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WESTERN HIGH ATLAS MOUNTAINS:
COMPLEMENTS, NOT IDEOLOGICAL OPPOSITES¹

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INTRODUCTION

In Morocco's Western High Atlas Mountains, Berber agropastoralists are oblivious to the ideological debate over land tenure occurring in the rangeland development community. Berber producers of sheep and goats use a continuum of tenure institutions, from private ownership, to communal control, to uncontrolled, open range. Far from being ideological opposites, these different types of land tenure are complementary tools. This complementarity contradicts the neat ideological lines drawn between pro- and anti-commons schools of thought in the range development community.

My purpose is twofold. First, I review briefly the current controversy over land tenure in the range development community. Then, arguing against a popularized paradigm that proposes that private tenure of scarce resources is necessarily more efficient than communal control, I present a case study of forage-land tenure in a High Atlas valley. Using examples of tenure in this valley, I argue retroductively in favour of a more comprehensive paradigm of rangeland tenure that considers both benefits and costs as factors of the appropriateness of private or communal tenure.

REVIEW OF LAND TENURE ARGUMENTS

Hardin (1968) in his essay, "The Tragedy of the Commons", reasoned that communal resources were subject to inevitable degradation. Using a pastoral analogy, he argued that a herder who abused his pasture by increasing his flock size beyond the pasture's capacity would gain all the benefit of his private decision in the form of the extra animals. But he would share the reduction in forage availability with all other herders on a communal pasture. Given this lack of incentives, no rational herder would restrain his herd size. Communal pastures, under Hardin's paradigm, are inevitably overgrazed and degraded if animal numbers have reached the productive capacity of the land, and can only be limited by uncoerced human decision.

Far from "exorcising" Adam Smith's spirit (as Hardin professed to do) his argument seemed to mirror Smith's 18th century argument against sharecropping (metayage). Under sharecropping, the producer had little incentive to invest in the land's productivity, because the landlord shared in, and therefore diluted, any profit from the investment. Under sharecropping, Smith reasoned, producers would invest little in the improvement of agriculture.

To paraphrase Hardin himself, Hardin did not assert that traditionally managed commons were invariably flawed. But, by his choice of the word "Commons" in a pastoral analogy, he has contributed to a tendency of thought that condemns all communal tenure. This tendency (or ideology) of agricultural development is eager to privatize communal rangelands, under the banner of "the tragedy

of the commons."

Gilles and Jamtgaard (1982) responded to this attack on communal institutions. They argued that under low productivity and spatial variability of rainfall, which are common characteristics of rangelands, extensive animal production was most efficient on large blocks of land. Large blocks of land could be managed either as private ranches (if most of the pastoralists depending on the range were excluded from it) or by maintaining communal ownership. Gilles and Jamtgaard chose to support the second more equitable option. They then discussed cases of communal pastures (in the Andes, the Alps and in Africa) where communal tenure did not inevitably lead to range degradation or where degradation was preceded by a weakening of traditional, communal management.

Artz (1986) clarified the debate over the commons by distinguishing between free and open, or uncontrolled range and true commons. He argued that under free and open range, with no social mechanisms of range control, Hardin's model applied: herders had no incentives to restrain herd size and the range would become degraded. State control of pastures, ineffectual in many developing countries, was essentially the same as free and open use, and led to the same result of range degradation. Under true communal tenure, however, management as well as use was communal, and decisions could be enforced to prevent range degradation.

Behnke (1985) further clarified the debate by applying property rights theory to understanding ownership of rangelands. He considered both the value of the land's product and the cost of policing it from trespassers as factors that determined the optimum level of tenure. The model he advocated predicted that more valuable land would be held in more concentrated forms of tenure (i.e. toward the private end of the tenure continuum) while less valuable land, not justifying the investment needed for policing, would be held in more diffuse forms of tenure. This is not a trivial observation for rangelands, which, because of their low potential for improvement, often cannot profitably absorb investments, regardless of the type of tenure under which they are held.

TENURE OF FORAGE LANDS IN THE IMENANE VALLEY

In this section, I argue in support of Behnke's model of the tenure of forage-producing lands. You, the development planner, I say, should follow Behnke's rather than Hardin's model of pastoral development. You should, in the interests of developing countries and pastoral producers, use your influence to allow privatization of forage land when its potential value, in spite of policing costs, is high enough to encourage producers to invest in the land's productivity. At the same time, you should encourage communal tenure to continue where poor land cannot profitably absorb investment and where larger user groups can more efficiently bear the costs of policing relative to the

benefits of production.

As evidence for my argument, I present a case study of land tenure institutions in a high mountain valley in the Western High Atlas where Berbers practice sedentary, irrigated agriculture and transhumant production of sheep and goats.³ The type of production on forage-producing lands varies from irrigated, seeded perennial pastures and hay meadows, to relatively unproductive, dryland ranges. More specific (i.e. private) forms of tenure are associated with the smaller, more intensively managed fields, while more diffuse (i.e. communal) forms govern the larger, more extensive pastures and ranges (Table 1).

Tenure and Levels of Investment

Land tenure in the Imenane varies from private to village-communal to multi-village-communal, to tribal-communal, to essentially free and open range. At the most specific level, families privately own small terraced meadows. One village communally owns a large irrigated pasture. One group of 3 villages communally owns another, equally large irrigated pasture, while a second group of 3 villages communally controls a dry mountain range. Certain villages of the historic Rherheya tribal confederation communally control a large watershed (Oukaimeden) that is legally owned by the State. Finally at the most diffuse level of tenure is the greater part of the Imenane watershed. It is owned by the State and used exclusively by the tribesmen of the Imenane, but it is essentially uncontrolled. This last category nearly fits Artz's definition of free and open range.

The level of investment practiced on forage-producing lands also varies. Most of the unimproved mountain range is merely policed very casually to prevent outsiders from entering, but rights holders can graze their flocks at any time of year, weather permitting. The tribal commons and the multi-village, communal-mountain range are policed both to restrict access to rights holders, and to limit season of use. This extra restriction requires a higher investment in policing. The multi-village and the one-village communal meadows are policed to restrict access to

³ To simplify discussion, I describe only forage-producing lands used by local Berbers within the Imenane Valley. Winter ranges 50 km away on the Haouz Plains (Mendes & Narjisse) are not described because they are not directly controlled by Imenane Berbers, who therefore cannot easily change the tenure institutions governing these lands. Also, in order to simplify the discussion of the marginal utility of forage used at different seasons and for different purposes, I describe only forage-producing lands exploited by small ruminants and ignore those used almost exclusively by cattle.

rights holders and to limit season of use; the communal entities also pay for irrigation. Only the privately owned meadows and pastures receive the investment of periodic revegetation. Like the communal pastures,

Table 1. Land tenure and types of production on land exploited by small ruminants in the upper Imenane Valley.

Land tenure institutions	Type of production	Orders of size
private	irrig crop terraces, meadows and pastures	m ² x 100
village commons	irrigated slope pasture	hectares
multi-village commons	irrigated slope pasture	hectares
	nearby mountain range	km ²
tribal commons	high altitude mountain range	km ²
tribal open range	other near and far mountain ranges	km ² x 10

they are also protected from improper season of use and irrigated. Table 2 illustrates the activities invested in lands held under successively more concentrated levels of tenure.

Table 2 suggests an association between more specific levels of ownership and higher levels of investment. The problem for us is: which is cause and which is effect? With no other information given, supporters of Hardin's model might argue that producers invest more in irrigated terraces precisely because the land is privately owned. They might argue that if all land in the valley were privately owned, it could all receive

Table 2. Land tenure and levels of investment in land exploited by small ruminants in the upper Imenane Valley.

Land Tenure institution	Levels of Investment			
		policing only		labour & cash inputs
private	users defined and policed	season of use policed	irrigation	periodic revegetation
village commons	users defined and policed	season of use policed	irrigation	
multi-village commons	users defined and policed	season of use policed	irrigation	
multi-village commons	users defined and policed	season of use policed		
tribal commons	users defined and policed	season of use policed		
tribal open range	users defined but little policing			

more investment and be more productive.

To support Behnke's model, that producers change land tenure to match the land's ability to profitably absorb investment, I must describe other qualities of the fields and rangelands in question. If these qualities can also explain the land's potential as a profitable investment, then we will have an alternative, retroductive argument to privatizing all land. To do this, I will follow Behnke's model and compare the benefits and costs of owning different types of forage-producing land in the Imenane.

Benefits and Costs of Land Ownership

According to Behnke's model, producers can invest in the private control of a piece of land only when the benefits of ownership are greater than the costs of protecting or policing ownership. Benefits of land ownership are due to the productive potential of the land itself (due to its soil, water availability and climate) and to the marginal value of forage harvested from the land at different seasons for different production purposes.

Tenure and land productivity potential. Mountain soils vary in their productivity, from fine-textured alluvium in the valley bottoms to stony, coarse-textured colluvium on steep mountain slopes. Because precipitation is low, irrigation is needed for cultivation, but low stream flow and the

expense of raising water over steep terrain restricts irrigation to the valley bottoms and lower slopes. In some high altitude rangelands, where peat soils and abundant water might allow cultivation, a short growing season and severe winters limit the value of the land for cultivated crops.

Table 3 shows the levels of tenure and the productive potential (subjectively rated) of the different forage producing lands in the Imenane.

Generally, land with physical properties that we would expect to result in a high productive potential are held under more specific forms of land tenure. I suggest that over time producers have privatized the more productive lands, leaving less productive lands under communal or no control. This suggestion is consistent with Miller's recounting (1984) of the oral history of a neighbouring valley. The process of privatization is apparently continuing: the communal owners of the irrigated village commons shown in Table 3 were debating in 1985 whether to parcelize and privatize the pasture (Mohamed Mahdi, personal communication, 1985).

Two anomalies to the general relationship of increasing specificity of tenure with increasing productive potential appear on Table 3. First, the multi-village range is held communally in spite of its poor productive potential. Second, the tribal commons is held communally rather than privately in spite of its relatively good potential. I will

Table 3. Land tenure and productivity potential (subjectively rated) of land exploited by small ruminants in the upper Imenane Valley.

Land tenure institutions	Type of production	Productivity Potential	Reasons
private	irrigated meadows and pastures	highest	level fields; alluvial soils; irrigation water
village commons	irrigated slope pasture	high	fine-textured soil; irrigation water
multi-village commons	irrigated slope pasture	high	fine-textured soil; irrigation water
multi-village commons	nearby mountain range	poor	coarse soils; warm (South-facing)

tribal commons	high altitude mountain range	good	some organic soils and natural irrigation; cold
tribal open range	other near and far mountain ranges	generally poor	coarse soils; cold (North-facing)

use

the former case to illustrate the importance of the marginal value of forage to land value and return to the latter anomaly in the discussion of policing costs.

Tenure and the marginal value of forage. The multi-village communal range in question seems indistinguishable from the rest of the watershed's uncontrolled rangeland. However, forage produced on it has a higher marginal value to flock owners because the forage is available in winter. The range is directly adjacent to the three villages that manage it and has a southern exposure. Because of the southern exposure, it is warm and snow-free in winter when the opposite side of the valley is cold and snowbound. Because winter is the limiting season for livestock production in the Atlas, and most flock mortality occurs at this time forage that is available in winter has a higher marginal value than forage available only in summer. As a result, villagers find it profitable to invest the effort in controlling this relatively unproductive range in a communal management scheme.

In general, forage-producing land in the Imenane is owned at more concentrated levels of tenure as the marginal value of its forage crop increases. Thus, the private, terraced fields are used to produce hay for emergency winter feed, in case the flock becomes snowbound. These fields also produce winter grazing to supplement the lactating flock in order to reduce lamb and kid mortality. These winter forages have a very high marginal utility. The two other village-level communal pastures provide forage of less marginal value, for mid-summer use, when men are busy with the barley harvest and not available to shepherd the flocks to distant pastures. Otherwise, in spring and summer, forage is less limiting in the mountains and therefore has a lower marginal value. Villagers do not seem to find it worthwhile to invest effort into controlling spring and summer pastures.

However, the high-altitude tribal commons appears to be an anomaly, both because of its relatively good production potential (Table 3) and because of the high marginal value that its forage could have if it were stored and used in winter. It is now used as a late-summer-fall breeding range.

(Mendes & Narjisse). Granted, cold climate limits its value as cropland and deep snow usually prevents winter grazing. But the common's subirrigated peat-soiled meadows are much more productive than the more usual, dryland mountain ranges. Why is this tribal commons not sub-divided and privatized, so that private owners could harvest and carry privately owned hay to their villages for use in winter, when its marginal value would be higher?

And, for that matter, why is the multi-village range, producing winter forage of high marginal value, not subdivided and privatized? Each family that now uses it could then exploit its own small range with assurance of forage supply. The objection of Gilles and Jamtgaard (1982) that spatially variable precipitation makes small areas of range risky sources of forage, does not apply here. Precipitation in the Atlas comes mostly in frontal, rather than convectional, storms. Rainfall is therefore widespread rather than localized. Forage productivity is low, but more or less even within a vegetation community, so that the range could theoretically be subdivided among its current communal users, with each flock owner continuing to receive the same relative amount of forage.

But this argument for privatization ignores the cost of policing land as a disincentive to ownership.

Tenure and policing costs. "To be thus is nothing," Macbeth tells us, "but to be safely thus." Privately owned land is worthless if owners cannot protect its product for their sole use. Worthlessness is not an absolute but a relative value: as the cost of defending property rights increases, the benefits of ownership must also rise, or the investment in ownership will be unprofitable, and no rational producer will invest. The cost of policing is determined by the land's remoteness, its size and the type of barrier that protects it. I discuss here four ways, in order of decreasing cost, of protecting productive lands in the Imenane from trespassers. Small fields can be fenced. Nearby rangelands - too large to fence - can be observed and intruders on it challenged. Less easily seen rangelands can be protected by severe threats of intertribal warfare or by religious or legal sanctions. Finally, very remote ranges can be protected by natural boundaries. Several of these protective measures might police use of a particular piece of land.

Privately owned, irrigated fields are usually protected from flock rights - of way by stone walls topped with natural briar fences. In winter, when flocks graze inside the fenced irrigated perimeter, each family devotes several shepherds to ensure that its flock does not stray into fields owned by other families. Private owners can afford these labour-intensive activities only when the protected property is small and relatively

valuable.

The larger, irrigated pastures and the multi-village communal range are not fenced, but their boundaries are clearly marked, and pastures are mostly within sight of the villages in which the owners live. Trespassers can be easily seen, challenged and punished. In policing, communal rather than private ownership has the advantage of many eyes, because everyone in the group has an interest in challenging intruders.

The far borders of the multi-village communal range, which are several kilometres distant, are not policed easily by sight, but high mountains and wide stretches of very poor pastures create natural boundaries. The cost-effectiveness of these natural boundaries is illustrated by the lack of communal ranges in the downstream villages of the Imenane. Producers in these villages claim to envy the winter-forage supply provided by the multi-village communal range, but they explain that such a protected commons would be impossible to defend in mid-valley. There, natural borders are lower, and intruders could enter from all sides.

The high-altitude tribal commons is located in a neighbouring watershed, out of sight, and on the frontier of a neighbouring powerful tribe. Policing exclusive rights to it would have entailed the high cost of intertribal war; but the two neighbouring tribes wisely compromised and share its use. As long as the risk of intertribal conflict remains, any individual tribesman's use rights are more easily defended by the united tribe, acting communally, than by the user acting privately. Communal rights here are also defended by religious and legal sanctions, though the effectiveness of the legal sanctions, at least, depend on observing the land and catching intruders. Here again, communal groups, with their many interested eyes, have the advantage over private owners in policing.

Finally, the tribal open range - the greatest part of the area of the Imenane watershed - is protected only by natural borders. While these are forbidding and effective along the upper watershed divides, generally they are ineffective as obstacles to flocks. Producers invest little effort, communally or privately, in trying to exclusively hold this hard-to-defend range. Shepherds (in the same tribe) from different valleys have the right to graze these ranges; it would be hard to prevent them from doing so even if they had no rights. Such is the case with shepherds from other tribes who occasionally graze into Rherheya territory where they have no rights.

In the Imenane Valley, a continuum of land tenure institutions - from private, to communal, to open range - governs land exploited by small ruminants. The land itself varies widely in productive potential, in the marginal value of forage harvested from it and in the ease with which it

can be protected from trespassers.

We saw that users invested more into land held under more specific tenure. Doubting that land tenure was solely the cause, and level of investment solely the effect, we looked at alternate explanations for differences in tenure. We found that in the upper Imenane, more specific tenure is associated with higher productive potential of the land, with higher marginal value of forage and with lower costs of protecting ownership. I reasoned that, while private tenure has the advantage of security of investment in small, highly productive fields, communal tenure has advantages for policing large, less productive ranges.

It would be absurd to argue that ecological and economic factors are the only determinants of land tenure in the Imenane, in the Western High Atlas or elsewhere. Legal and traditional precedent and the positive feedback to incentives for investment in private land theorized by Adam Smith two centuries ago obviously play roles in the way land is held and developed. But it is equally misleading to ignore the ecological and economic constraints to investing in extensive rangelands.

DISCUSSION

Policy makers use paradigms to make sense of myriads of details in order to act purposefully. But, to be simple enough to be understood, models must be gross simplifications: imperfect descriptions of the "real world". Nevertheless planners choose to use that paradigm which helps them to act coherently, replacing it when a more useful one is found.

Hardin's model of the "tragedy of the commons" has performed a service for range development policy, explaining the inefficiencies of diffuse ownership of those resources that can profitably absorb investment. But most rangeland in the world serves as range precisely because of its low potential productivity. Such land cannot be profitably improved regardless of the tenure by which it is held.

The more comprehensive alternative, which I advocate, is Behnke's paradigm, which considers both the benefits and the costs of land ownership. Using Behnke's model, we will encourage investment by privatization, when it is ecologically and economically feasible. At the same time we will encourage less intensive ecological manipulation through control over season of use and by restricting access to marginal rangelands when privatization is not feasible. Finally, we must bring under State control, or ignore, those ranges that are subject to degradation but are too remote or unproductive to justify private or communal control.

Specifically, in the Imenane, I believe that a current Eaux et Forêts

(Forest Service) policy governing use of State lands could be adapted to fit new techniques in agroforestry. Currently, farmers can secure long-term usufruct of State land ("Forest-land") for dryland cultivation of wheat or barley. Usufruct is guaranteed by the State Forester if the user cultivates the field every year.

However, in the poor soils of the upper Imenane, these dryland cereal fields are often unproductive. During my two-year visit, many hillslope fields were abandoned because of low rainfall. Farmers may find it more economical to produce fodder shrubs or trees on these lands with new agroforestry techniques. Fodder shrubs protrude above the snow except after the most severe storms, and could provide critical winter forage to chronically starved sheep and goats.

I suggest, therefore, that the State grant long-term usufruct of "Forest lands" on the perimeter of villages to local farmers. Families should be given rights to blocks of land small enough to be planted within an autumn (the correct transplanting season for nursery stock in this cold, winter-precipitation region). Long-term usufruct could be guaranteed to families that maintained a certain density of live plantings on the land. I believe that Eaux et Forêts would be acting consistently with its mandate to protect the mountain watershed if it allowed families to control as many blocks of land as they could plant and maintain, year after year. And, I believe that farmers would find it economical to transplant small nearby patches of forage shrubs in order to have one more source of winter forage for their flocks.

Private usufruct of improved ranges is not, however, a reasonable option for most of the watershed. Nursery stock, which must be transported into the valley by Eaux et Forêts, or grown by farmers themselves, will be expensive in farmers' labour, even if its cash price is subsidized by the State. The newly transplanted stock must be irrigated by hand in late autumn until the first heavy rains come. Plantings, even on land within sight of the village, will progress slowly.

For those lands within sight of the village that have southern exposures but which are not yet claimed for private usufruct I suggest communal village control. Village councils could be given the same kind of usufruct rights over these lands as private farmers receive for dryland cultivation on Forestlands. This seems to be similar to a former traditional system of range control. Currently, with no control on their use, these ranges are overgrazed early in spring. With a legally enforceable guarantee that no flock would exploit these village commons out of turn, village councils could set them aside as deferred winter ranges.

For ranges that lie between two or three villages and that would be difficult for one village alone to police, I recommend a multi-village commons. Families in every member village would have an incentive to respect, and coerce others to respect, the opening and closing dates of grazing.

Finally, much marginal land in the Imenane is far from sight and accessible to flocks only on long summer days when forage is not limiting. Eaux et Forêts cannot expect farmers, either individually or communally, to invest scarce labour into policing access to these lands. Because the State also lacks the resources to effectively police these lands, it has no realistic option but to leave them uncontrolled and free and open range. I believe (or hope) that distance and difficulty of access will protect these Alpine ecosystems until the State has the administrative resources to defend them from overgrazing.

Acknowledgements

The insights I present in this report come from observations of the site, from conversations with local Berbers and from exchanges of ideas with my colleagues, Mohamed Mahdi and Jere Gilles. I have referenced their ideas whenever I have remembered the sources. No doubt, many other unreferenced ideas were formed from our interdisciplinary conversations, though I am solely responsible for the conclusions that I draw here.

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