does not attribute extremely high gains to R^L_4 (for credible commitment), we can assume that the above condition, indeed, holds. Then, P can reasonably assume that A^L will choose not to fight, it is always

reasonable for P to encroach, because $P_3 > P_2$. Hence, P will encroach. Now, we have to consider whether it is reasonable for A^0 to agree to a mutual agreement with P. If it agrees, it can expect that P will encroach and A^L will not start a fight. In fact, if this is the case, then it is, indeed, rational for A^0 to agree, because A^0_3 max. (ie., $A^0_3 > A^0_5; A^0_6; A^0_7$). It has only relatively minor costs (negotiation costs and social costs, but gains additional livestock from P). How then, will P decide in the first instance? Since $-NC^P_3 + L^P_3 > 0$ (net gains in livestock = gains – remuneration for A^0) easily outweigh the negotiation costs, the most likely equilibrium will be decision path 3, i.e. P will start negotiations.

Let us also consider the case if A^0 does not enter into an agreement ("disagrees") with P. For P, it is then only rational to encroach the grazing land, if it can reasonably expect A^L not to fight (because $P_7 \ll P_5$). For A^L , it is rational to fight only if the following condition holds:

$$(4) A^L_7 > A^L_6 \leftrightarrow -L^L_7 - SB^0 - HC^L_7 + R^L_7 > -L^L_6 - SB^0$$

In this case, A^L has the support of A^0 and can expect to win the fight. If we compare this situation to the above situation where A^0 enters in agreement with P, some costs and benefits may change substantially for A^L : The livestock loss when fighting ($-L^L_7$) may remain relatively low ($-L^L_7 < -L^L_4$) and similarly the human costs ($-HC^L_7 < -HC^L_4$), whereas the reputation gains may be considerably larger, because a successful fighter gets a tougher reputation than a losing fighter ($R^L_7 > R^L_4$). These shifts in incremental costs and benefits may be such that A^L considers $R^L_7 > HC^L_7 + \Delta L^L$ and that A^L signals its willingness to fight more credibly to P. In this case, the social equilibrium to emerge would be that P, indeed, would stay out of the area at all.

It is also possible to observe that the equilibrium situation for such seasonal migration will also have distributional effect. That is, those members of the agro-pastoral community in Yerer and Daketa valleys, who do not possess livestock to graze on the common grazing land, can now benefit from assisting migrants. They make use of their social capital and endowments to the common grazing land to facilitate mobility of the pastoralists, thereby, sharing the additional utility that P gains or a reward for their role in minimizing the herd loss from P.

In this study, we shall attempt neither to quantify the values of the payoffs which can be observed at the terminal nodes nor the probabilities associated with playing a strategy of fighting or accommodation. But we try to make an in depth study of local institutions which can mediate access to the common resources, norms and rules which govern mutual arrangements, ways of arbitration of conflict in resource utilization by different stakeholders and how the benefits are distributed.

The Narrative: Understanding the Negotiation for Resource Access

The livelihoods of both livestock-keeping pastoralists and agro-pastoralists in eastern Ethiopian lowlands largely depend on livestock production based on property right systems originated from communal ownership for grazing lands and with exclusive rights of the household to crop lands. The management of rangelands in our study area, the Yerer and Daketa valleys, depends on a complex body of rules established by local groups - rules established over time to resolve how

best to regulate access to grazing lands. The definition of these rules, their supervision and adjustment depend on local organizations acting under the authority of traditional institutions. These organizations rarely act without having obtained widespread support for the decisions that need to be taken, by seeking the advice of tribal headmen and various local interests.

Agro-pastoralists in the Yerer and Daketa valleys have to win their livelihoods out of some of the most unstable environment in the country. The study area is characterized by sparse and irregular rainfall, and is highly drought-prone. Communities in the area are vulnerable to the effects of adverse climatic occurrences, especially drought whose frequency is rising and resource degradation. Livestock, largely composed of cattle, sheep and goats, and camel, are vital sources of household welfare. Livestock have the ability to withstand fluctuations in weather patterns better than crops, and therefore, provide both food and income security. Hence, there is heavy involvement of the communities in this area in animal agriculture. Households also grow crops when the rain condition permits.

In periods of rising resource scarcity during drought years, competition for pasture resources and grazing land increases. More over, the increasing number of migrant pastoralists and their large number of cattle exercise an increasing pressure upon grazing land, particularly, during times when it is ecologically fragile. The puzzle we want to explore and provide theoretical and empirical justification is why the agro-pastoralists in the Yerer and Daketa valleys accommodate rather than fight the intruding pastoralists from the semi-arid areas.

It is important to bear in mind that this theoretical model provides a *stylized* representation of the situation and makes many simplifying assumptions (e.g.: perfect information, rational choice of actors). We cannot say *per se* in how far the theoretical analysis corresponds with the structure of decision making in our specific case study. However, the model is helpful in generating new hypotheses that are then further investigated in *empirical* work. It serves as a *heuristic* tool in analyzing the structure of the negotiation process. Which equilibrium path will hold in reality, is subject to empirical investigation. However, from the empirical observation, we can then continue theorizing about the motivations and payoff structures of the players in the game. That is, starting from our initial investigative survey, we drew up this model to make sense of the strategic interactions of the different players in this real-life game over competing resource claims. While elaborating on the model, new hypotheses were generated and ambiguities in the model came up which need further investigation

Our theoretical model, derived from an investigative survey of the nature of the resource competition, suggests two propositions, which need to be further confined, validated and tested in the empirical studies:

Proposition 1:

Resource competition in times of natural scarcity may enhance the bargaining position of asset-poor members of an agro-pastoral society and, in turn, enable them to improve their asset stock and relative socio-economic status by allying with external players.

Hence, it is a kind of paradox that times of scarcity may offer opportunities for asset-poor players to improve their overall and relative position within a society. Furthermore, our model

suggests that the bargaining position of A^0 can create a changing balance in the incremental costs and benefits for P and A^L which may determine whether there will be a peaceful or violent solution to the competing resource claims. This leads to:

Proposition 2:

The alliance of asset-poor agro-pastoralists with outsider pastoralist encroachers changes the relative power assets of pastoralists vis-à-vis agro-pastoralists and urges the latter to comply with a non-violent resolution of competing claims towards a resource sharing arrangement.

The empirical investigations will have to confirm or disconfirm some of the remaining puzzles in the theoretical model and provide further validation of these two basic propositions:

- In reality, we will have to relax the assumption of perfect information. Implicitly, we have already done this when we theorized in how far the other players will know how a subsequent mover will decide. In real life, however, the uncertainty about the motivations and decision making of other players may be much higher: for example, can P know how important it is for A^L to keep the reputation as tough fighters for preventing other potential intruders from encroaching the grazing land?
- The role of A^0 appears to be central: if A^0 decides to take sides with P, the probability is much lower that A^L will go for a fight. We have to ask which factors will influence the decision of A^0 . Our model shows a trade-off between asset gains (livestock) when A^0 joins P in a mutual agreement on the one hand, and social costs due to the damaged relationship within the agro-pastoralist community. Which will outweigh which? In particular, can A^0 bear the social costs which may have long-term consequences in the social structure of the agro-pastoralist society and may weaken its social entitlements in times of crisis? This question can only be answered through empirical material.
- To keep the game fairly simple, we have not considered the possibility that A^0 enters in double negotiations with both P and A^L at the same time, taken whoever offers superior terms. Strategy of A^0 : while bargaining with P, A^0 may also try to convince A^L to concede something that improve A^0 's position within A society and stabilizes its livelihoods. In fact, why should A^0 alliance with strangers when its own people have something reasonable to offer to improve its lot?

We have not yet specified the potential negative environmental consequences of the social equilibrium:

- Our model predicts that social equilibrium 3 will occur where A^L is likely to accommodate P. This, however, will increase pressure on grazing pasture and may further degrade its ecological as well as livelihood value. We did not specify the impacts on the sustainability of resource governance in this model, and how perceptions about such issues may influence decision making of players.

In this paper, we have provided a methodological note for analyzing the negotiation of resource access to (agro-)pastoral grazing land. This approach is based on an understanding of institutions as emerging sites of social interaction, negotiation and contestation comprising heterogeneous actors with diverse goals. Game theoretical reasoning provides a conceptual approach for

"institutions-as-equilibria" emerging from social bargaining. We have proposed the analytic narratives approach which combines (game) theoretical analysis with empirical narratives and combines inductive and deductive research methods in a cumulative and iterative process of theorizing and empirical inquiry. Arguably, one may raise some objections against the kind of modeling which we have proposed in this paper, such as:

- Is rational choice really the mode of decision making or are players rather rule-bound, ex-post-rationalizing agents? A growing literature in the bounded rationality paradigm questions the validity of rational choice and game theory, because authors assume the "one voice" in the literature, for example, emphasize the rule-boundedness of human actors, which outplays motivations for individual gain (Bolton and Ockenfels 2000; Fehr and Schmidt 1999). In fact, emotions and social norms can improve the strategic position in social interaction in other ways as proposed by standard rational choice theory. Sen (1977) refers to the selfish rational agents of economic theory as "rational fools" because they lack these advantages of emotions and norms. Another strand of literature emphasizes that people do not maximize utility, but are rather satisfying (Selten 1999; Simon 1956). These are serious concerns, however, up to present, there are no coherent alternative models in sight, and as long as this is so, it may be reasonable to continue with rational choice models, having their limitations in mind.
- In the current model, we have not specified what the long-term prospects of resource competition are likely to be. Indeed, drought years occur comparatively frequently in these areas in Ethiopia, and the ecological condition of grazing pasture tends to decline. Hence, the players in this game may be faced with the same structure of decision making again and again. How would this change the reasoning of the different players and could this possibly alter the social equilibrium that our theoretical model would predict?

Having these limitations in mind, we would argue that if our propositions get further confirmed in the in-depth field studies, this would add a substantial argument to the CPR literature, in particular pointing to the importance of distributional issues in the governance of resources. Of course, our findings also raise the question of a tradeoff between the sharing arrangements and resource overuse and subsequent degradation. At the same time, resource access in times of drought may be a question of life or death for pastoralists, and hence, questions of efficiency in resource governance cannot be detached from entitlement questions of resource access.

The Study set-up and Methodology

Survey Design and Data Collection

In order to have a clear understanding of the problems associated with entitlement to rangelands in which natural resource management fall into the responsibility of communities composed of group of users, it is necessary to be able to trace the interdependence through effective methodologies of acquiring reliable information. The first task to be accomplished in acquiring information will be to identify major issues in the management of rangelands and other resources in the region through literature review, examination of secondary data, and informal exploratory surveys. Informal surveys are particularly useful because reliable prior studies on property rights

are often unavailable or, if available, are mostly incomplete.

In the extensive survey, most communities in the valley have been covered and semi-structured group interview with community representatives was conducted. This is supplemented by information acquired from key informants with the help of focus group discussion. At this stage data has been collected on:

- Land use pattern and farming systems
- Land rights and land tenure systems, rules of resource use
- History of and change in use of natural resources (farm land, forest and wood lands, grazing lands) and their acquisition
- Institutions that mediate mobility and rangeland management

Selection of appropriate communities for intensive household survey was based on the intermediate results of the extensive survey. One criterion was to ensure representation of communities with contrasting characteristics in terms of prevailing property right institutions, degradation and protection of the natural resources. The sample size considered the complexity of the issue and accuracy and coverage of data necessary for the statistical analysis to be used. A total of 80 households (50 from Daketa and from 30 from Yerer valley) were covered during the intensive household survey. The households were selected randomly proportionate to size from a complete list of members of the community. A structured questionnaire was designed and pre-tested before executing the intensive household survey. Data obtained includes information on the local economy, effects and responses to stress, family composition, inventory of assets, history of acquisition of assets, property rights, water sources and rangelands, assistant provided during drought, among others. Well-trained enumerators conducted the intensive household survey with close supervision of the principal investigator.

Analytical Methods

The proposed research will investigate factors associated with cooperation and determine the impact of cooperation on grazing land utilization. The study investigates the incentive for the social network with specific purpose of facilitating access to community resources. Descriptive analysis will be used to provide detailed description of the rules and institutions that govern resource entitlement, use and system performance. The nature of the statistical tool to be employed will depend on the nature of the variable under consideration. In this case study we concentrate on descriptive statistics to access the relationship between ownership of livestock assets, personal wealth ranking and various strategies employed by the poorer and relatively wealthier members of the community.

Results and Discussion

Demographic characteristics

Household demographic profile of the 80 respondents surveyed is presented in Table 1. The average number of persons per household was found to be 6.98 in Daketa valley and 6.34 in

Yerer valley with an overall average of 6.75. On average, children and the youth (less than 14 years of age) constituted 49% and 52% of the households in Daketa and Yerer valleys, respectively.

Table 2: Demographic characteristics of sample households

Household Demographic characteristics	Daketa	Yerer	Overall
a. Household size (number)	6.98	6.34	6.75
Household size (AE)	5.75	5.08	5.50
Age of household head	40.78	39.48	40.30
b. Gender structure	-- mean number per household --		
Adult female	1.78	1.41	1.65
c. Age distribution - people per age group	-- mean numbers --		
≤ 6	1.56	1.90	1.68
7 – 14	1.88	1.47	1.71
15 – 64	3.44	2.89	3.24
> 64	0.06	0.14	0.08
d. Dependency ratio	1.16	1.29	1.21

Source: Author's computation from the household survey

The adult female members of the household, which constitute on average 24.4% shoulder great pressure and responsibility in the household affairs of the community we surveyed. Their responsibility include, among other things, cooking, gathering firewood, caring for the children and elderly. They are also responsible for caring for sheep and goats, the breeding stock including milking cows and young animals as well as for marketing animal products, particularly milk. Fetching water for human consumption, among other responsibilities of women, was raised as the most time consuming and labour demanding challenge. Not only the distance to water sources increases during dry seasons but also the depth of the well, and thus making the task even worse for women.

An overall dependency ratio of 1.21 does not seem relatively high as compared to other rural households. Of course, young children share some duties in the household, which may include looking after livestock, fetching water, gathering fuelwood as well as participating in weeding.

Household welfare

The respondents were also asked in the household survey: “How wealthy do you consider your self?” and the answers were coded 1, lower than most; 2, same as most; and 3, higher than most. Even though such a subjective measure of poverty is advantageous in terms of collecting information, the response may be influenced by considerations that do not reflect the actual welfare of the household. Particularly, some household heads may be unwilling to admit that they are poor as it may imply low status in the community. Where as, others may claim that they are poor if they anticipate that the survey results will bring them some assistance, which may arise as a result of failure to understand the purpose of the research. Table 3 shows the frequency distribution for the two locations under consideration.

Table 3. Frequency distribution for personal wealth ranking*

Personal wealth ranking	Location		Overall sample
	Daketa	Yerer	
Lower than most	18 (36)	6 (20)	24 (30)
Same as most	24 (48)	21 (70)	45 (56)
Higher than most	8 (16)	3 (10)	11 (14)

* Note: Figures in parenthesis represent percentages

Proportionately more households (36%) in Daketa valley consider themselves less wealthy than other members of the community, where as the corresponding value for Yerer valley is 20%.

For agro-pastoralist societies in the study area livestock and livestock products are the main source of livelihoods. Therefore, data was gathered on livestock ownership of each respondent household. The results are provided in Table 4. The results reveal that agro-pastoralist households in the study area had an average of 7.23 TLU per household. Agro-pastoralist in Daketa valley own relatively larger herd size, but this is not statistically significant ($P > 0.10$). It is also possible to observe from the results that cattle (cow, ox/bull and young animals) constitute large proportion of the livestock population. The cattle herd was also female dominated with a cow to ox/bull ratio of 3.9:1, 4.5:1 and 4.1:1 for Daketa valley and Yerer valley and the whole respondents, respectively. A more female dominated herd structure is, of course, a common feature of pastoralist communities.

With an average of 5.36 animals per household, Daketa agro-pastoralists had the larger herd of small ruminants. Small ruminants are valuable assets to the households particularly in terms of their contribution to food security, particularly during the onset of drought. It is this category of the livestock that households prefer to dispose in order to get food in exchange. They are also considered to contribute towards “efficient” utilization of household labour as they employ young children labour, which would have remained idle, otherwise.

Table 4 also depicts that even though livestock is the main source of livelihoods for agro-pastoral communities, there are some households (7.5%) which do not own any livestock. Of course a large majority of the respondents (74%) do not own any camel and some 60% and 47.5% of the respondents do not own any donkey and ox/bull, respectively.

Table 4: Household livestock holding characteristics

Livestock ownership	Location		
	Daketa	Yerer	Overall
	---- mean numbers per household ----		
a. Tropical Livestock Unit	7.77	6.33	7.23
b. Number of livestock	----- mean numbers per households -----		
Cow	3.36	3.03	3.24
Ox/Bull	0.86	0.67	0.79
Young animals	1.66	1.83	1.73
Donkey	0.74	0.60	0.69
Sheep and goat	5.36	2.30	4.21
Camel	0.94	0.50	0.78
c. Households who don't own	-- Number (percent) of households --		
Livestock	4 (8)	2 (6.7)	6 (7.5)
Cow	7 (14)	2 (6.7)	9 (11.3)
Ox/Bull	22 (44)	16 (53.3)	38 (47.5)
Young animals	11 (22)	3 (10)	14 (17.5)
Donkey	28 (56)	20 (66.7)	48 (60)
Sheep and goat	6 (12)	14 (46.7)	20 (25)
Camel	35 (70)	24 (80)	59 (74)

Source: Author's computation from the household survey

Water sources

Agro-pastoralists in Daketa and Yerer valleys consider water as perhaps the most fundamental resource because trekking of livestock to water sources is among the major duties for the members of the community. The information obtained through the household survey revealed that on average households trek their livestock for 2.12 kilometers during dry season and 1.29 kilometers during wet season to water points (Table 5). Agro-pastoralists in Daketa valley are found to trek their livestock for a relatively longer distance as compared to those in Yerer valley.

Table 5: Mean distance (km) trekked by livestock to watering point

Location	Dry season	Wet Season
Daketa	2.12 (0.94)	1.29 (1.66)
Yerer	1.90 (0.78)	1.08 (1.12)

Various types of water sources were used in the study area, including hand dug wells, digging stream beds, ponds, concrete in ground and reservoirs (Table 6). The deep hand dug wells, locally known as *ella*, are of particular importance in shaping social organizations in Daketa valley where surface water is relatively scarce. The deep hand dug wells are mostly used during dry seasons to supply water both for people and livestock dry seasons. The wells which can be up to 8 meters deep require enormous labour both for lifting water as well as excavating and removing the soil after each rainy season which in turn required continuous and coordinated supply of labour. Those relatively wealthier members of the community with large herd size obviously need more labor to lift water and members of poorer households may supply such labor in exchange for food or promises of a future calf.

Table 6. Utilization of different types of water sources (% of respondents)

Water source	Dry season	Wet season
Hand dug wells (<i>ella</i>)	71.3	35.0
Digging stream beds	77.5	41.3
Ponds	10.0	22.5
Concrete in ground	27.5	22.5
Reservoir	7.5	7.5
Seasonal stream	0	81.3

Communities in Yerer valley largely depend on Yerer river during the wet seasons, digging the stream bed during the dry season and also reservoirs built on the river with the provisions made available for the purpose from Menschen fuer Menschen foundation. Communities in Daketa and Yerer valley also use ponds which are easily accessed but available only short period of time after the rainy season has passed over.

Applying the model: the accommodating behavior of the poor

Mobility of livestock is one of the major ways in which pastoralists have managed ecological uncertainties and risks (Bassett, 1986; Scoones, 1994) and various studies are showing that mobile production systems in Africa appear to be economically efficient than sedentary systems (Scoones, 1993, 1994). Since productivity of the ecosystem in arid and semi-arid areas is spatially and temporally variable and to a large degree unpredictable, mobility enables the opportunistic use of the resources (Niamir-Fuller, 2000). The prolonged dry seasons of the 1980s and 1990s observed a mass movement of the pastoralists in the Shilile zone of the of Somali regional state towards the Yerer and Daketa valleys which is normally a territory of agropastoralists. In most instances the pastoralists return to their transhumance system but very few have been able to settle converting into agropastoralists.

Agropastoralists in Daketa and Yerer valleys are largely governed by the customary land tenure system where land nominally belong to the state but the council of the peasant association in collaboration with concerned government offices allocates cultivation rights to individual

households while pasture land remains under the management and control of the community. Individual households may gain more exclusive use right by investing their labour into development or maintenance of water points. Therefore, one can observe a mix of private, common and state property and sometimes open access resources as mediated by local institutions.

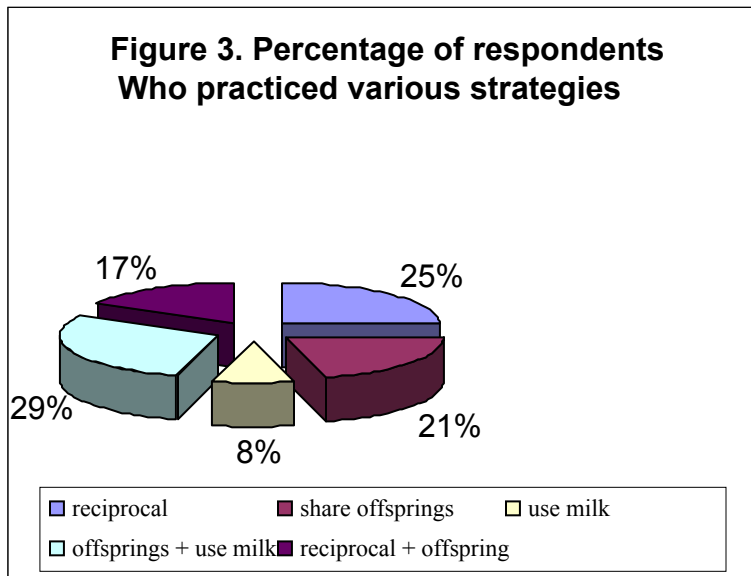
Agricultural encroachment onto rangelands both by nearby farmers and agropastoralists has led to a shortage in pasture area and threatened mobility of animals of pastoralists. This can lead to a significant disruption of the periodic transhumance cycle and also risk-management systems. The variability of boundaries between grazing and cultivated lands always required the mediation of traditional institutions in granting access to different users. More over, poorer community members may be negatively affected in the process because land encroachment prevents them from directly accessing common resources and preclude them from extracting wood for charcoal making and fuel wood for sale. Therefore, they tend to engage in negotiations with wealthier pastoralist from nearby semi-arid areas to facilitate mobility and encroachment. The payoffs of such negotiations were very important starting points for asset building. These community members are therefore more likely to contract with outsiders in order to support their families as well as foster capabilities. Table 7 confirms that among households who accommodate pastoralists, those who consider themselves lower than most in terms of wealth constitute 46 percent, where as the corresponding figures for medium and wealthier community members are 21 and 33 percent, respectively.

Table 7. Percentage of respondents which hosted pastoralists by wealth

Personal wealth ranking	Percent of respondents
Lower than most	46
Same as most	21
Higher than most	33

Under such situation, the main strategies of the poorer members of the community is to assist pastoralists to encroach into the common resource to guarantee their own welfare at the expense of other community members, which are considered to be relatively better off. But one also note that accommodating is not the exclusive behavior of the poor, rather the medium and wealthier households also accept the pastoralists even though the terms of negotiation and contract may vary.

In the study area, we can distinguish among five major institutional arrangements for managing mobility of the pastoralists: sharing offspring, the right to use milk, reciprocity, sharing offspring plus the right to use milk, and reciprocity plus sharing offspring (Figure 3).



Results of the survey reveal that the poorer a household is, the more s/he involves in arrangement which enable her/him to share offspring (Table 8). All community members who accommodate pastoralists in exchange for sharing offspring own less than 3 TLU per household. The possibility of poor agro-pastoralists engaging in hosting pastoralists has persuaded the relatively wealthier community members to call for mutual arrangements with the poorer members to exclude potential entrants, thereby benefiting from reduced overstocking on common rangeland. Failure to reach agreement, however, may result in disputes.

Table 8. Percentage distribution by wealth ranking and strategy

Personal wealth ranking	Strategy	Percent of respondents
Lower than most	Sharing offspring	20.8
	Right to use milk	8.3
	Offspring + use milk	16.7
Same as most	Offspring + use milk	12.5
	Reciprocal + offspring	8.3
Higher than most	Reciprocal	25.0
	Reciprocal + offspring	8.3

Reciprocal arrangement is found to be largely risk-management strategy by relatively wealthier community members. Wealthier members of the agro-pastoral communities accommodate pastoralists and extend their resources particularly the rangelands and water points for the major reason that they expect the same treatment from pastoralists in case members of the agro-pastoral communities face drought and forced to migrate to areas under the control of pastoralists. The

survey results reveal that those respondents who hosted pastoralists based on reciprocity arrangements had greater than 12 TLU per household. The existence of such reciprocal arrangement has been crucial for sustaining agro-pastoral and pastoral communities in their production systems. Reciprocity also plays an important role towards enhancing livelihoods of the pastoral and agro-pastoral communities by extending resource availability through institutional arrangements between community members and others and so creating greater security.

However, there is an increasing apprehension that such traditional systems of institutional arrangements are faced with rapidly changing environment which threatens their role as mediators. Mediators in traditional communities are usually tribal leaders, whose decision must be respected by all parties. During the last three decades however their authorities have been undermined, particularly during the time of socialist revolution, as new powers sprang up at local level. The formation of peasant associations with their justice system invited community members to look for “institutional shopping” (Egeimi, et al., 2003). If a member is not happy with the decision of the traditional village leader, s/he always has recourse to alternative institutions, which may be more in favor of her/his cause. More over, the ever worsening resource scarcity is making negotiated settlement for sharing grazing land and water points relatively difficult. Grazing lands were cleared as a significant number of people took up cultivation activities, while pressure from livestock also increased. With virtually no one fully responsible for the development and management of common rangeland resources, combined with the effect of population growth, has challenged institutions of sustainability in the study areas. The heightened resource scarcity has implicated the protection of patches of grazing land by fencing or putting land marks and required institutional innovation, in which the former communal resource regime gives way to more localized management of grazing lands and even privatization.

Conclusions

The Daketa and Yerer Valleys with their relatively better quality range lands and availability of water points created good conditions for grazing during dry seasons, which, in turn, attracted a number of pastoralists, there by necessitating the creation of institutional arrangements to get access. Such institutional arrangements can reduce the vulnerability of poor community members which traditionally depend on common property resources. They take advantage of the stock of goodwill and social networks among community members (i.e., social capital) to facilitate access for the pastoralists and enable them build livestock asset. Cooperation and institutional arrangement also constitute forms of social capital through which members can generate and acquire assets that would be difficult or impossible for them to obtain in isolation, or without this particular legacy (Johnson, 2003).

Even though recent research findings cautioned against assuming that common property regimes guarantee equitable distribution of benefits (Agrawal and Gibson, 1997), such institutional arrangements enhance the capability of resource poor community members to make the most from the common grazing land. This paper has tried to elucidate some of the complexities in the linkage between status of wealth and engaging in strategic choice of facilitating herd mobility of

pastoralists. The case study Yerer and Daketa revealed that poor members of the agropastoral community transform their endowments (right of access and use) of common grazing land and social capital to actual entitlements of economic value of livestock through institutional arrangements. Since range land development activities need to be seen in relation to people's capabilities, it is necessary to recognize that thoughtful policies should give due emphasis to the complexities of such arrangements. More over, there is a need to recognize that agropastoral communities are heterogeneous with different social actors having different sets of assets and so diverse and sometimes divergent interest in common property regimes.

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