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drylands

*sustainable use of rangelands
into the twenty-first century*

Edited by Victor R. Squires and Ahmed E. Sidahmed

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Preface

Dryland areas are a major focus of attention for the International Fund for Agricultural Development. Such areas occupy about one half of the land surface of the earth. It is often thought that drylands and semi-arid zones are wastelands of little use. But for the inhabitants of these zones, even of deserts, this has never been true. Historically, deserts and drylands have provided livelihood to large numbers of human beings and continue to do so. Unfortunately, because of inappropriate policies, these vulnerable zones have been subject to progressive – in some cases what was thought irreversible – deterioration.

These issues are of considerable significance for the Kingdom of Saudi Arabia. Commercialization of livestock production and the transport of livestock and water, together with the erosion of communal systems of managing pasture and rangelands have had serious consequences for dryland areas. Nomads, as well as policy makers, face serious constraints in addressing these problems in spite of advances in technology for monitoring and predicting changes in vegetation and precipitation patterns.

The Meteorology and Environmental Protection Administration (MEPA) and the Ministry of Agriculture and Water (MAW) of the Kingdom, in collaboration with IFAD, organized a four-day workshop in Jeddah, 3 to 6 November 1996 on sustainable use of rangelands and desertification control. The workshop was attended by senior government representatives from the countries of the region as well as over 140 experts from universities and other institutions in Australia, Europe, the Near East and North Africa, and the United States.

The workshop was held under the high patronage of His Royal Highness Prince Sultan bin Abdulaziz. It was inaugurated by His Royal Highness Prince Magid bin Abdulaziz bin Al-Saud, the President of the Saudi Meteorology and Environmental Protection Administration and keynote speeches were made by the President of the Islamic Development Bank and by myself.

The workshop reviewed in depth the capacity and potential of satellite imagery, remote sensing and related technologies advances for monitoring trends and changes in rangelands, livestock and movements of human population. The discussion examined how such advances in technology could provide management early warning tools responsive to the needs of the pastoralists while respecting their cultural traditions and values.

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Rangeland degradation and socio-economic changes among the Bedu of Jordan: results of the 1995 IFAD Survey

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Synopsis

The paper describes the pastoral system of the Bedu of Jordan as it existed in 1995, and summarizes the reasons for the changes that have occurred over recent years. The likely course of future development is outlined.

Key points

- 1. The classic literature on the Bedu in Jordan and neighbouring countries has shown regular patterns of transhumance, following traditional routes and associated with particular tribal and sub-tribal groupings. This situation has been shown as if it still existed in quite recent reports. However, in reality, it has all but broken down in favour of a more opportunistic system using trucks and telecommunications to exploit remote pastures.*
- 2. The main reasons for the changes in the Bedu behaviour can be summarized as follows:*
 - Availability of trucks to move animals and water;*
 - Telecommunications to assess the availability of pasture;*
 - Closing of the national frontiers to the pastoralist movement;*
 - Breakdown of traditional authority systems; and*
 - A relatively liberal political climate.*

1. INTRODUCTION: THE HASHEMITE KINGDOM OF JORDAN

The Hashemite Kingdom of Jordan has a land area of some 90 000 km² and a human population of nearly 4 million. Situated between 29° and 33°N and between 35° and 40°E, it is bordered by Syria in the north, Iraq in the east, Saudi Arabia in the south and east, and Israel and the West Bank in the west. Map 30.1 shows a general political map of the Hashemite Kingdom of Jordan.

Jordan has long been heavily dependent on the service sector, both internally (tourism, transport, trade) and externally (via a highly educated expatriate population sending money back). This pattern underwent a dramatic change after the Gulf War, following the return of large numbers of expatriate workers and the consequent boom in housing and expansion of the urban population.

Of the entire land area of Jordan, only 5% is estimated to be arable. The agricultural sector contributes some 7% of the gross domestic product (GDP) and has a substantial export element. However, Jordan also has a policy of subsidies on basic foodstuffs, flour, sugar and rice and until recently, on animal feed, notably barley and wheat bran. Public expenditure in the agricultural sector has generally been declining and levels in the rangeland areas are very low indeed. There have been a number of projects initiated for the rangelands but none are presently very active.

Map 30.1

Map of the Hashemite Kingdom of Jordan, showing the location of the IFAD Rangeland Rehabilitation Project



2. BACKGROUND TO THE RANGELANDS

2.1 Extent of the rangelands

The land area of Jordan's rangelands depends largely on the definition adopted. An inclusive definition joins together much of the desert proper, the steppe region and the highlands, regarding the spaces between cropped land as 'range'. In this case, some 97% of the land area of Jordan can be considered 'rangeland'. Alternatively, only the regions unsuitable for rainfed cropping, with rainfall below 200 mm annually, are defined as range which gives a figure nearer 80% of the total land area.

The decade since 1985 has seen an acceleration of all types of agriculture, gradually eating into the area of the rangeland. The practice of "pseudo-cropping", especially along the Syrian border, has effectively excluded both natural forage and livestock from significant areas of former rangeland and it is natural to regard these areas as extensions of the cropped area of the steppe. Similarly, in the Jordan valley, intensive cultivation has caused the disappearance of all but the smallest strips of natural forage, and livestock production now depends on feeds and vegetable residues. This process cannot be reversed and this former rangeland can be regarded as permanently eliminated.

The rangeland which is still available for producers, and for which it is possible to reverse the process of degradation, is the region known in Jordan as the badia. Nearly all of this region has rainfall under 200 mm, and the great majority is under 50 mm. Although crossed by some major roads for long-distance trade, the vast majority of the badia has virtually no infrastructure and no development at all. The land is technically government land and permission to put up permanent structures is rarely granted.

2.2 Physical and biological resources

The original description of the bioclimates of Jordan goes back to Long (1957). Shehadeh (1985) has compiled a more up-to-date description of the climate of Jordan.

2.2.1 Rainfall

The rainfall and associated parameters have been described in some detail in Shehadeh (1985) and IFAD (1993). Almost all of the badia falls within the 100-200 mm isohyets. There are few stations in much of the east and south east, otherwise it is likely that these regions would fall below 50 mm annually.

Analysis of the actual rainfall data from 1970-71 to 1993-4, within the rangelands, suggests that there has been no significant overall change in the

trend of rainfall in the last quarter-century (Blench, 1995). However, the contrary is widely believed and is also used to explain the poor state of pasture in the rangelands.

2.2.2 Geomorphology

The broad categories into which the badia is divided are highland, steppe and desert. The highlands with high rainfall and high population densities are only marginally covered by the survey, as some livestock producers who exploit the badia live in this region. The steppe is represented by a narrow band, perhaps only 20 km wide, between the highlands and the desert proper.

The harra, black basalt plains that cover a great proportion of the northern badia, remain a difficult environment to exploit for subsistence. The sometimes large, evenly scattered stones, make the movement of humans and ruminants difficult, and a track has to be cleared for a vehicle to pass. Nonetheless, such clearways have been made and herds can be moved in to graze the annual grasses that penetrate the stone cover. Where the stones are large, herds are small and goats are preferred to sheep because of their sure footing.

2.2.3 Flora

The main floral regions of Jordan have been classified into some thirteen types (Eisawi, 1985). However, many of these occur only in the highland areas. The rangelands and their western edge can effectively be divided into seven categories. These are as follows:

- (i) Juniperous forest;
- (ii) Mediterranean non forest;
- (iii) Steppe;
- (iv) Hammada. This subdivides into three distinct categories:
Runoff hammada - Wadis and pools,
Pebble hammada - the plain is covered with pebbles or stones, usually of black basalt, and
Sand hammada - sandy plains with scattered plants;
- (v) Sand dunes. Confined to Wadi Araba and Wadi Rum. It consists almost entirely of shrubs and bushes which act to fix the sand dunes;
- (vi) Hydrophytic vegetation. This occurs principally around Azraq Oasis; and
- (vii) Mudflats. The mudflats or qa'a are virtually lifeless plains of cracked mud scattered throughout the badia. The largest one is due east of Al-Jafr in the southeast.

Vegetation zones are a major determinant of livestock distribution. In particular, the pattern in the rangelands has eliminated cattle, a major pastoral species in other parts of the world. The hammada deserts, where annuals dominate, favour sheep and the wadis and dune vegetation are where goats predominate.

2.2.4 Fauna

The Jordanian rangelands used to be quite rich in both small and large mammals and reptiles. These are described in Mountfort (1965), and to a lesser extent in Hatough, Eisawi and Disi (1986). Although small mammals such as rodents survive, and indeed flourish in the reserved areas, large mammals have undergone a significant decline due to hunting and habitat destruction.

2.3 Land use in the rangelands

2.3.1 Pastoralism

The single most significant economic use of the rangelands is pastoralism. The most important animal herded is sheep, although goats are more numerous further south. This represents a major change from camel production, which was predominant until the 1940s. Camels are still kept in certain areas, but their numbers are much reduced. This change has almost certainly affected the vegetation patterns, since the large thornbushes that camels graze cannot be eaten by sheep and goats. The controlled system of land use in the rangelands, the hema system, persisted until the early twentieth century in some form, but grazing is now virtually uncontrolled.

2.3.2 Agriculture

One of the most visible uses of the Jordanian rangelands is for agriculture. Given the extremely low rainfall, this area is not usually regarded as suitable for agriculture. Despite this, cropping is common all along the western edge of the rangelands. The most common pattern is rainfed winter barley and the ploughing of undisturbed rangeland is usually associated with this pattern. Yields are so poor that it is difficult to demonstrate that such production is economic and its function may be as much to bolster land claims as to provide cereals. IFAD (1993) refers to this practice as "pseudo-cropping".

Irrigated cultivation is usually based on drip-fed systems, using large rubber hoses with smaller feeder hoses and drawing water from artesian sources. This is most apparent in the region between the Mafrq to As-Safawi road and the Syrian border. The artesian wells, as most in the northern border region, depend on the watershed with its source in the Jebel Druze. The watershed continues as

far as Saudi Arabia, where, however, the water is saline. Extremely high rates of extraction are increasing the salinity gradient in Jordan and it is likely that within a few years much of the water from these wells will be unsuitable for agriculture.

2.3.3 Hunting

Hunting with both dogs and falcons has long been part of the culture of the Bedu pastoral nomads. Large numbers of wild animals probably survived until vehicles became common. A combination of modern rifles and fast transport reduced mammal populations to remnants, mostly around the edges of reserves. Hunting has not been eliminated, as the numbers of salugi dogs attest.

2.4 Sources of degradation in the rangelands

This section enumerates all the sources of degradation of the rangelands, cited by livestock producers or noted during the survey. These are assigned very different degrees of importance by producers, whose views reflect their own concept of responsibility for resource management.

2.4.1 Grazing and overgrazing

The level of grazing is determined as much by the accessibility of the area as the actual plant cover. For example, the harra areas of the northern badia are covered in large stones that are extremely difficult for both animals and vehicles. As a result, patches of harra remain almost ungrazed because the costs of reaching them are too high. Similarly, in the southern wadis, some are so remote and windswept that pastoralists avoid them. The vegetation in these wadis is visibly in better condition than elsewhere.

2.4.2 Plastic waste

The use of synthetics for all types of industrial and commercial purposes has increased considerably in Jordan in the decade since the mid-1980s. No public ethos of recycling, or even litter prevention, exists in many parts of the country. Hence, many agricultural areas and adjacent rangelands are covered in plastic waste. Apart from plastic bags, the black plastic laid in strips to reduce evapotranspiration in fields under drip irrigation is left to blow into the rangelands once the harvest is collected.

Apart from the aesthetic aspect, plastic waste is extremely dangerous for ruminants, especially goats, as they will eat it. The plastic becomes twisted around their intestines and effectively strangles them. Owners living adjacent to agricultural areas, cited swallowing plastic as the single most important cause of death in their flocks.

2.4.3 Declining rainfall

There is a widespread conviction throughout the entire region that the present state of the rangelands is due to declining rainfall. This is emphatically not the case. It is certainly true that there is an important seed reserve in the badia regions and a year of exceptional rainfall, such as 1994-5, caused the appearance of herbs and other perennials not seen for more than a decade.

Declining rainfall has an important function, as far as producers are concerned; it absolves them from responsibility. The idea frequently propounded was that if only the rainfall would return to "normal" levels then grazing would return to "former" levels. Since rain is at "normal" levels, this is best described as a convenient fantasy.

2.4.4 Cutting of woody vegetation

The disappearance of almost all large specimens of woody vegetation has meant that households in the badia are pressed to find wood for the principal fire. This fire, used for cooking the morning coffee, has an important symbolic value for the tent, as much of the actual cooking is done in the haram using gas cylinders. Cut wood is sold in the larger settlements on the roads, but in remoter areas it is difficult to buy or transport. As a result, branches are cut from shrubs, especially *Artemisia herba-alba*. However, the frequent cutting has led to a shortage of burnable wood and the response has been to use hoes to dig up the woody roots to burn. Swenne (1992) has documented the extensive uprooting of woody shrubs in the Shobak area, which is far more accessible by road than the more remote parts of the badia.

This strategy is little short of disastrous, since the plant is permanently destroyed. The soil-fixing properties are also lost, leading to greater erosion. Although some Bedu complain about this practice, and many can see, when pressed, that it is contributing to long-term degradation, there are no communal sanctions operating to prevent this practice. Such sanctions would in any event be difficult to enforce, since this degradation occurs most commonly where tents are scattered and there is no effective community.

2.4.5 Gathering of wild plants

The practice of gathering herbs for food and medicinal purposes is still widely practised throughout the Jordanian rangelands. Sometimes these are gathered in large sacks and sold. The scale of this is hard to determine and probably only causes very local declines in plant populations. Plants are usually gathered by tearing off the heads rather than by cutting them down at the roots, so the effect is similar to grazing.

2.4.6 Can the rangelands recover?

Initiatives for the conservation of the Jordanian rangelands are not new – indeed there is a long history of reports recognizing the problems and proposing solutions. Most notable among these reports are those by Park (1955), Tittle (1971), Draz (1979), and Juncidi and Abu-Zanat (1993). In each case, the authors noted the erosion and degradation in the rangelands and proposed action to arrest the situation. Actions following these reports seem to have been minimal.

Indeed, since these reports, it is safe to say that the situation has become substantially worse. Almost certainly, there has been a major expansion in both the size and number of sheep flocks with a correspondingly greater pressure on range resources. The greater availability of water-tankers and trucks has meant that pastoralists are able to reach regions previously inaccessible, especially in the *hama* pebble desert. At the same time, the gradual tightening of restrictions on cross-border movement has meant that the pasture resources of the broader region are no longer available to Jordanian producers.

Whether the range can fully "recover" is unknown, due to an absence of baseline data. Moreover, the grazing regime of sheep and goats is very different from the grazing of antelope and camels which contributed to its evolution. However, evidence from protected areas and border zones is unequivocal that biodiversity can be greater and biomass much increased with proper management.

3. SOCIO-ECONOMIC BASELINE SURVEY OF THE JORDANIAN BEDU

3.1 Objectives and methods

A socio-economic baseline survey¹ of Jordan's badia rangelands was conducted in 1995, as part of the preparation for a project on the conservation of the rangelands. This survey aimed to devise the socio-economic matrix into which a feasible project could be slotted for providing baseline data against which the overall impact of the project could be measured.

The principal method was the administration of two questionnaires: a community and a household questionnaire. The community questionnaire was administered in an informal manner to senior figures in the community who were also livestock producers. In preference, they were asked to call as many other producers as was practical; thus an open-ended discussion could evolve.

The household questionnaire was designed to elicit basic numerical data on livestock numbers, inputs and expenditures and to allow estimates of the cash income from livestock. It also explored basic issues of sedentarism versus migration and livestock holdings. It did not look at overall household income, as this would have

required a considerably more detailed investigation of kinship and residence patterns.

The information gathered was based on recollections of 1994, so in general it could not be checked except on the rare occasions where producers kept written records. There is every reason to believe that the majority of producers answered reasonably honestly. The questionnaires included a certain degree of self-checking, so internal checks often revealed inconsistencies. In some cases, the questionnaire was rejected on the spot and left incomplete, in other cases it was eliminated during data entry. Overall, some 10% of the questionnaires were thrown out.

3.2 Livestock producers in the badia

Livestock producers using the rangelands are divided into the Bedu, who may be described as occupationally specialized pastoralists, and the village producers who by and large combine livestock production with agriculture. Such a distinction is not clear cut, as many villages, (especially in the steppe regions) consist of Bedu who have settled within the last few generations. Similarly, although the Bedu generally have larger herds than the settled producers, this is not invariably the case.

3.2.1 Bedu

Livestock production in the rangeland areas of Jordan is largely in the hands of the Bedu. Although sharing many cultural features with the settled populations, (fellahin) their distinctive systems of production have set them apart since the earliest records of this region.

The Bedu are divided into numerous tribes, (ashira) of varying size, and these are subdivided into clans and lineages, (qabila). Until recently, these affiliations have constituted the single most important organizing principle in the Bedu social organization, defining livestock production strategies, patterns of migration, marriage and warfare, as well as access to pasture.

There is a substantial literature on the Bedu of this region, most notably Musil (1928), Marx (1978), Lancaster (1981), Chatty (1990), Lancaster and Lancaster (1990), and Abu Jaber et al., (1987). Except for the latter, these works tend to focus on specific tribal units. Moreover, despite publication dates they refer to the 1970s or earlier, prior to the profound changes that have overtaken Jordanian society since 1975.

Important changes that have gradually occurred over the course of this century include:

- Increasing settlement of the Bedu on the marginal lands;
- Switch from camel production to sheep production;

- Collapse of traditional migration patterns through widespread use of motorized transport; and
- High level of dependence on imported feeds.

All these factors have had the effect of transforming Bedu society, both economically and socially.

3.2.2 "From camel to truck"

This evocative phrase, taken from the monograph by Chatty (1986), describing the transformation of pastoral society in south Lebanon, is equally applicable to the Bedu of this entire region. With few exceptions, the rangelands-based Bedu seem to have specialized in camel production until the 1940s. The monograph on the Rwala by Musil (1928) describes a society based around camel production with horses kept as prestige animals. At that date, the term 'Bedu' appeared to be coincident with camel production, as Musil notes that sheep producers were called Al-Freije.

The appearance of vehicles as early as the 1920s began to make a major economic impact in the 1940s. The camel had as its major function transport, especially of water. Once it was evident that this function could be fulfilled more effectively by the truck, camel production was threatened. As the need for money became more pronounced, the products of the camel, hair and milk were observably less marketable than the products of sheep.

The virtual demise of the camel as an economic element in the lives of livestock producers was sealed by a major drought between 1958 and 1962. Lancaster (1981) estimates that at least 70% of the camels died during this period. Combined with the disappearance of the raiding economy and the increased demand for ruminant meat in the growing urban areas, camel production never recovered. The Bedu are generally perceived as small ruminant producers today, specializing above all in sheep, a perception which is amply confirmed by the survey (Table 30.1).

Table 30.1

Percentages of households owning different livestock species

	All n=664		North n=313		Central n=157		South n=194	
	No.	%	No.	%	No.	%	No.	%
Sheep	644	97.0	309	98.7	152	96.8	183	94.3
Goats	543	81.8	234	74.8	130	82.8	179	92.3
Camels	37	5.9	3	1.0	7	4.46	27	13.9
Donkeys	460	69.3	229	73.2	92	58.6	139	71.7
Chickens	297	44.7	126	40.3	73	46.5	98	50.5

3.2.3 Village producers

Down the central spine of the Jordanian steppe are villages which are primarily agricultural, but with variable holdings of domestic animals. They have long traditions of exploiting rangelands, that were traditionally attached to a particular community or group of communities. These rangelands were used seasonally when crop residues were not available and the animals were often herded collectively.

Although such villagers perceive themselves as having tribal affiliations, they do not link themselves with pastoral groups. Their social organization is very much the same as villagers in the intensive agricultural areas. Few of them move long distances with their animals, although this is necessary for those whose herds grow to very large numbers.

3.3 Livestock holdings

The majority of livestock producers in Jordan probably have just a few animals to meet ceremonial obligations, and those which can be tended effectively within the family and fed on household and agricultural wastes. The survey focused on owners with more than 30 head of either sheep or goats, on the grounds that such flocks were likely to make an impact on rangeland use and exploitation. This should be borne in mind when assessing the mean figures for livestock holdings.

3.3.1 Determinants of livestock holdings and distribution

As has been suggested above, the dominant domestic species is sheep. Ninety-seven percent of all the households surveyed owned sheep, as opposed to only 82% owning goats. Table 30.1 shows the percentages of households owning different species overall and in different regions.

Numbers of horses and cattle are too small to be treated in this way. The survey noted 15 households owning 20 horses and 8 households owning 14 cattle.

These figures show trends for some species only. For example, sheep are kept at virtually the same frequency in all parts of the rangelands (Table 30.2). Goats and camels, however, show a marked upward trend from north to south (Figure 30.1 and Tables 30.3 and 30.4). Donkeys represent an essential work-animal needed everywhere and ownership patterns show virtually no inter-regional variation.

These results suggest, as would be expected, that sheep predominate in the higher rainfall rangelands, whereas goats and camels are more important as rainfall decreases. The mean size of sheep flocks peak in the 75 and 100 mm isohyets, represented largely by the northern *badia*. Below this figure, the vegetation becomes too difficult to digest for sheep. The higher rainfall zones are too densely settled to permit such large flocks, except on a feedlot basis.

Table 30.2

Mean herd size by rainfall in zones for all households possessing sheep

Zone (mm)	n	Mean Herd Size
All	644	296.7
< 50	53	197.7
< 75	24	711.0
< 100	178	419.4
< 200	302	241.0
< 300	68	168.0
< 400	13	254.6

Table 30.3

Mean herd size by rainfall zone for all households possessing camels

Zone	n	Mean Herd Size
All	37	7
< 50	21	9
< 75	1	16
< 100	6	10
< 200	7	4
< 300	2	3
< 400	0	0

Figure 30.1

Percentage of households owning goats by region

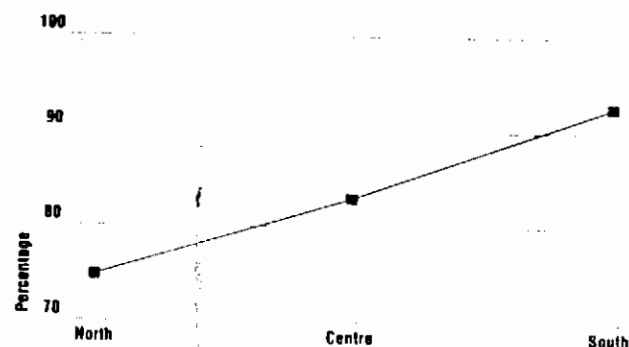


Table 30.4

Mean herd size by rainfall zone, 1994 for all households possessing goats

Zone	n	Mean Herd Size
All	543	38.6
< 50	55	73.6
< 75	21	71.3
< 100	146	40.2
< 200	258	30.8
< 300	51	27.9
< 400	12	17.3

3.3.2 Flock size

Sheep predominate numerically in the Jordanian rangelands and herds are very large indeed by the standards of pastoralists worldwide, especially in the northern badia. Table 30.5 shows the mean flock size for the entire sample of households contrasted with the flock size for households owning that species.

Table 30.5

Mean flock size recorded by the survey, 1995

Species	All	For Households with this species
Sheep	287.9	296.8
Goats	31.6	38.6
Camels	0.56	8.2
Horses	-	1.3
Donkeys	1.13	1.5

Source: IFAD Survey

Table 30.6 provides the overall mean, and then the mean herd sizes, in different regions for each species.

Table 30.6

Mean flock/herd size by region different livestock species

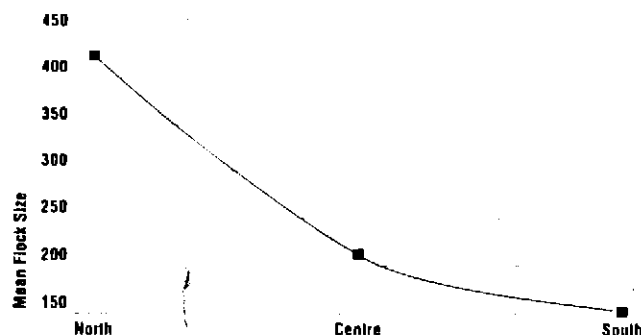
n=664	All owners		North		Central		South	
	n	Mean	n	%	n	%	n	%
Sheep	644	296.7	309	424.8	152	211.7	183	151.5
Goats	543	38.6	234	35.7	130	35.1	179	45.0
Camels	37	7.7	3	6.3	7	11.4	27	7.5
Donkeys	460	1.5	229	1.6	92	1.4	139	1.5
Chickens	297		126	18.7	73	18.4	98	12.5

Source: IFAD Survey

Sheep show a marked upward trend from south to north (Figure 30.2). Goats, however, show little variation in the north-central region but increase markedly in the south. Although there are markedly more camels in the south, the mean herd size does not change significantly, suggesting that constraints on camel herd size may be more to do with labour than feed. As with ownership percentages, there is no significant difference in the size of donkey herds between the different regions.

Figure 30.2

Mean sheep flock size by region



Source: IFAD Survey

3.3.3 Conversion to a common unit

The principal domestic species, both consuming natural forage and purchased feeds, are sheep, goats and camels. All other species, such as donkeys, represent a very small fraction of the total feed consumed. Donkeys are rarely fed purchased feeds but graze on the same shrub vegetation as camels.

To calculate the potential impact of grazing on the environment, it is useful to convert all species to a single unit. Unfortunately there are a diversity of ways of achieving this, which produce rather dissimilar results. The formula used in this report is the one proposed by the United States Agency for International Development (USAID) in their policy review of the low rainfall zone (USAID, 1992) as:

Unit = 1 sheep or 1 goat

1 camel = 13 units

Small Ruminant Units are thus sheep + goats + 13 x camels

This formula is similar to that used for Tropical Livestock Units (TLUs). Using this conversion, a mean herd size in small ruminant units (SRUs) can be calcu-

lated for the entire sample (Table 30.7). To obtain the figure for mean SRUs the herds were individually summed according to the formula above and the mean taken of those sums. This allows expenditures such as feeds and veterinary services to be averaged over SRUs.

Table 30.7

Conversion to SRUs n=664

Species	Mean Herd Size
Sheep	296.7
Goats	38.6
Camels	7.7
SRUs	325.3

Source: IFAD Survey

3.4 Household structures and labour availability

3.4.1 Size and structure of households

The size and structure of households in the rangeland areas is not an easy variable to analyze because of the complex relations with collateral branches of the family (Lancaster, 1981 contains more detailed descriptions relating to the Er-Rwala Bedu). The householders were asked about members of the family present and those away working. However, schoolchildren or aged relatives may stay in the concrete house in the west, while parts of the family migrate with the tent. There is a constant flux of family members between the badia and the permanent house, and an ever-changing labour resource. Results for this part of the survey should, therefore, be taken as indicative rather than absolute.

Table 30.8 shows the mean household size for the entire survey. The number away working is given in the second column and the mean for total members, present and away in the third column. Members working away or abroad do not contribute labour, but they are usually extremely punctilious about sending monetary contributions to the family and their presence is thus felt economically.

Table 30.8

Mean household size present and total

n=664 Region	n	Present	Away	Overall
All	664	10.5	1.0	11.5
Highland	10	6.5	1.4	7.9
Steppe	405	10.2	1.2	11.4
Badia	249	11.1	0.7	11.9

Source: IFAD Survey

The professions of absent household members suggest something about the alternative occupations available to livestock producers. Soldiering was the most common form of work, but otherwise government service and casual labour are the only other options (Table 30.9).

Table 30.9

Professions of migrant household members

Region	Number	%
Soldier	203	71.7
Government Official	47	16.6
Unskilled Employment	29	10.3
Other	4	1.4

Becoming a merchant or trader, especially in livestock products, is a common option for Bedu, but such merchants normally cease producing animals.

3.5 Migration

3.5.1 Traditional classifications of migration

One of the most distinctive features of pastoral production is migration; highly visible in certain seasons, it is usually described in some detail in descriptive studies. One of the staples of such studies is the "migration map" with arrows criss-crossing the map showing seasonal movements of the herds.

In Jordan, the traditional classification of migration is threefold:

- (i) Migration from the mountains to the valleys westward;
- (ii) East-West transhumance; and
- (iii) Nomadism, i.e., all-year-round movement.

This has been described in various sources including Nesheiwat (1991). Mountain-valley transhumance, also called "vertical" transhumance, is outside the scope of this study and will not be further discussed.

It is hard to judge the reality of such a system in the past. However, it is evident that by 1995 it had broken down irretrievably. A combination of the use of vehicles to move flocks, the rise of detribalized producers with no respect for the traditional system of grazing rights, and the use of modern communications to establish areas of potential grazing, have all combined to produce a considerably more fragmented system of migration.

3.5.2 Tribal migration

An analogous staple of the literature on migration is tribal migration. This argues that particular tribes have specific migration routes which they follow most years. The usual product of this view is the migration map with arrows assigned to particular tribes.

As with annual migration patterns, it is hard to judge the reality of this in the past, but the present survey does not support such a view. Economic individualism has meant that individual members of particular tribes decide both whether to go on migration and, if so, where. Hence the scatter of individuals from a wide variety of tribes encountered, especially throughout the northeast, where the good rains in the winter of 1994-5 attracted numerous herders from all over Jordan.

In the villages, producers with large herds who do not identify themselves as Bedu, nonetheless make use of the rangelands in good rainfall years. The case history in Box 30.1 gives an example of such a producer.

Box 30.1

Case history: a new urban nomad

Mohammed S. is a resident of a village near Tafila. He owns some 300 sheep, as well as a substantial farm and a house. He does not regard himself as Bedu and will criticize Bedu intrusions into grazing lands attached to the village. However, he makes use of the badia grazing every year to reduce expenditure on purchased feeds. To find out where rain has fallen and grazing is consequently good, he makes extensive use of the telephone and of a network of contacts. After identifying a region of pasture, he uses his lorry and water-truck to graze his sheep there for as long as the forage lasts. Although he considers himself a member of a tribe, the Er-Hwerat, he will go to any area of the country and does not consider it necessary to ask permission or even to enquire into traditional grazing rights in the region where he plants his sheep.

Source: IFAD Survey

3.5.3 Migration versus sedentary production

By contrast, one of the striking findings of the survey was the large number of livestock producers who have ceased to move. Of the entire sample, only 216 households (32.5%) migrate in any way. Many of those questioned had ceased migration in recent years due to the costs and problems associated and the availability of subsidized feed. Table 30.10 shows the numbers migrating, broken down by region. It might seem surprising that a lower percentage in the badia migrate but this includes pastoralists who are permanently resident in the desert and who simply move around a central encampment.

Table 30.10

Households still migrating by land category

1994 Region	n	%
All Rangelands	216	32.5
Highlands	1	10.0
Steppe	148	36.5
Badia	67	26.9

This pattern is strongly associated with feed availability; subsidized feeds have allowed householders to become more sedentary. If the price of feeds rises substantially, it is inevitable that producers will either cease production or begin migration.

3.5.4 Reclassifying migration patterns

In the light of the responses to the survey and broader discussions with producers, a more comprehensive classification of migration was evolved. This suggests the following six categories:

- (i) Owners whose herd is always resident in one place;
- (ii) Owners whose herd is mostly resident in one place, but who occasionally move it to pasture in a year when the rains are good;
- (iii) Owners who move their herds every year to pasture, according to a reasonably regular schedule ('transhumants?');
- (iv) Owners whose herd is on the move all the time over the Jordanian rangelands ('pure nomads?');
- (v) Owners whose herd is on the move all year, but stay within a reasonably small ambit (e.g., 50 km radius); and
- (vi) Owners who move their herds across the border to other countries.

It is perfectly possible to be a nomad and farm, because it is easy to rent both land and agricultural labour. It is also possible to be a nomad in the badia and to have a settled family with a farm and children going to school. Indeed, because of the potential to have more than one wife, some pastoralists maintain two distinct families with two distinct lifestyles.

3.5.5 Surrogate migration

The gradual development of national borders and the increasing difficulty of seeking pasture in other countries has stimulated the development of a number of subterfuges to circumvent the inevitable restriction on access to pasture.

One of the most intriguing mechanisms for persisting with cross-border migration is the use of re-sale rings. Essentially, if an owner wishes his herd to make

use of pasture in another country, he "sells" it to another pastoralist, who herds it while the pasture is available. When the pasture is exhausted, the herd is "sold" back to the owner. Such rings may involve more than one country, and animals may move in large circles crossing from Syria to Jordan, Saudi Arabia and Iraq. For obvious reasons, no information is available on to the extent of this practice.

3.6 Land and land rights

Land rights can be effectively divided into two categories: rights over farmland and rights in the rangeland. In principle, tenure in farmed areas is related to patrilineal inheritance. Owners with rights in such land usually inherit it from their family. This land can in principle be bought and sold.

However, rangeland is, legally at least, controlled by the Government and the construction of buildings and ploughing up for farms is controlled. In reality, however, the boundary between "rangeland" and private farmland is constantly shifting due to pioneer agricultural settlement which can confer title to land.

3.6.1 Two views of land tenure

There are essentially two views of land tenure in the rangeland areas: "complex" and "simple". Rights in pasture are viewed, especially by anthropologists, as highly elaborated and sanctioned by traditional society. Numerous interlocking systems of rights existed in the past and development can only be effective if these are respected or strengthened. The alternative view, the "simple" one, is that although tenure may exist in theory it is non-functional today. In other words, although pastoralists can explain their rights in a region of pasture these rights cannot be made operational, except through agriculture or related types of land development. Traditional tenure has to all intents and purposes broken down.

3.6.2 Collapse of rights in rangeland

Traditional theory holds that rights to pasture are not held by individuals and that, in principle, all producers are free to exploit it. This theory has not been operative through much of the history of this area (Nesheiwat, 1991). The evolution of the hema system essentially allocated pastures to individual subgroups, where authority was exercised via a sheikh.

Several key elements of the hema system allowed it to survive for many centuries, for the following reasons:

- (i) a high degree of militarization of society which allowed violent retribution against rule-breakers;
- (ii) the slow pace of movement to a given pasture (on foot);

- (iii) the fact that herding was done more directly by the owners of the animals; and
 - (iv) actual herd sizes were smaller implying less competition for pastures.
- These conditions have all been transformed within the last half-century: the Bedu have come under control of central Government; they have acquired trucks to transport animals; herding is largely done by hired shepherds; and herd sizes are now very large.

Many individuals or families perceive themselves as having rights in rangeland and can classify an area as their "traditional" grazing area. However, this does not mean they have any mechanism to prevent outside herds from coming in and exploiting the grazing. In general, this pattern seems quite acceptable because of the uncertain nature and inter-annual fluctuation of forage resources. If you do not allow someone to graze "your" area this year, in another year your herds may have access blocked elsewhere.

In the same way, there is a strong resistance to private or individual ownership of the rangeland. While notions of rights subsist in a conveniently ambivalent form, they can persist. If private ownership meant the erection of fences across the rangelands, there would be considerable resistance.

4. CONCLUSIONS AND POLICY IMPLICATIONS

4.1 The rangelands: producers' views

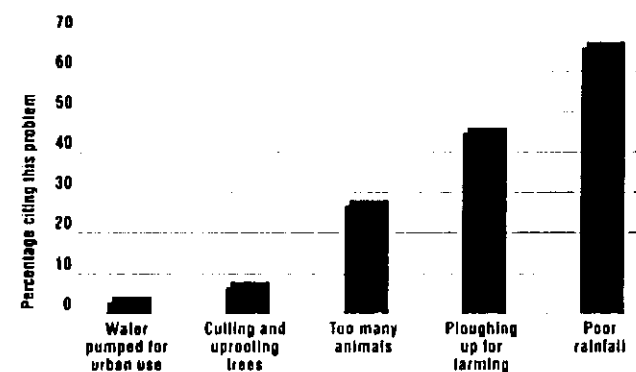
No project to manage the rangelands can succeed effectively without the participation of the users. To this end, the opinions of community leaders were sampled as part of the community questionnaire. This consisted of a series of open-ended questions relating to economic changes, problems observed within the rangeland and potential solutions. The answers were coded and the elements that cast light on producers' attitudes are analyzed in this section.

4.1.1 Rangeland degradation: who is responsible?

One of the most striking responses to the question of who was responsible for rangeland degradation was the uniformity with which community leaders attributed degradation to low rainfall. Most (66%) respondents considered the rainfall to be responsible for the state of the range. Much fewer (27%) attributed the problem to a surplus of animals. A significant number (46%), especially in the steppe and western badia, considered that ploughing up the land for irrigated agriculture was a major source of degradation. In a sense, this is a less a problem of degradation and more one of change of use. Figure 30.3 shows the percentage responses concerning the problems of the rangeland.

Figure 30.3

Perceived problems of the rangelands



Source: IFAD Survey

One problem may be that livestock producers are probably used to inferring the rainfall from the state of the range. Since they do not measure it, they gauge rangefall from the plant cover. As the plant cover declines, so they estimate the decreasing rainfall.

Few respondents mention the cutting and uprooting of woody vegetation, but this unfortunately does not mean that it is not a real problem. Since those being questioned are also mainly responsible for this practice, they are unlikely to blame themselves. The pumping of water for urban use is a very real concern in limited areas, notably in the Azraq oasis and the Wadi Mujib.

The principal conclusion that can be drawn from is that only a small proportion of livestock producers accept responsibility for the state of the rangelands. Most attribute it to external forces which they are unable to control. Until producers demonstrate a clear awareness of their own role in bringing about the present situation, it will be difficult to involve them in the management of rangeland through selective destocking.

4.1.2 Management and authority structures

Bedu society has always been noted for its ideology of equality, both in terms of equal access to leaders and in the system of justice. Lancaster (1981) noted that the power of the sheikhs is always mediated through the consent of the tribe. While tribal groups were bound together by a common ideology, this system could function effectively.

However, once pastoralists began to function within the framework of the modern state, they were subject to the demands of conflicting authority structures.

The combination of the changing state and the growth of economic individualism has had the effect of breaking down allegiances within tribal groups. During interviews with individual householders, many spoke against the authority of the traditional leaders.

Following this, pastoralists with grievances tend to look to "government" for assistance or redress. Table 30.11 shows a summary of the bodies that community leaders had dealt with in matters relating to rangeland. It should not be assumed that the result of their dealings was positive.

Table 30.11

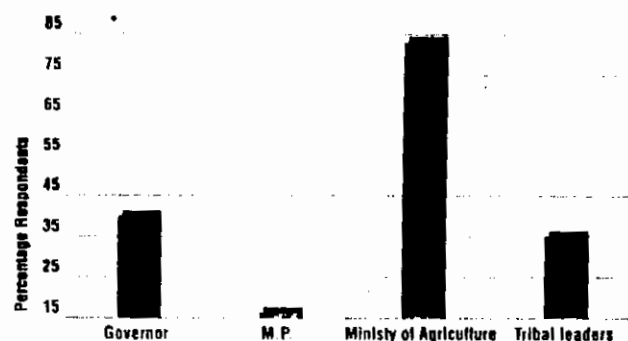
Existing authorities with which community leaders dealt n=85

	No.	%
Governor	43	50.6
Member of Parliament	14	16.5
Ministry of Agriculture	72	84.7
Tribal leader	31	36.5

Asking a speculative question such 'who would you work with?' invites an answer influenced by the interviewee's perception of the interviewer. It proved nearly impossible to disentangle the fact that teams were from the Ministry of Agriculture with a positive response. Presumably, if the interviewing team had been from either a cooperative organization or a non-governmental organization (NGO), this would have elicited a substantially more positive response (Figure 30.4)

Figure 30.4

Existing authorities with which community leaders dealt



Source: IFAD Survey

Perhaps more interesting is the negative responses; very few interviewees put much faith in tribal associations. This is probably a good indicator of the breakdown of traditional authority. Table 30.12 shows the institutions that community leaders claimed they could work with in the event of a project to improve rangeland.

Table 30.12

Authorities with which community leaders would work n=85

	No.	%
Cooperatives	28	32.9
Tribal associations	16	18.8
Ministry of Agriculture	75	88.2
Others	11	12.9

4.2 A conservation ethos

One of the principal conclusions of the survey is that by and large livestock producers do not feel responsible for the condition of the rangeland. Moreover, their dependence on it as a feed supply is limited; they have thus little or no economic motivation to conserve it. Therefore, to conserve the Jordanian rangelands, the strategy of a project should be to make good the economic loss to livestock producers represented by the withdrawal of this resource. This is similar, in principle, to the 'set-aside' approach for farmland in Europe.

It is important to recognize that it is not in the immediate economic interest of individual producers to conserve the rangeland. Indeed, most of them see it as the task of government to help them exploit it still further. Despite this, the benefits of rangeland conservation remain in the larger national interest and probably the long-term interests of producers.

Individual studies have shown that protection of rangeland areas increases biomass, increases biotic diversity of both fauna and flora and increases the moisture-holding capacity of the soil (Hatough, et al., 1986). The development of reserved areas and use such as the Dana reserve, As-Shaumari at Azraq, suggests there is local pressure for conservation and that this can be seen as beneficial.

Whether a rangeland is "overgrazed" will inevitably remain controversial, as the long-term climatic cycles make it difficult to establish the "natural" condition of the range. In addition, the virtual disappearance of the species of wild ruminants that grazed in substantial numbers until the turn of the century mean that the present system of intense pressure from small ruminants cannot be considered to replace "natural grazing".

However, there is little doubt that such heavy pressure from just two species, aided by mobility through the use of water-trucks and lorries, represents a poor management strategy. Biomass is never allowed to reach development, plants may never reach the phase of setting seed and habitats for small fauna are virtually eliminated. Studies at Dana have shown that with dissected terrain, larger mammals can also survive.

In cases where wild fauna actually become a predator on the flocks, the two world views come directly into conflict. As in Dana, a number of sheep producers reported predation by wolves on their flocks in the northern hammada desert. Losses were not great, at perhaps 10 sheep from a herd of one thousand. Nonetheless, as far as the owners were concerned, these were losses, and their solution was to shoot the wolves. The Asiatic wolf is now extremely rare throughout the whole of the Middle East and, in national terms, may be considered a priority for conservation.

Resolving the conflict between these opposing attitudes is similar to the issues of conservation of biodiversity against maximum use by ruminants. As far as the Bedu are concerned, the diversity of species and even the development of biomass is simply an irrelevancy in the business of producing sheep. Yet, there must sometimes be larger national priorities and wider concerns may sometimes displace local needs.

5. RECOMMENDATIONS

Recommendations from the survey fall into two categories, immediate and long-term, which are summarized below.

5.1 Immediate

- Action should be taken to prevent the uprooting of woody vegetation for firewood. This is best done through a combination of public awareness and the facilitation of gas supplies in remote areas.
- A strategy should be adopted to encourage the bringing to market of more mature animals, especially sheep, thereby reducing the need for large flocks. One possible strategy is a subsidy on animals over a certain weight.
- The use of feed supplements, mineral blocks and industrial by-products by herd-owners should be encouraged, since the poor nutrition of animals fed only on cereals is an important reason for herders whose animals persist largely on feeds to continue using the rangeland in certain periods.
- The use of fertility drugs without strict veterinary supervision should be discouraged.
- Veterinary services should be monitored and improved, especially in regions

close to the western edge of the badia. Particular attention should be given to vaccination against bluetongue, PPR and foot-and-mouth-disease. The poor health of stationary animals is another reason for encouraging migration.

- A public awareness campaign should be mounted, focusing on the following issues:
 - the rainfall situation and the consequent responsibility of producers for the situation of the rangelands;
 - the dangers of plastic waste;
 - a complete illustrated reference list of local and scientific names of all the useful plants of the badia should be prepared and circulated to all extension staff in this region. Without such a tool it is difficult to see how discussions about rangeland management can proceed at a more than superficial level; and
 - a preliminary survey of the faunal resources of the rangeland area should be commissioned to help understand the conservation issues more clearly.

5.2 Long Term

The long-term objective of any rangeland rehabilitation project must be the assignment of demarcated regions of the rangeland to social groups for management. The traditions and culture of the users argue that individual ownership would be strongly resisted. Since it is not practical or economic to fence such large areas, prevention of incursions must be in the hands of the community of users.

Communities of users will only make the effort to police a large open area of this type if: the economic benefit of using it is substantially greater than at present; and they have effective support from the local regulatory authorities (e.g., police, forest rangers) to act against intrusive herds or even their own members overusing the resource.

Priority should be given to rangelands within reasonable access of farming communities, because the community is stable and the members remain in touch with one another and the associated rangelands are close enough to the village to be policed by its residents.

The following stages have to be applied:

- (i) Communities of users who are prepared to cooperate with a rangeland project must be identified. Ideally, these should be settled groups with a strong livestock orientation and a proven record of community cooperation on other issues;
- (ii) Rangeland areas with a tradition of association with a particular community ("facing areas") need to be identified, demarcated and gazetted;
- (iii) The community needs to form or adapt an existing association to manage the rangeland;

- (iv) The community association, in collaboration with the livestock and range departments, must establish a grazing capacity for their range and assign usage quotas to their members;
- (v) The community must develop a system of levies on members to pay the cost of policing the area; and
- (vi) The community association must develop, in collaboration with the police and range department, a procedure for dealing effectively with defaulting herds or producers.

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Mahmud Al-Souib	Enumerator
Mohammed Al-Rousan	Enumerator
Mohammed Fushaikar	Enumerator
Mohammed Qublan	Enumerator
Sana Halasa	Enumerator