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COMMON PROPERTY
RANGELAND

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The Common Property Rangeland : Case
Study of Ain Leuh (Middle-Atlas, Morocco).

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A B S T R A C T

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The rural community of Ain Leuh, currently concerned by the project of pastures improvement as one component of an integrated and large project covering the middle-Atlas, has evolved through three different stages. Each period had presented important transformations with intensive impacts on the common pastures. The diversification of income sources seems to be an accelerated trend through which adjustments are expressed at each era. The oakerson model is used to better characterize the static and dynamics of the common pastures. An important remark should be made at this level, concerning precisely the boundaries for applying the framework. These limits are defined within the administrative rural community for reasons related mainly to the interferences present at each era among different resources existing in Ain Leuh .

Such study can be refined and made more consistent with the reality of this common through surveys to be expanded in time and to cover a specific faction for a better measurement of efficiency attempted in this paper all the tribes .

PRESENTATION AND BACKGROUND

The rural community of Ain Leuh (Administrative denomination) is identified with the federation Ait Abdi composed of five tribes, concerned with common grazing land. The common land belongs to the factions of each tribe, each of them, having the ownership of land and the resource. The members of each faction have individual rights to use the resource through the number of heads of livestock they exploit yearly .

The dispersion of information and the difficulty of gathering it in an unbiased manner at the user's and owner's levels made it hard to describe a specific pasture within this territory. The approach adopted concerns the federation as a whole with references to cases for which appropriate data and information are available. Such an orientation seems to be helpful since it accounts for the overall environment in which common land evolves. In fact, besides common land, private and public ownership are also practiced in this region and concern respectively the cropped land and the forests. This creates an institutional heterogeneity within the territory and a diversity of activities as they are supported currently by individual strategies leading to privatization and diversification of sources of income.

However, this situation is the result of several years of transformations and adjustments which have occurred since the settlement of Ait Abdi in this region. Three important stages,

can be considered, following Beaudet's (1969) description and for the purpose of a dynamic study. The first stage is defined from the earliest period of settlement to the beginning of the legislative period (1900-1940). The second one is mainly concerned with the appearance of individualistic behavior and the privatization of parts of the common land. This is the period where the central authority had defined the ownership and the right to exploit the common land, and which had induced adjustments at the group and individual levels (1940-1970). The last stage is the current one where exogenous forces from the government and market have pushed towards technical and economic adjustments on the common land (1970-1984).

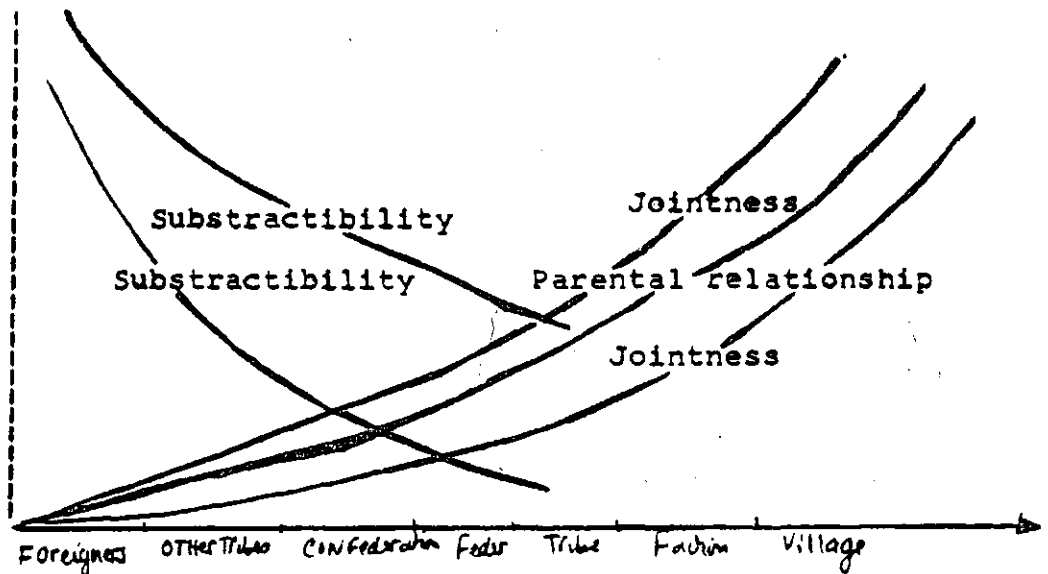
The Oakerson sets of variables

The model prescribed by Oakerson is used to better characterize the static and dynamic aspects defining the practice followed on the common grazing land in Ain Leuh. However, for a dynamic setting and accounting for the proposed orientation of this study, it's important to mention the importance of the environmental effects on such a characterization.

A- Technical/Physical attributes

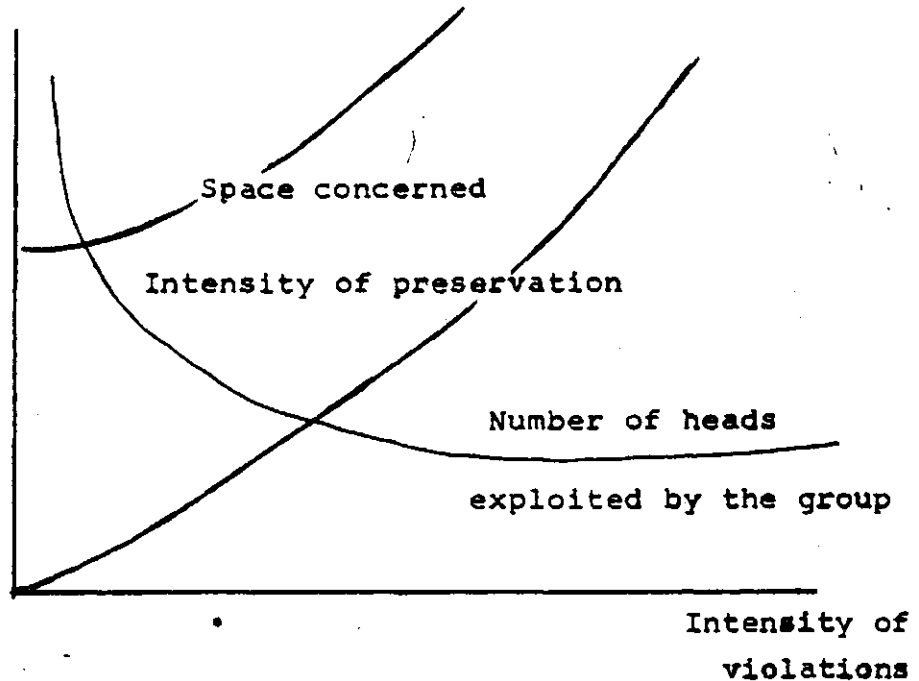
The common land used by the members of each tribe is in general expanded on two ecological units : the mountain (Jbel) and the plain (azarhar) . On these units, groups organized in a way to exploit such a complementarity and to solve the seasonality of forage supply presented disjointly by the plain and the mountain. This is an invariant fact which continues to be present even currently. The only transformations have concerned the use of other sources of forages (agriculture, forests), the mode of transportation and the length of stay on each ecological unit, given the adjustments operated by the

members through time in exploiting new opportunities. The traditional rules on this common land, give rights for grazing to members who cannot exclude each other from deriving a stream of benefits through grazing their livestock on the common pasture recognized as belonging to their faction. Jointness applies among members of the faction and can still apply inside some tribal units where several other factions benefit from non subtractibility. Verbal contracts, also contribute to the consolidation of this attitude. Subtractibility begins occurring with foreigners who are by definition individuals without any parental relationship with ^{the} faction. This presentation can be better explained by the following diagram.



As the parental relationship is relaxed, subtractibility is increased and the conditions of jointness are not realized. Depending on the situation of each faction, the rate of increase or decrease with the parental relationship is adapted. If this overall picture were mainly theoretical, it could be made more realistic when accounting for the facts characterizing each stage. Within the first stage, there was more instability in the group given different movements occur:

in the territory and given the non-well defined boundaries for the pastures. At this stage, jointness can be considered realized as far as it is not disturbed by other groups. When realized, substractibility was quite precisely applied to foreigners. Given the extensive nature of the economy within this era, and given the large spatial basis on which the group can graze, it was difficult to apply such principles at the spatial fluctuating limits and at a special period of time within the year. The territory was often violated by foreigners and the intensity of these events could degenerate into a war which was the only way to define the rights to grazing for a give period. These situations were reproduced as far as the conditions of semi-nomadism and extensive economy were realized .



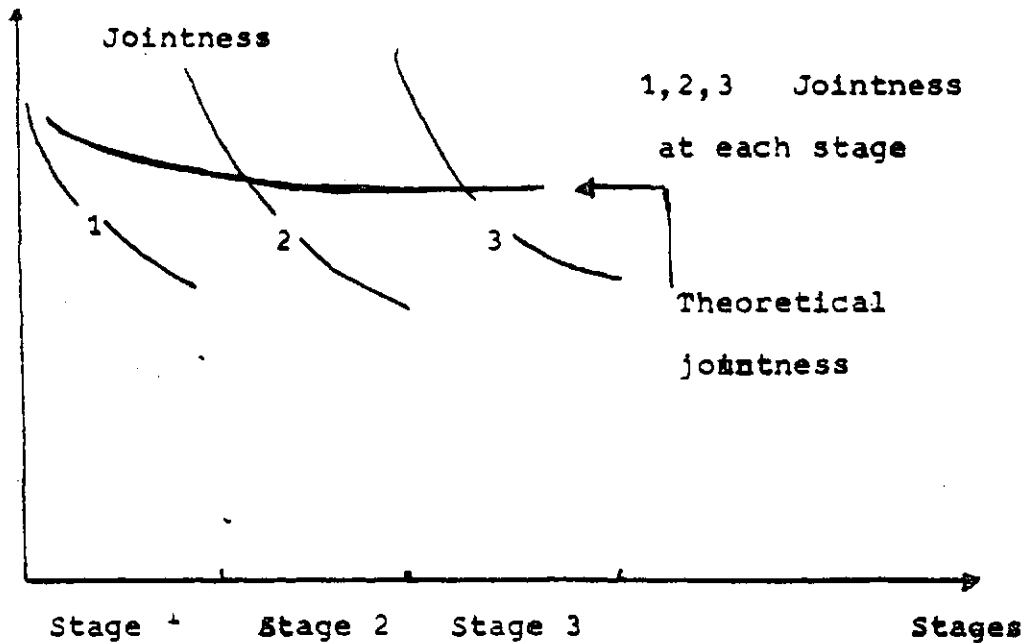
As the intensity of violations by foreigners is increased meaning that more and more space is concerned by the conflict and might be substracted to the group, it becomes more beneficial for the faction to protect and preserve its territory. Otherwise, when violations are not perceived by users, no contro and no enforcements are observed allowing potential uses at the spatial boundaries and at given periods of the year.

These facts could define this period as an era of partial jointness as compared to the theoretical one. During the second stage, and under the colonization period, several facts* intervened in reducing the spatial and temporal movements for the users : delimitation of the public domain, subtraction of forests from the common land, delimitation and definition of ownership was extended on the common land through the practice of agriculture and the external grazing movements were reduced. This meant that a complete redefinition, limitation and remodeling of the common practices were prescribed and enforced by formal and informal legislation. Conditions of jointness were relatively more precise since an ownership is enforced by the central authority. The current stage is the result of these past events which have induced inter-factions adjustments as well as intra-faction. These adjustments, eventhough not achieved at this stage were mainly oriented towards the diversification of activities and the emergence of individualistic behavior which can bias the conditions of jointness on the common grazing land. The current stage coincides also with the development of agriculture on both the ecological units, expanding the private ownership, and reducing the spatial basis for the common grazing area. The conditions of access to common pasture are adjusted through the market mechanisms and contracts established with foreigners (urbans, bureaucrats, . . .). The jointness in grazing is indirectly violated since each

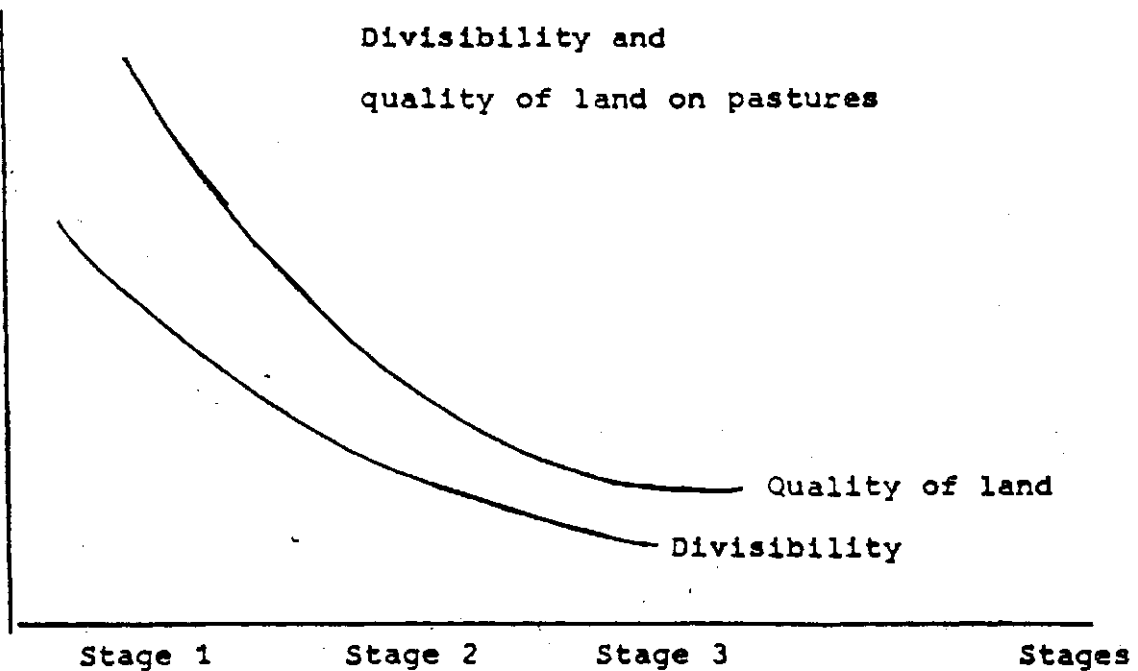
* Reference to the graphical representation of common land reduction for the factions Ihadrane and Ait AZZOUZ (LAADNANI and BOUTOUBA - E.N.A 1980).

user can increase the number of heads he exploits, using this mechanism and using the fact that no other can follow the same strategy without subtracting others from pursuing it. This is another idea of jointness which accounts for interferences with the external opportunities offered to individuals. The lack of control of the right to use the pasture, the dispersion of villages and the external pressure made it hard to enforce practical rules of exploitation of forage in a costless way.

This is a notion of enlarged jointness which has to account for all the opportunities presented to individuals. Eventhough there existed a trend to decrease jointness within each stage, its nature was not similar from one stage to the other.



From the analysis of jointness within the 3 stages, it appears that excludability in absolute sense is quasi-inexistent . At each era, foreigners can be admitted either discretely through transactions or by contracts. Also in the theory (Legislation) developed at the second stage, divisibility of the common is not permitted within the faction. Before this period, eventhough it was not allowed by consensus among the group's members, divisibility could have occurred more intensively than in the second and third stages. It is therefore appropriate to mention the divisibilities which happened during the second and third stages and which accounted for the adjustments. Such divisibilities had finally led to consecrating marginal lands for pastures and had concerned land of better quality .

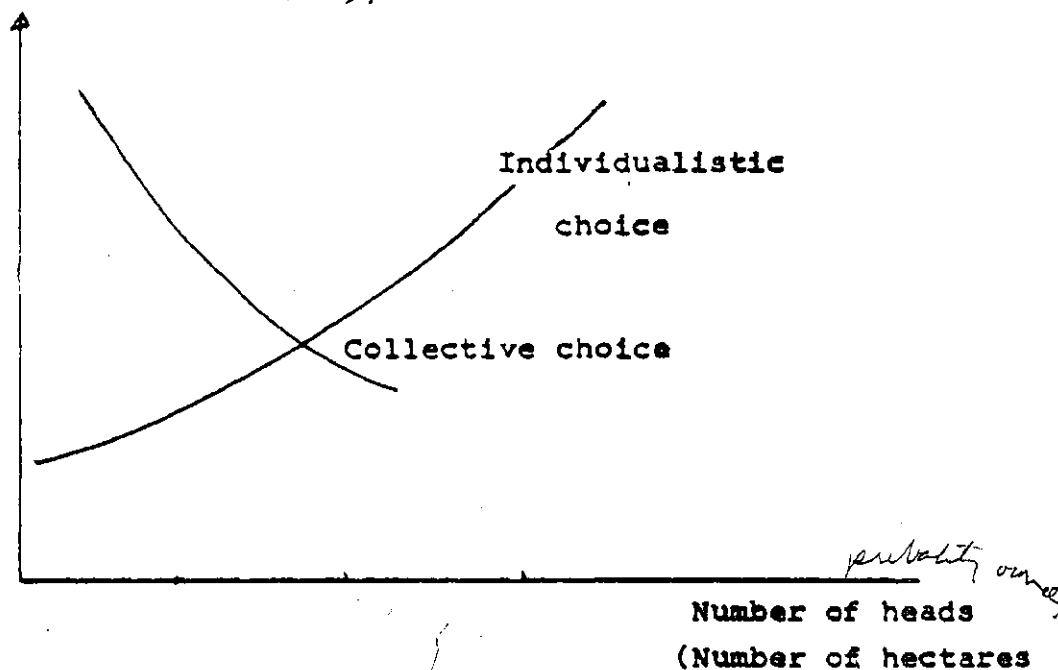


B. Decision making arrangements

The endogeneous decision making process, based on the organization of villages and factions was predominant within the first stage. The village head in charge of applying the decisions made within the faction committee (all the villages-heads belonging to a given faction) coordinated within the spatial territory grazing of the faction. Furthermore, external movements were also concerned by these decisions, and depended on weather conditions and contracts and practices developed with neighbors and non neighbors . These practices were described by several authors as identical for several tribes in Morocco before the colonization period (Beaudet 1969). The roads to be followed as well as the opening of the improved pasture (Aguedal) were decided yearly. The adjustments which had occurred within the second period had altered these decision making arrangements. The role of government through local authorities started to have more weight in the process, especially with the domanialization of forests and the reduction of external movements. Currently, such an interference is too important since it relates to the overall organization of the exploitation of the resource. The technical projects of pasture improvements and land restauration besides the political monitoring of the traditional groups are important dimensions of the alteration of the traditional process of choice* . If the endogeneous decision chain can be characterized as in favor of collective choice, the second and third stages are mainly characterized by the emergence and development of individualistic concerns especially when the opportunities

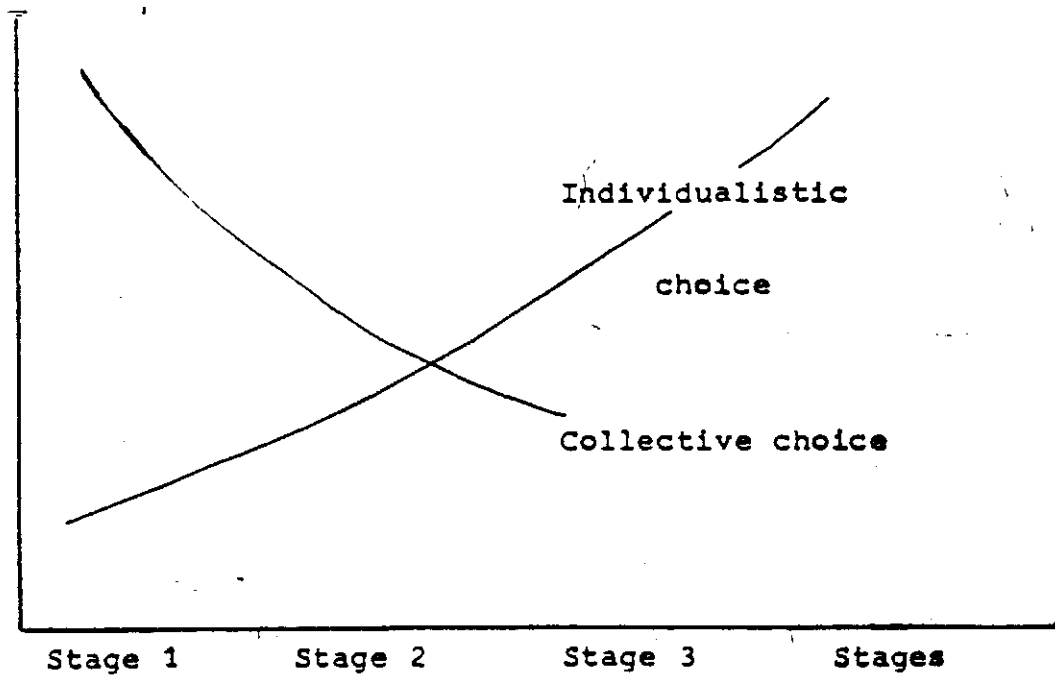
* Government's intervention concerns also financial and technical aspects where agriculture and livestock can benefit from regional and local credits at individual and cooperative levels see table (LAADNANI and BOUTOUBA -E.N.A - Juillet 1980).

external to the common land are concerned. These two last periods shown that the traditional group is heterogeneous and its individuals have divergent objectives. The number of heads exploited by each individual varies within a large scale and the land cropped follow the same trend. This heterogeneity had led individuals to act solely outside the group through contracting with foreigners and through land privatization and livestock expansion. For the adhesion of an individual and his participation to the collective choice, it can be seen that as the user's wealth increases (measured by number of heads and hectares cropped), his individualistic choice increases and favors



This is to say that directly or indirectly, some individuals are affected by others. When observing the number of heads, the less endowed in animals, can either contract with foreigners to increase his exploitation of the resource, or to increase the land cropped yearly with using intensively the forest. From this picture, the willing consent conditions underlying the management rules for the common resources are more operational than those of collective choice since specific interactions have appeared within the trajectory of such communities. Diversification of resources had also emerged as individualistic strategies followed

either for subsistence or for better pursuing the privatization of land and the expansion of number of heads of livestock. Furthermore, the decision process can be altered deeply towards few individuals having specific positions outside the common (Bureaucrats, influential group...) or inside the common. These alterations have given rise to some operational rules which are voluntarily accepted even though they are in contraction with the collective choice and not covering all the dimensions for communal management .



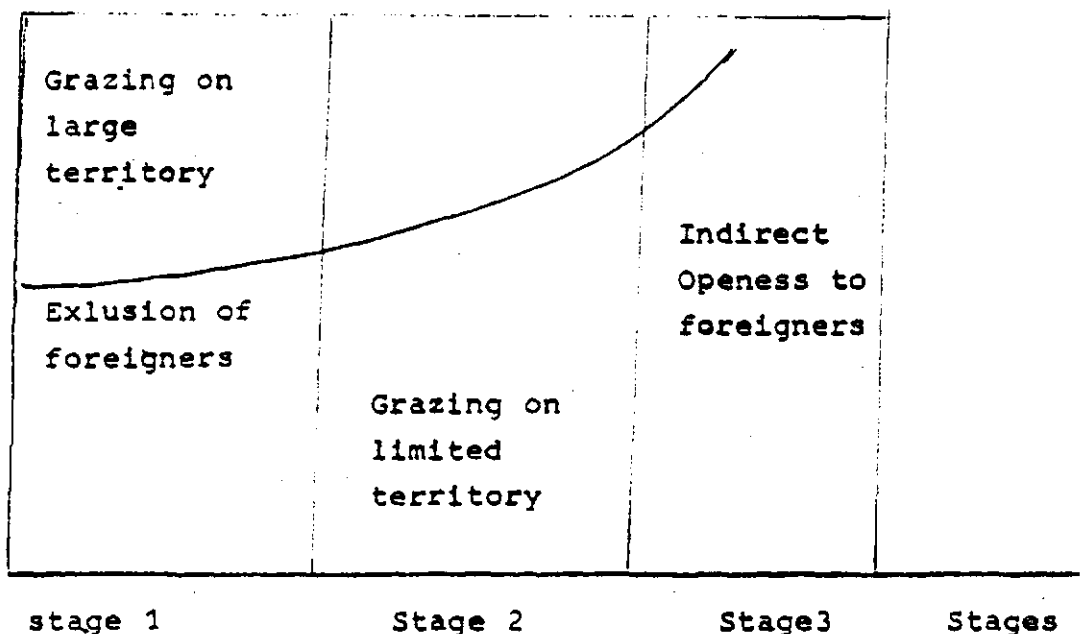
C- Operational rules

The partitioning rules defined as limiting the user's behavior in the interest of jointness are quasi-inexistent. There is no limitation on the common and no restrictions to the use of other resources existing within the area. At the boundary of such an inexistence, access to the forest is organised by law and enforced by the government. Except for this, when not possible agriculture, services and intensive livestock are possible. There are no rules applying to the relationship that can be built among individuals belonging to the communal groups and these environments. This diversifying strategy can also be observed on the composition of the herd sent to the common pasture (heterogeneity of species). It seems, therefore that jointness is mainly maintained as a solidarity act which has to be saved for hard climatic conditions and for grazing purposes. Otherwise it is an assurance devoted to the authority of the group which is respected as far as the individual uses the pasture as an opportunity among others. This means that there doesn't exist an overall management policy which would act for jointness and account for the diversifying strategy followed by the members. No partitioning is admitted by law, but accepted in practice, especially within the adjustment period .

Also , from the point of view of the common organization and later, on, the legislative perspective, the access is theoretically reserved to the group members. Outside this relationship, subtractibility applies. In practice, given the heterogeneity developed among members through time and concerning the

exercise of the right to graze their livestock, an indirect rule of entry is created through contracting with foreigners. This, potentially, creates a greater pressure on the resource .

This current situation might have differences with the two other stages. For the first one, and since there was no written law defining the pasture for each collectivity, the operational rules for maintaining jointness were mainly directed by the nature of the extensive economy and the relative absence of diversification. The entry was strictly limited to those belonging to the group which had the right to use the resource on large spatial basis. The amputation of land from this basis and the delimitation of a major part of the pastures, created new conditions to which users have adjusted through privatization and with the technical projects the communities in AIn Leuh seem to have a quasi-absence of operational rules . The comparison among the three stages can be presented in the following diagramm :



Given the technical and physical nature of the common grazing land, namely that animals are needed to realize a stream

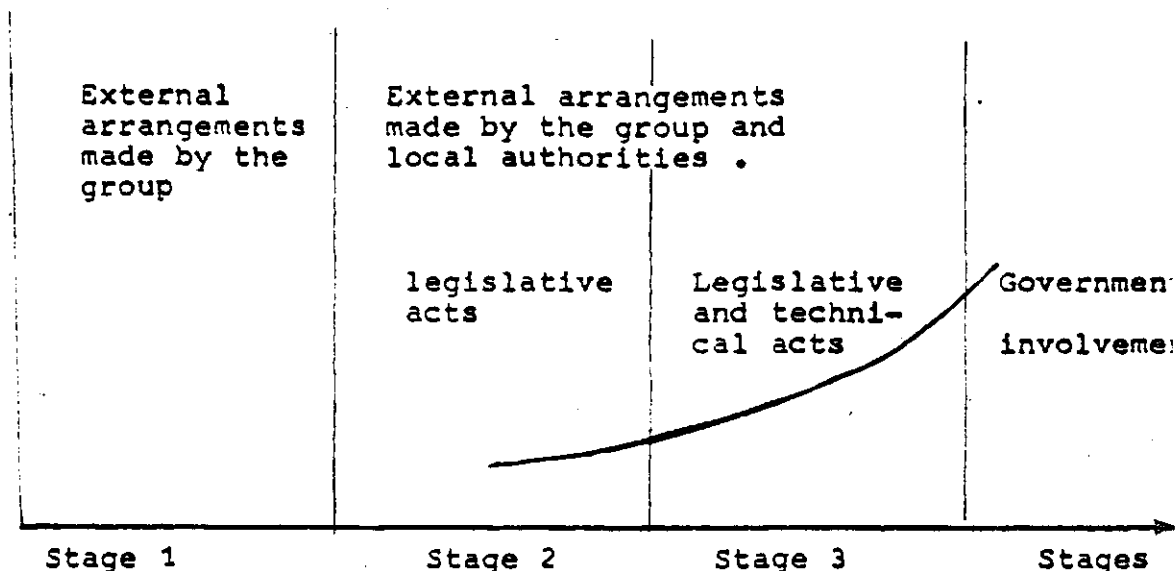
of benefits from owned and/or contracted livestock and because of the seemingly costly operations of rational management as viewed by the users, any limiting rules are hard to assess and implement. All the attempts initiated by technical authorities were a quasi-failure in the sense of reducing the density of animals on the pasture and regulating the entry .

D. External arrangements

External arrangements were mainly based on the traditional practices inherited from the settlement period and consisted of using other group's pastures at a given period of the year (external movements). Such practices were often renovated or canceled depending on the position of each group and the technical and physical characteristics of the pastures involved. These external arrangements were changed within the second period and conducted through the local authorities (gouvernement) which have taken a dynamic role in assessing through tutoring the communal group. This was indeed, a substitution of a given kind of external arrangements (external movements) by another kind of arrangements in which the gouvernement through the administration of collectivities plays an important role .

Such government involvement was related directly to the legislative structure introduced and developed for the common pastures. Since then, the communal group cannot act solely but in contact and coordination with the tutorial institution. Currently, the government's involvement benefits to the group in cases of emergencies in planning the group displacement for a given period of the year outside its territory and in arbitrating the communal

problems. Furthermore, the technical advice, even though, not perceived by the whole group, as beneficiary to the common for reasons of inadequation to the local characteristics of a given pasture, can be conceived as a way to induce an economic rationality on the common grazing land. It can be said at this level, that the nature of external arrangements within the second stages have evolved from a legislative act to a technical act .



E. Patterns of interaction

As presented above, it can be said that there exist tendencies which show the consequences of interaction among individual users: tendency to reduce the interdependence to a strict minimum, tendency to use the strategic interdependence as far as it benefits to an individual user and finally a tendency for not accounting for the social cost of an individualistic action.

Given these patterns of interactions, the government's intervention is not viewed in a homogeneous fashion by the group. It is desired by individuals as long as the strategic interdependence and as well as the individualistic actions* don't realize individualistic goals. At the contrary, it is rejected when one of the two other strategies can be followed. Technical actions on the pasture are viewed within this context, implying a rejection of innovation and reproducing the adjusted traditional technology of grazing through the use and storage of forage for example .

In a behavioral cost-benefit analysis, the first tendency can be better expressed as the attitude of using other benefits through the opportunities presented to individuals. This reduces the availability of the individual for the group. The second tendency is related to a saving of the grazing possibility within the group without a complete self-substraction from it. This attitude gives rise to the assurance presented by the group, which is reduced to its simplest expression when a large set of opportunities is investigated and used by an individual user. Any cost to the group resulting from such actions is not taken into account by a member. It's known (Zoughar 1982) that grazing is the cheapest way for feeding livestock, and the individual user is forced to exercise his right and to find out other opportunities outside the common pasture. Forage degradation, if any, is not accounted for by a user. He can increase the number of heads indefinitely without taking into account the social cost of his actions.

In a dynamic setting, the current stage is characterized as presenting inducements for individuals to act outside the group under the strategy of diversifying their stream of benefits. This was in fact the situation within the second stage too. The only difference is presented through the nature of obstacles which should be faced at each stage. For the earliest period, where grazing was the relatively unique activity, the group could be considered as behaving in a homogeneous manner and no specific pattern of interaction existed within this era. Reciprocity was the rule under which, decisions were made eventhough no operational rules existed. The group behaved as a unique individual to protect its grazing land and to extend its influence towards other groups.

F. OUTCOMES

The outcomes to be derived from the management dynamics of the common pastures in Ain Leuh can be described through the current situation of the communal entity. The common pastures represent a total area of 46.612 Hectares and the private land

represents 56.668 hectares. Domanial land is represented by 48.700 hectares used for forests and 9.78 hectares used for agrarian reform purposes. The privately owned land used for cultivation and private grazing is not homogeneous since only 32000 hectares are cultivated and divided into dry land (26100 hectares) and irrigated land (5900 hectares). On the cultivated land, cereals (Wheat, barley, maize) vegetables (potatoes), forages and currently fruits are produced. Given this diversity for affecting the privately owned land and given the heterogeneity of locations within the spatial territory of different tribes, the livestock measured by the number of heads and for each species depends also on the availability of collective land (Survey 1983, CT Ain Leuh).

	<u>SHEEP</u>	<u>BEEF</u>	<u>GOATS</u>
Ait Wahi	30887	1083	339
Ait Med ou Lzhcen	40920	302	1572
Ait Mouli	44611	2445	6599
Ait Meroual	47470	3703	6153
Ait Lias	26253	1864	4874
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	190151	9397	19537

The resources are used by a total population of 27966 persons (1983) or 5261 households, among them 70% are concerned by rural activities (agriculture, livestock and forests). Besides having the right for grazing their livestock, they own and operate 3.613 farms where 55% of them are organized on less than five hectares. In 1983, 43% of the privately owned and arable land was not cultivated given the drought .

On the collective grazing land, the project middle Atlas concerns the communal entity of Ai Lauh and proposes a technical as well as an reorganization of the common land. The final list of users is not yet defined given the settlement of foreigners established within the past periods. This problem should be resolved through the collective authorities, the ministry of interior and the ministry of agriculture. Otherwise the technical project plans to substract progressively common land from users and to ameliorate it with appropriate seeds after cultivation. The acceptance of livestock within the improved land could be rationed given objective criteria related .

To pasture capacity. Government support for such evolution in this region is intensively reviewed within agricultural, livestock and forestry programs and supported by government financial effort. This trend will push towards a better efficiency in using natural resources since the diversifying behavior adopted by the users of the pasture seems to be accepted by the technical and political authorities .

Besides the problem of foreigners settled before the independence (1956) and/or before the delimitation of the common pasture, it is quite certain that other conflicts on land exist as they are exhibited in other areas (El Hajeb) and oppose well persons to members of some factions. Planting seems to be the best sign of a well defined private ownership on land .

Given these changes and the government involvement for economic reasons, it seems obvious that when the weight of uncertainty is taken into account the resulting diversification is in favor of efficient allocations of land. The affectation of marginal lands to the pastures as the result of adjustments could be viewed as orienting towards an efficient path for all the group.

The historical reason mentioned previously and concerning the adaptation process of the group to grazing in this area could be considered as getting close to be realized and therefore related to the overall strategy followed by the members.

These arguments are in favor of the hypothesis of the existence of a lack of efficiency within the earliest stages of grazing and as far as this activity was the unique source of revenue .

1- An evaluative criterium of efficiency

Considering the group in the earliest stages as behaving in a homogeneous way regarding the quantity of animals put into pastures, a simple mean-variance model is used of testing efficiency. Let N be the number of heads put yearly into the common pasture, A a random shock which is perceived homogeneously by the group as having an expected value $E(A) = 1$ and a variance $\text{Var } A = B$ (This shock can be understood as rainfall or climatic conditions in general), and let C be a constant absolute risk aversion coefficient .

Then : The group is assumed to maximize :

$$EU(N) = E(N) - \frac{C}{2} \text{ Var } N$$

IF $N = f(L) \cdot A$ Where $f(L)$ is the production function where L refers to labor .

Then $E(N) = f(L)$

$$\text{Var } N = f^2(L) \cdot \text{Var } A = f^2(L) \cdot B$$

The maximization of such a function gives :

$$E(N)^* = \frac{1}{C \cdot B} = \frac{1}{C \cdot \text{Var } A}$$

To test this hypothesis, we can test the transformed model

$$\ln N^* = - \ln A + \ln D$$

Where $H = \ln D$ refers to a shock not accounted for it by the model. This is a linear regression where $Y = \ln N^*$ is the dependent variable, $\ln A = X$ is the independent variable and where $\ln C = F$ is the intercept .

2- The empirical analysis

Under these conditions, efficiency will be equivalent to $G = - 1$. This is to be realized on time series data from where X can be estimated as the logarithm of the variance. For the purposes of homogeneity in the units of measurements, simple indexes are built from the date. At this level two major are encountered : the non availability of data before 1921 and the incompleteness of the series .

This was avoided through the reduction of the series and the study of the period 1941-55 which is known to be inappropriate for such a test .

	<u>F.</u>	<u>G.</u>
Ait Meroual	0.1596	-0.0562**
Ait Ouhi	0.1300	-0.0402**
Ait Mhamed	0.0666	-0.0912**
Ait Mouli	0.1040	-0.0656**
Ait Lias	0.898	-0.0898**

The testing of /G/ seems to be significantly different from one and consequently, a lack of efficiency characterizes the management of the number of heads on the common pastures. In the sense of this model an inefficiency existed within this period 1941-1955 . There is no reason to say that efficiency was realized before 1941 .

(CONCLUSION

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The oakerson framework appears to be an appropriate model for the characterization of the common pastures in Ain leuh. An overall picture is drawn for each set of variables at each period of time accounting for the major transformations operated within this community. The concepts used, such as jointness substractibility and divisibility had to be adjusted to better account for the reality of each era. The idea of a specific resource to be isolated within appropriate boundaries had to be omitted, mainly given the intensity of interferences operated on different other resources. The strategy of diversification is therefore an important behavioral rule which accounts on grazing as an alternative among others. The common land defined mainly from the second stage was reduced and adjusted through government's legislative effort and individualistic interventions. It is considered within the diversification rule as a specific resource for which an individual member has a total right of use and an opportunity to rise collective issues related to the parental group (faction). Government intervention is a major exogeneous force contributing to the dynamics of these groups through legislative, technical land tutorial acts. It is an important dimension in the decision making process and could be an appropriate agent in establishing efficiency within this overall economy. The middle Atlas project seems to preserve the common pasture as belonging to factions and proposes technical actions for the improvement of grazing conditions. It is an integrated proposal which accounts for the other resources and therefore follows the path created by the groups (diversification) excepts for pastures improvements. Eventhough several problems have to be resolved such as practical definition of rights to use the common and grazing rules acceptance, a more efficient economy can be established. This statement is based on the partial test of efficiency produced for each tribe from 1941-1955 and which has shown an inefficiency on the common pastures.

These results shows two important features concerning the use of Oakerson model. In this case and for a better

Understanding of the management rules on the common pastures, it is necessary to account for the mixture of other resources on which faction members orient their strategies. This first feature imposes a boundary which is not based on the common pasture but in this case on a spatial territory which happens to be defined with Ait Abdi federation. This implies, the unnecessary closeness of such economy which is exposed to market forces and government intervention. Endogenous mechanisms are therefore dominated by these exogeneous actions which has shaped Ain Leuh pastures and therefore the mixture of resources to which they relate.

This is an attempt to describe the common pastures in a regional economy which could be refined through surveys to be realized for a specific faction and to be expanded on a large period of time .

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APPENDIX I : The model

Assumptions

- 1- The community accounts for risk through the perception of a shock (A) occurring with $E(A) = 1$ and $\text{Var } A = \beta$.
- 2- The community is assumed to have homogeneous preferences for the number of heads and behave as a single risk averse individual (risk averse community) with the parameter.
This group is assumed to optimise an expected social utility function $EU(N)$.
- 3- The number of heads is supposed to be a random variable such that $N = A \cdot f(L)$ where $f(L)$ presents the portion of increase in the number of heads to familial labor - we have then :

$$\begin{aligned} (\bar{N} &= f(L) \text{ and} \\ &) \\ (\text{Var } N &= \beta \cdot f^2(L) \end{aligned}$$

OPTIMIZATION

Under the risk aversion assumption, L^* is chosen such that $EU(N) = N - \frac{C}{2} \text{Var } N$ is maximised

$$\text{Therefore } \frac{dEU(N)}{dL} = f'_L - \beta C f'_L \cdot f(L) = 0$$

The trivial solution is $f'_L = 0$ or that the marginal productivity of labor is binding which consistent with the weight of uncertainty on the production process..
The second solution is given by $f^*(L) = \frac{1}{\beta \cdot C} = N^*$

This solution implies that when $f'_L \neq 0$, the optimum solution is given by $f^*(L) = \frac{1}{\beta \cdot C}$ and therefore

if $f(L)$ is monotonically increasing we have :

$$L^* = f^{-1} \left(\frac{1}{\beta \cdot C} \right)$$

In general among these solutions, the risk averse individual will choose $N^* = \frac{1}{B \cdot C}$, the solution accounting for the shock to the production process.

Variations in optimal expected number of heads

N^* is a decreasing function of both risk aversion coefficient and the variance of the shock.

$$\frac{\partial N^*}{\partial B} = - \frac{1}{C B^2} < 0 \text{ since } C > 0$$

$$\frac{\partial N^*}{\partial C} = - \frac{1}{B C^2} < 0 \text{ since } B > 0$$

Estimating equations

From $n^* = \frac{1}{B \cdot C}$ We have

$$\begin{aligned} \text{Log } N^* &= - \text{Log} (B \cdot C) \\ &= - \text{Log} B - \text{Log} C \end{aligned}$$

Using a time series data on N^* and X , we consider the model :

$$Y_t = F + G X_t + H_t \quad t = 1, 2, \dots, T$$

Where Y is the number of heads measured in log; X is the variance measured in log, and F, G are the coefficients and H_t is $\log A$, The hypothesis to be tested is $\hat{G} = -1$

$$\hat{G} = \frac{\sum_{t=0}^T (X_t - \bar{X})(Y_t - \bar{Y})}{\sum_{t=0}^T (X_t - \bar{X})^2}$$

$$\hat{F} = \bar{Y} - \hat{G} \bar{X}$$

Will give an estimation of C with :

$$\begin{aligned} - \text{Log } C &= \hat{F} & \hat{F} &= \text{Log} \frac{1}{C} \text{ and} \\ \hat{C} &= e^{-\hat{F}} \end{aligned}$$

Tableau 1 : Government financial support (G.F.S)
(Survey)

	Total investment (DH)	G.F.S(DH)	Number of individuals concerned
Machinery	15.110	7.755	1
Trees planting	-	-	36
Land management	83.854	38.562	04
Fertilizer and improved seeds	-	-	-
Machinery for cooperatives	301.876	83.279	21
Total	400.840	158.033	62

Tableau 2

Private investment from 1975 to 1979 (Total)
(Survey)

1975	292.250
1976	319.250
1977	374.170
1978	455.150
1979	729.450

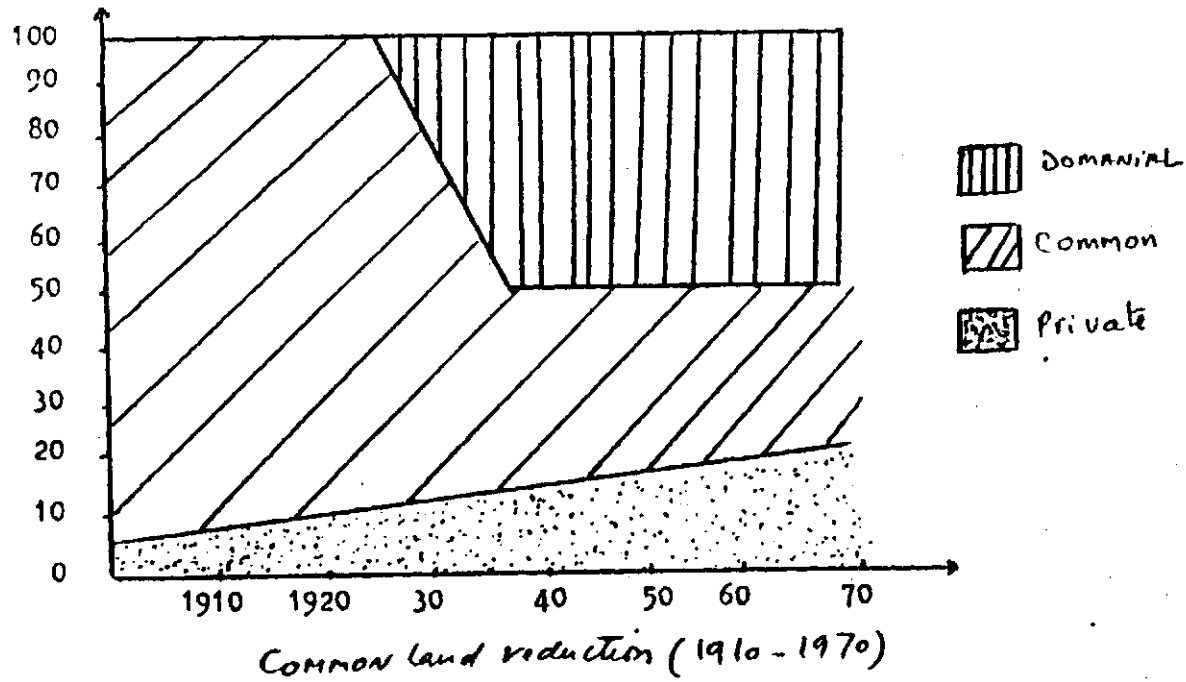


Tableau : 3**Type of private
Investments (Survey) .**

	1975	1976	1977	1978	1979	Totaux
Buildings	39.950	31.100	68.500	85.250	96.500	321.300
Sources of water	13.400	26.400	14.700	33.000	47.900	130.400
Land management	51.000	97.000	116.000	156.200	219.300	639.500
Land management	650	6.500	8.770	11.100	24.600	51.620
Livestock	68.750	87.050	83.400	146.900	141.650	507.750
Other animals	8.500	10.200	7.800	15.700	19.500	61.700
Machinery	110.000	60.000	70.000	19.000	171.000	430.000
	-	1.000	5.000	8.000	14.000	28.000
	292.250	319.250	374.170	455.150	729.450	2.170.270