Conflicts, Entitlements, and Natural Resource Management in the Yerer Valley, Ethiopia

Ayalneh Bogale**, Konrad Hagedorn*, Benedikt Korf* and Fekadu Beyene**

*Department of Agricultural Economics and Social Sciences, Humboldt-Universität zu Berlin.

**Department of Agricultural Economics, Alemaya University, Ethiopia

Abstract:

In view of remaining ambiguities in the literature on common-pool resources (CPR), this paper makes a twofold argument: first, it proposes a methodology to study the emergence of institutions that govern CPR use employing the analytic narratives approach which combines game theoretical reasoning with empirical narratives and thus combines inductive and deductive research methods. Secondly, we want to bridge the gap between efficiency and equity considerations in the CPR literature. We will analyze a case study of conflicting resource claims to grazing pasture in the Yerer/Daketa valley in eastern Ethiopia under conditions of particular resource scarcity (drought) where outsider pastoralists seek to encroach grazing resources, which are customarily claimed by the agro-pastoralists inhabiting the valley. In fact, pastoralists enter in the agro-pastoralists grazing resources without violence occurring, although the increasing resource pressure harms livestock assets of the agro-pastoralists. Our theoretical model suggests the following explanation: Asset-poor members of the agro-pastoralist community in Yerer/Daketa valley without own livestock enter in mutual agreement with outsider migrant pastoralists and trade their resource entitlements against asset transfers. This agreement weakens the bargaining power of livestock owning agro-pastoralists who become more reluctant to fight.

Introduction

In explaining the relationships between institutions governing access to resources, there are two different lines of arguments appearing in the CPR literature: "efficiency" and "equity", which seem to co-exist without much cross-fertilization (Johnson 2003). Those researchers advocating *efficiency* view study collective action in the rational choice perspective. They examine conditions under which collective action leads to sustained use of CPRs and try to develop a general theory of the commons by refuting Hardin's claim (e.g. Ostrom 1990; Baland and Platteau 1996; Wade 1988). Other scholars from the entitlement school are interested in how common-property regimes affect the livelihoods of the poor. Their approach underlines *equity* giving more concern to historical-sociological analyses of specific contexts (e.g. Beck and Nesmith 2001; Jodha 2001; Mosse 1997). This group relies on the socially optimum distribution of resources that contributes to stable use of such resources. By heavily emphasizing on the need to combine both concepts, we examine a case of pastoralists and agropastoralists interaction in the Yerer Valley of Ethiopia through employing analytic narratives approach (Bates et al. 1998) that subsumes game theoretic reasoning and rational choice theory.

The livelihoods of both livestock-keeping pastoralists and agro-pastoralists in lowlands of eastern Ethiopian depend largely on livestock production. They practice property right systems originated from communal ownership for grazing lands and with exclusive rights of the household to croplands. The management of rangelands in the Yerer/Daketa valley depends on a complex body of rules established by local groups over time to resolve how best to regulate access to grazing lands. Agro-pastoralists in the area are vulnerable to the effects of adverse climatic occurrences such as frequent drought and associated degradation. In periods of rising resource scarcity during drought years, competition for pasture resources and grazing land increases. Even though the incumbent traditional agro-pastoral communities have long considered the Yerer/Daketa valley area to be theirs, other pastoral groups from semi-arid areas of the Shilile zone of the Somali Regional State access the common grazing lands (mainly shrub woodlands), particularly during drought years. The puzzle we want to explore and provide theoretical and empirical justification is why the agro-pastoralists in the Yerer/Daketa valley accommodate rather than fight the intruding pastoralists from the semi-arid areas.

Empirically, we will analyze a case study of conflicting resource claims to grazing pasture in the Yerer/Daketa valley in eastern Ethiopia under conditions of particular resource scarcity (drought). In fact, outsider pastoralists seek to encroach those grazing resources, which are customarily claimed by the agro-pastoralist communities inhabiting the valley. What we observe is that pastoralists enter in the agro-pastoralists grazing resources without violence occurring, although the increasing resource pressure harms livestock assets of agro-pastoralists. Our analysis suggests that this "peaceful" arrangement has important distributional implications within the agro-pastoralist community: Those members of the agro-pastoralist community who do not own livestock may engage themselves in mutual arrangement with outside pastoralists making use of their information, social capital and the right to access to common grazing land by virtue of their membership to the incumbent community. These asset-poor members exchange their social assets as being part of the agro-pastoralist community, which grants them with access rights (endowments) to grazing pasture. In this arrangement, they can transform their endowments to grazing land into concrete entitlements (benefit streams), and gain a share in the additional utility that the outsider pastoralists gain from being allowed to graze livestock on this pasture. This mutual agreement enables outsider pastoralists to enter the grazing resources without violent struggles with the agro-pastoralist community.

This case merits further scrutiny for two reasons: first, to study the reasons for the non-violent resolution of competing resource claims, and second, to evaluate the distributional issues involved in emerging institutions of resource governance. In fact, our findings propose

that, in contrast to a widespread view in the literature, droughts may not necessarily benefit the rich and harm the poor, but there may also be a prospect for the poor to use opportunities for negotiating new entitlements. In this paper, we present the theoretical framework of our study and illustrate how one can use the concept of analytic narratives as a cumulative approach to theorizing, which combines inductively gained empirical data, deductive reasoning using game theory and subsequent re-assessment using both, quantitative and qualitative data.

The Analytic Narratives Approach

In the commons literature, economic models based on game theory hold that cooperation cannot be sustained in a one-period game, but an infinite number of outcomes may be sustained by a group of users if the game is repeated because players are able to do credible threats in case of non-cooperative behavior (Kreps 1990). If groups emerge for CPR management, this kind of analysis cannot foster our understanding of the reasons for cooperation and the specific functioning of institutions (McCarthy 1999). For this reason, game theory seems to leave us with a puzzle that merits further analysis. For empirical analysis of CPR, some use quantitative, econometric method and criticize others (e.g. Agrawal 2001; McCarthy 1999: 167-9) for not providing rigorous factors' relationships. On the contrary, others employ qualitative approaches, narratives and historical analysis.

Arguably, while econometric analysis may be useful in delineating specific factors that determine institutions *in equilibrium*, it does not help much in analyzing *processes* of institutional change. A case study research using qualitative methods may yield more promising insights. Thus, an approach that reconciles and combines the strengths of both inductive and deductive reasoning and related research methods is preferred. That is an analytic narratives approach. It helps to develop systematic explanations based on case studies (Bates et al. 1998, 2000; Greif 1998). The studies in the book of Bates et al. (1998) purposely jump back and forward between theory and empirical inquiry stimulating each other and combine the analytical tools commonly employed in economics and positive political sciences, namely game theory, with the narrative form, a standard tool in history.[1] They employ an inductive approach to reconstruct an appropriate game to reproduce a certain historical explanandum. The process of developing the right game by selecting the actors, their preferences and the structure of the environment is inductive reasoning. Once the induction is complete, Bates et al. (1998: 700) apply the deductive methods to study behavior within the context of the game: "We use deductive theories for inductive purposes".

Game theory delivers a good instrumentation for explaining institutional outcomes via backward reasoning from a specific social outcome to the decision making of relevant actors (see Selten 1965). The idea is that each institutional outcome can be traced to individual (or collective) decisions characterized by a specific set of preferences, coupled with incentives and situational restrictions. Understood in this way, institutions provide order that emerges endogenously (Scharpf 1997: 1-18). In this regard, Bates et al. (1998: 10) emphasize the difference between a Nash equilibrium and sub-game perfect equilibria: Sub-game perfect equilibria are a subset of Nash equilibria. While Nash equilibria are attained regardless of the credibility of threats or promises that are not credible, sub-game perfect equilibria demand that threats or promises be credible. Hence, in sub-game equilibrium analysis, credible threats and the consequences of fear play a significant role in explaining the generation of institutionalized patterns of behavior (Hanisch 2003: 124). The analytic narratives approach then employs contextual information to sort out why specific sub-game equilibria may occur

[1] Bates et al. (1998) argue that the general approach is also open for other theoretical concepts than rational choice: "Yes, we use and have a preference for rational choice theory, but it is not a necessary condition for an analytic narrative ... [however] we believe that rational choice offers a superior approach because it generates propositions that are refutable" (Bates et al. 2000: 697).

or not. For this, one must move outside the theoretical game and investigate empirical material, in particular what determines the different actors' beliefs about other actors' behavior (Bates et al. 1998: 10).

Theoretical Analysis of The Case

Consider the following sequential game between pastoralists and agro-pastoralists in times of drought and resource scarcity. The pastoralists, who inhabit the semi-arid areas of the Somali lowlands in Ethiopia during normal times, consider encroaching grazing lands that are situated at the transitional region with the Eastern Hararghe highlands. This is a strategic move to cope up with drought and resource scarcity in their customary grazing areas in the lowlands, because the pastures in the transitional region offer more grazing resources even during drought years.

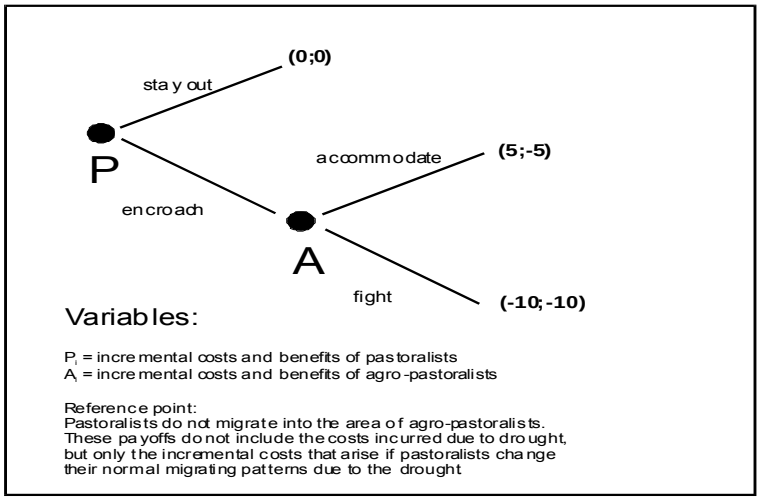

Figure 1: One-shot game

Assuming a simple game, pastoralists *P* can either remain in their original area (i.e. "stay out" of the agro-pastoralists' grazing land) which may mean heavy loss in livestock due to scarce resource conditions or they may decide to "encroach" into the agro-pastoralists' grazing land, increasing the pressure on already diminished pasture resources due to the drought conditions, but still better than grazing land of the pastoralists in the lowlands). The agro-pastoralists have two options to react to an encroachment of pastoralists: they may either (1) accommodate them, accepting a loss in own livestock 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 roughly representing the incremental costs and benefits of the two players (see Figure 1). When pastoralists stay out of the agro-pastoralists area, the incremental costs for both actors are zero (even though they experience losses due to drought). If *P* encroaches and *A* accommodates *P*, *P* will have an incremental gain, because it can safeguard some of its livestock that it would otherwise loose. *A*, on the other hand, will loose some of its livestock due to increased pressure on the grazing pasture. If *A* fights against the intruders, this will cause high human costs (deaths) and may also incur high livestock loss, and loss due to decreasing livestock prices: the area becomes known to be insecure, so few traders will dare to come and buy cattle.

In this situation, both players have perfect information. However, *P* cannot know in advance, whether *A* will fight or not. In the view of *P*, *A* will fight with a probability of ρ and (1-ρ) that *A* will accommodate the pastoralists. In this situation, *P* will encroach, only if:

-10 ρ + (1- ρ) 5 > 0, and this is the case, if ρ < 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 happens frequently. Then, *A* may have an interest to keep 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. Thus, *A* wants *P* to believe that ρ >> 0.33. Pastoralists tend to be stronger fighters since they are used to defend their livestock resources when moving around. Hence, *P* may be ready to fight with the expectation to win the fighting and then gain regular access to new grazing lands. This expectation 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, one-shot game is too simple to grasp the real situation in which games are repeated. Unlike in the prisoners' dilemma, where infinitely repeated games will trigger cooperation as cheating can be countered by credible threats (Kreps 1990), in our case infinitely repeated games may lead to fighting (non-cooperation).

Agro-pastoralists are not homogenous in terms of the assets, social status and ethnic origin of households, but we specify them here on the basis of livestock assets they hold as:

A^L = agro-pastoralists who own livestock, and
A^0 = agro-pastoralists who do not own livestock or own few.

Our game now offers new interactive moves among three players (*P, A^L and A^0*). From our investigative survey, pastoralists negotiate with poor agro-pastoralists to use their resource entitlements. In exchange, the poor agro-pastoralists 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 such a mutual agreement.

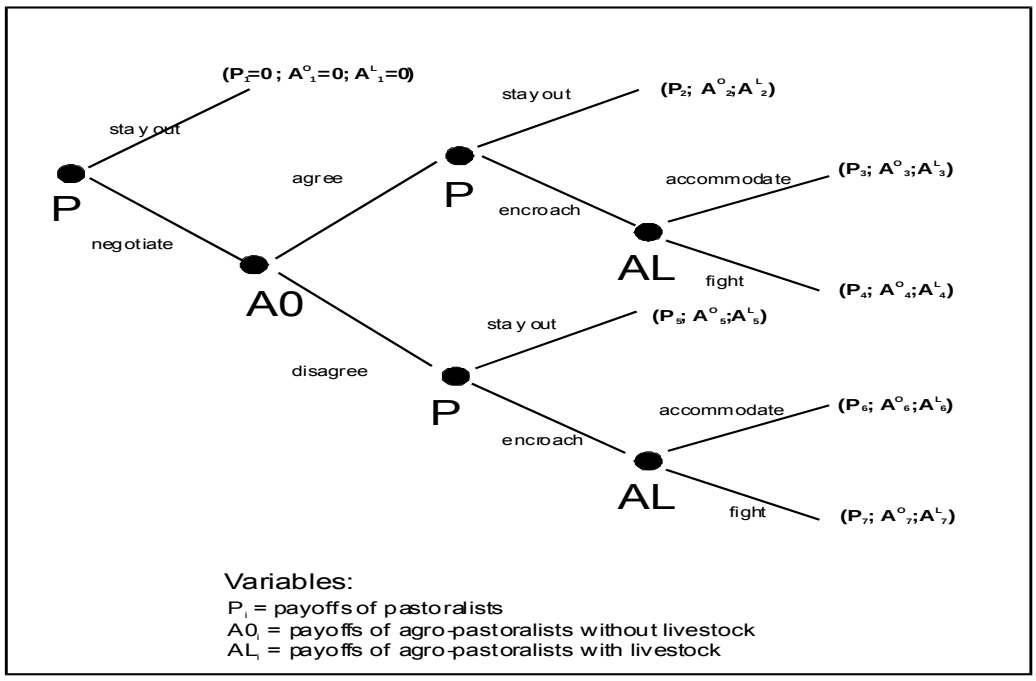

Figure 2: Extended game

This strategic move involving three players is represented in Figure 2. Pastoralists (P) can either decide to stay out of the area (risking loss in their livestock due to drought) or they can start negotiating with the poor (A^0). In the next move, after either reaching an agreement or not, pastoralists have to decide whether to enter the grazing resources of the agro-pastoralist community. If pastoralists enter the grazing area, agro-pastoralists who own livestock (A^L) have to decide whether or not to confront the intruders and to fight. In the last move, however, the position of A^0 becomes decisive, because it determines the relative power of both, P and A^L. A more in-depth theoretical analysis of the game leads to seven possible equilibria.

(1) Decision path 1 (node 1): This is a reference case with (P_1; A^0_1; A^L_1) with 0 payoff for all since pastoralists remain in their normal grazing area and there is no incremental costs and benefits.

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 (see Table 1 for details).

(2) Decision path 2: P negotiates with A^0 and reaches an agreement, however it could decide to stay out of the area for any other unknown reason. This involves negotiation costs for both, and social costs for A^0, because it looses support from A^L as a response for A^0's willingness to make an agreement with P, which may harm A^L.

(3) Decision path 3(Assisted intrusion): P negotiates with A^0 who agrees. P decides to encroach the grazing land and A^L accommodates P. P has negotiation costs, but gains from grazing resources reducing livestock losses due to drought. A^0 has negotiation costs, social costs (see equilibrium 2), but gains remuneration from P in the form of livestock or other assets. A^L looses livestock 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 to keep the intruders out of the grazing area. P has negotiation costs, loss in livestock due to fighting and decreasing marketing opportunities[2], but may also gain livestock (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 due to the agreement. A^L has maximum livestock loss both, due to fighting and due to vanishing market opportunities. All three actors may have human costs (injuries and loss of lives).

(5) Decision path 5: P negotiates with A^0, but fails to find an agreement, and decides to stay out of the grazing area. Here, A^0 has negotiation costs, but social benefits from strengthening its links with A^L. P has to bear the negotiation costs. A^L has no direct costs or benefits other than granting remuneration (social benefits) to A^0 for its supporting behavior.

(6) Decision path 6: P negotiates with A^0, but fails to find an agreement. In this case, however, P decides to encroach the grazing area anyway. A^L decides to accommodate P. A^0 has negotiation costs and may have social benefits, if A^L is willing to grant something. P has to bear the negotiation costs, but reaps the benefits from grazing its livestock in the richer pastures, thus avoiding high 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.

[2] When fighting occurs between the groups, the area will gain a reputation of being unsafe to travel to, therefore, traders will be reluctant to come and buy livestock. This will put pressure on livestock prices.

(7) Decision path 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 lacks area expertise and faces a strengthened A^L (alliance 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 (deaths and injuries). A^L may have livestock losses due to fighting and decreasing marketing opportunities, human costs, some costs for remunerating the support of A^0, but may also gain reputation as a strong fighter willing to defend its own territory which may keep other potential intruders away from encroaching the grazing resources.

Equilibrium	Players' moves	Players' payoffs
1	P stay out	$P_1 = A^0_1 = A^L_1 = 0$
2	P negotiates with A^0 A^0 agrees P stays out	$P_2 = -NC^P$ $A^0_2 = -NC^0 - SC^0_2$ $A^L_2 = 0$
3	P negotiates with A^0 A^0 agrees, P encroaches A^L accommodates	$P_3 = -NC^P + L^P_3$ $A^0_3 = -NC^0 - SC^0_3 + L^0_3$ $A^L_3 = -L^L_3$
4	P negotiates with A^0 A^0 agrees, P encroaches A^L fights	$P_4 = -NC^P - L^P_4 + L^*_4 - HC^P_4$ $A^0_4 = -NC^0 - SC^0_4 + L^0_4 - HC^0_4$ $A^L_4 = -L^L_4 - HC^L_4 + R^L_4$
5	P negotiates with A^0 A^0 does not agree, P stays out	$P_5 = -NC^P$ $A^0_5 = -NC^0 + SB^0$ $A^L_4 = 0 - SB^0_5$
6	P negotiates with A^0 A^0 does not agree, P encroaches A^L accommodates	$P_6 = -NC^P + L^P_6$ $A^0_6 = -NC^0 + SB^0$ $A^L_6 = -L^L_6 - SB^0$
7	P negotiates with A^0 A^0 does not agree, P encroaches A^L fights	$P_7 = -NC^P - L^P_7 - HC^P_7$ $A^0_7 = -NC^0 + SB^0 - HC^0_7$ $A^L_7 = -L^L_7 - SB^0 - HC^L_7 + R^L_7$

Table 1: Payoffs of players

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^J_i = social costs of player J at equilibrium path i;
HC^J_i = human costs (loss of lives, injuries) due to fighting;
L^J_i = gain (or loss) in livestock assets;
L^{*J}_i = 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);
$NC^P_i = NC^P$ for all i; $NC^0_i = NC^0$
R^L_i = reputation that livestock owning agro-pastoralists gain (defending their own territory)

Which conditions must hold for a specific decision path to come into being? We apply backward reasoning from the decision nodes by first comparing 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. A^L does not fight only if the following condition holds:

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

It is reasonable to assume that $-L^L_4 - HC^L_4 << -L^L_3$ 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 since P has the support of A^0. Only if A^L attributed extremely high gains to R^L_4 (for credible commitment), A^L may start fighting, which is unlikely. Then, P can assume that A^L will choose not to fight, it is always reasonable for P to encroach, because $P_3 > P_2$ (P gains livestock due to increased grazing resources).

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

Let us also consider, theoretically, the case if A^0 disagrees with P. For P, it will only be rational to encroach the grazing land, if it can reasonably expect A^L not to fight (because $P_7 << P_5$). 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 loosing 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 rational decision path would most likely be that P would stay out of the area at all.

Conclusion

Based on initial phase of the survey, we draw up this model to make sense of the strategic interactions of three groups of players in this real-life game over competing resource claims. We found the game theoretic reasoning and theoretical explanations very useful in developing insights on how social institutions governing access to resources under conditions of stress will emerge. 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 that can determine whether there will be a peaceful or violent solution to the competing resource claims. The model has been helpful in generating two propositions that will be verified in further *empirical* work. These are: 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 aliening with external players, and 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.*

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