

MASLAKH RANGE PROJECT, QUETTA, WEST PAKISTAN (A REVIEW OF ITS FIRST TEN YEARS)

By M. MUHAMMAD RAFI,
B.Sc. (Agri), A.I.F.C. (Hons)
Chief Conservator of Forests

SUMMARY: *Maslakh Range Project, Quetta, West Pakistan was started in 1954 as a pilot research, training and demonstration scheme. During its first ten years sufficient knowledge has been gained to enable us to extend scientific range management to other areas. The results of range improvement studies have been indicated. Complete protection from grazing for a minimum period of five years seems to be essential to enable the area to allow proper grazing management. Pitting of flat land has proved to be useful. The provision of stock water and supplemental feed and protection from inclement weather and from predators such as wolves is important to make the programme a success. The recommendations for future management of similar grasslands have been given.*

INTRODUCTION

In West Pakistan rangelands constitute about 70 per cent of the land. Generally these lands are used by the entire community without any management and improvement. A nomadic way of life has been adopted to overcome the shortage of forage. Mis-use and over-use for centuries have resulted in serious deterioration of their condition. It is, therefore, essential that this vast resource be developed to meet the food requirements of the nation.

The Maslakh Range Project, Quetta was started in 1954 on the recommendations of a number of experts with the technical and financial assistance of the U.S. Government. It extends over an area of 115,040 acres of Maslakh State Forest. This area had a history of severe over-use due to unrestricted grazing by *powindabs*. Initially the project was sanctioned for a period of 10 years ending 1964 at a total cost of Rs. 2,000,000 with the following objectives:—

- (i) To carry out range improvement studies;
- (ii) To demonstrate scientific range management to local people; and
- (iii) To provide range management training to Forest Service personnel.

It is now being continued for another 6 years till the end of the Third Plan (1970) with an estimated cost of Rs. 586,000. Commercial aspects of rangeland management will be emphasised in the revised programme. Training and research will continue to be important functions of the project.

The project has succeeded in focussing the attention of the Forest Service to the problem of our rangelands and has served as a valuable training ground for personnel. It has also furnished technical knowledge. Experience gained in this project has made it possible to extend improved range management operations to many other areas.

ENVIRONMENT

Physiography — Maslakh State Forest is situated about 20 miles west of Quetta town between $30^{\circ} 3' N$ and $30^{\circ} 21'$ latitude and $66^{\circ} 31' E$ and $66^{\circ} 49' E$ longitude. It extends over the western slopes of Maslakh range. Maslakh peak at 7967 feet above sea level is the highest point while the lowest point in the valley is at 4613 feet. The topography of the hilly parts is rather rugged. The slopes extend down to gentle ground and are strewn with a net-work of dry ravines. Grey and red shales of Siwaliks with outcrops of sand-stones occupy the area. These shales are saturated with white salts and, therefore, are a source of poor quality water. The soil is shallow and is mostly covered with erosion pavement due to severe erosion. The texture of the soil in the valley is predominantly loamy fine sand with very little organic matter content.

Climate — The climate of the tract is characterised by severe winters with rather hot and dry summers. The rainfall is very erratic, annual average for 1956 to 1964 being 3" to 13" (Table 1). Most of it is received during winter and spring. The range of temperatures is rather large — absolute maximum and absolute minimum recorded being $107^{\circ}F$ and $3^{\circ}F$ respectively (Table 2).

Vegetation — Maslakh State Forest lies in the Olive-Pistacia vegetation zone where the predominant tree species are *Olea ferruginea*, *Pistacia khinjuk* and *Fraxinus xanthoxyloides*, *Srtaegus songorica*, *Caragana decorticans*, *C. ulicina*, *Prunus eburnea*, *Cotoneaster racemiflora*, *Stocksia braubica* and *Berberis vulgaris* are abundant. *Artemisia maritima* and *Cousinia minuta* constitute the main ground cover above 5,500' while *Hammada griffithii* replaces *Artemisia* in lower parts. The

major grasses are *Stipa pennata*, *Chrysopogon aucheri*, *Cymbopogon schoenanthus*, *Aeluropus littoralis*, *Poa sinaica* and *P. bulbosa*.

As a result of heavy lopping and grazing in the past tree growth is represented at present only by *Pistacia khinjuk* with an occasional coppice of *Fraxinus xanthoxyloides*. *Olea ferruginea* is totally absent. *Caragana*, *Prunus*, *Berberis*, *Daphne mucronata* and *Cotoneaster* are the common shrubs found in the hills. On the gentle slopes only occasional plants of *Zygophyllum atriplicoides* are found. A dense bushy growth of *Stocksia braubica* occurs in the ravines. *Artemisia* and *Hammada* constitute the main ground cover with a very few grasses. With continuous protection against grazing for 8-10 years the soil conditions have somewhat improved and a number of ephemerals such as *Poa annua*, *Bromus tectorum*, *B. japonicus*, *B. danthoniae*, *Malcolmia africana*, *Lepidium repens*, *Avena fatua*, *Hordeum spontaneum* and *Trigonella emodi* and ephemerals such as *Poa bulbosa*, *P. sinaica* and *Carex physodes* come up during spring. They grow in dense patches on lower flats where conditions of soil and moisture are comparatively more favourable.

Artemisia is used by livestock during autumn after it has started regrowth while the bitter *Hammada griffithii* is nibbled only soon after rains. The annuals constitute the major and nutritious part of available forage in the area. On the hill slopes regrowth from *Chrysopogon* and *Gymbopogon* also provide some feed.

RANGE IMPROVEMENT STUDIES

Considerable efforts have been made to evolve suitable techniques to improve the carrying capacity of the rangelands.

TABLE 1. DISTRIBUTION OF PRECIPITATION AT SULTAN MASLAKH (4790') IN INCHES.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1956*	1.97	1.31	2.47	0.63	0	0	5.98	0.16	0	0	0	0	12.46
1957	3.90	0.91	2.21	0.98	0.51	0	0	0	0	0	1.21	3.20	12.92
1958	2.03	0.63	0.78	0	0	0	0	0	0	0	0	2.04	5.48
1959	0.39	3.41	0.39	0	0.42	0	0.09	0.17	0	0	1.83	1.45	8.15
1960	1.15	0.25	1.20	1.80	0	0	0.53	0	0	0	0	0.35	5.28
1961	0.87	1.10	0.28	1.99	0	0	0	0	0	0	0	2.00	6.24
1962	0	0	2.21	0	0	0	0	0	0	0	0	0.60	2.81
1963	0.60	0.80	0.85	0.81	0.80	0	0	0	0	0	0.35	0.25	4.46
1964	4.05	0.90	0.50	0	0	0	0.65	0	0	0	0	0	6.10
Average	1.66	1.03	1.21	0.69	0.19	0	0.81	0.04	0	0	0.39	1.10	7.10.

* Recorded at Daru 2 mile from Sultan.

TABLE 2. TEMPERATURE AND HUMIDITY AT SULTAN, MASLAKH.

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Mean daily Maximum	55.6	58.5	66.5	84.1	91.7	99.9	99.2	100.2	95.8	84.0	70.4	66.1
temperature												
Mean daily Minimum	19.0	25.3	34.2	44.8	55.8	64.0	65.5	62.0	55.0	40.8	26.3	19.7
temperature												
Relative Humidity	45	71	57	50	48	49	50	53	31	39	40	43



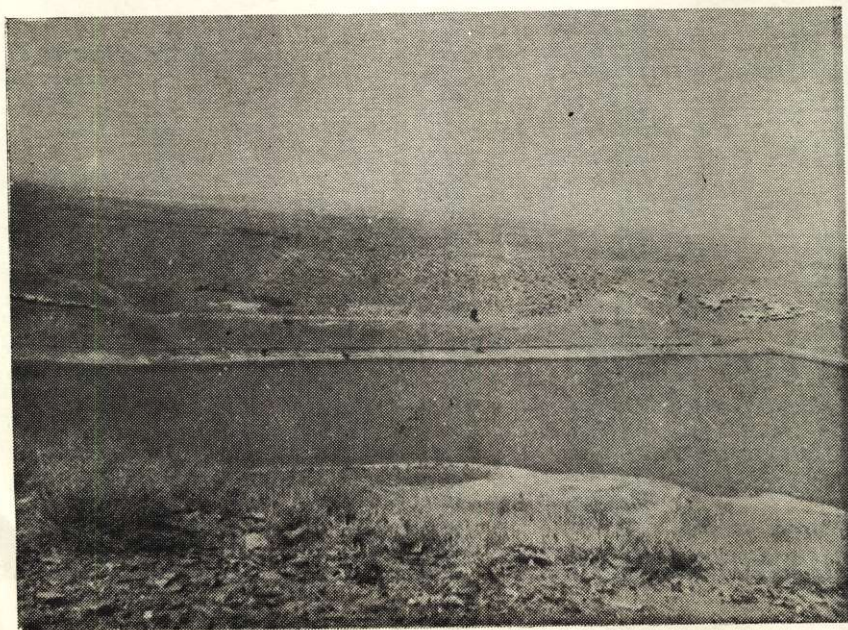
1. Maslakh hills with gentle slopes in the foreground — cut up with dry ravines. Ground covered with snow — unusually heavy fall received during January, 1964.



2. Dry ravines carry mainly *Pistacia khinjuk* and, *Stocksia braubica*. Sheep browsing on *Stocksia Pistacia* trees have shown marked response to protection.



3. The ground cover consists of *Artemisia maritima* and *Hammada* (= *Haloxylon*) *griffithii*. The photograph shows the regrowth of Lichens, *Poa sinaica* and *Carex physodes* after 8 years of continuous protection from grazing.



4. Shortage of drinking water for livestock was a limiting factor for proper utilization of Maslakh range. An earthen bund for storage of rain water.

Numerous methods including reduction of competition, preparation of seed bed, water conservation and introduction of local and exotic plants have been tried. The results of those trials which were of some significance are given below briefly:

(a) Reseeding trials with all the important indigenous and 37 exotic grasses were carried out over an area of 76 acres using different known techniques and during various seasons. The results in all cases proved to be negative because of drought and desiccation.

(b) Eradication of undesirable species was carried out over 400 acres in various representative sites. The results obtained in increased utilizable forage were not commensurate with the cost involved.

(c) Contour furrowing was carried out over an area of 1,000 acres but the response was not significant.

(d) Pitting by making saucer-shaped interrupted pits has been carried out over 1550 acres. This operation has been found to be quite useful and profitable. The value of improvement in the forage production is far more than the expenditure involved.

(e) Growing of fodder trees and bushes has been attempted but so far no success has been achieved due to severe drought and cold.

IMPROVEMENT WORKS

Fencing — 45 miles of external fence and 20 miles of internal fence have been erected. The external fence covers all sides of the area except the eastern bound-

ary where the Maslakh ridge provides a natural barrier. The internal fence subdivides the area into smaller units to facilitate grazing management. This fence has made possible effective protection against illicit grazing and lopping by *powindabs* and local tribesmen.

Water development — The tract had only a few water points in the form of seeps and springs in the foot-hills and brackish ground water in the valley. The middle belt of about five to eight miles width had no surface or ground water at all. This belt has been studied geologically. The results indicate that there is no sweet water available within reasonable depths. Many trial wells have been dug throughout the area but the results have been poor. Therefore, the only course left is either to develop surface water by construction of small bunds or to transport water from springs down the slopes by pipes or surface drains.

The following water development works have been carried out during the last 10 years:—

- | | |
|--|----------|
| (a) Springs — — — — — | 7 |
| (b) Surface well only — — — — — | 9 |
| (c) Surface wells with windmills — | 3 |
| (d) Surface wells with
persian wheels — — — — — | 5 |
| (e) Earthen bunds — — — — — | 12 |
| (f) Water tanks — — — — — | 7 |
| (g) Pipe line — — — — — | 9500 Rft |
| (h) Surface drains — — — — — | 4 miles. |

Water development continues to be the main factor in proper distribution of livestock.

Supplemental Feed Development —

Vegetation at Maslakh Range represents one of the most depleted grasslands. The major handicap in these areas is that the livestock enterprise has to be prepared for the uncertainty in forage production due to the vagaries of climate. Annual grasses which are the main source of feed may not germinate due to failure of rainfall or may get washed away by torrential showers. For such areas the livestock managers must have sufficient reserve of fodder in the form of grain, *bhoosa*, dry lucerne and hay. It is, therefore, essential that maximum possible acreage should be brought under annual and perennial fodder crops such as barley, sorghum and lucerne. The fodder and grain produced from such land should be stored carefully for use during years of scarcity.

In Maslakh State Forest a few small fields with a total area of 10 acres have been developed for growing supplemental feed crops with *sailaba* irrigation. An area of 85 acres of *khushkaba* fields developed from good flat land was sown with barley during spring 1964 to avail of the heavy snow-fall.

Buildings — The following buildings were constructed and maintained up to 1963-64:—

(a) Forest Rangers' quarters — —	2
(b) Deputy Rangers'/ Foresters' quarters — — — —	4
(c) Forest Guard huts — — — — —	4
(d) Chaukidar huts — — — — —	2
(e) Stores and godowns — — — —	3
(f) Mud huts for shepherds — — —	21
(g) Sheep sheds — mud — — — —	11
(h) Sheep sheds — — portable G.I. Sheeting — —	4

Roads — 139 miles long jeep roads were constructed and maintained to enable easy inspection and control of the area.

RANGE EVALUATION

Detailed studies were carried out to evaluate the improvement in vegetation resulting from protection and/or cultural operations. A series of permanent line transects have been laid out. Clipping studies from quadrats were carried out every year to determine the grazing capacity and to evaluate the effect of various cultural operations. The studies indicate that there has been a remarkable increase in the forage production (Fig. 1).

GRAZING MANAGEMENT

The total area of Maslakh State Forest is 115,040 acres out of which only 87,592 acres constitute utilizable range. This area is subdivided into 11 management units called allotments (Fig. 2).

During 1959 a flock of 90 Bibrik sheep — 88 ewes and 2 rams — was introduced in one of the allotments in order to evaluate the results of range improvement and to demonstrate scientific range management to local people. The results were so encouraging that during 1961 two flocks of sheep belonging to the local tribesmen (433 sheep) were introduced in two other allotments with the object of range management extension and education. Subsequently, the number of livestock was increased in order to utilize available feed and to give a commercial bias to the project. The number of livestock on 31.8.1964 was 52 rams, 1630 ewes and 992 lambs (Table 3). An American breed of sheep, Rambouillet was tried in the area to study its adaptability but it has not proved to be successful.

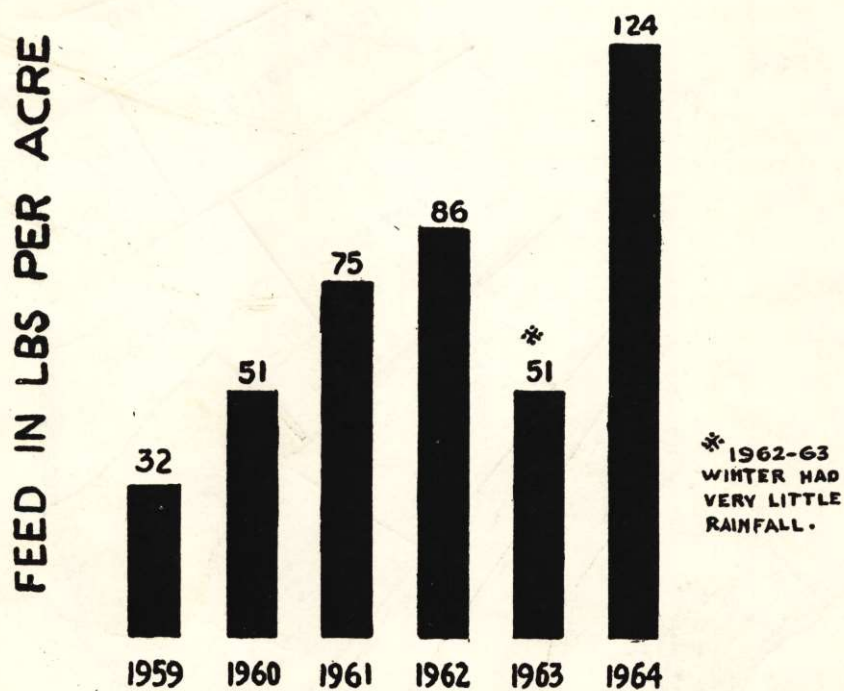
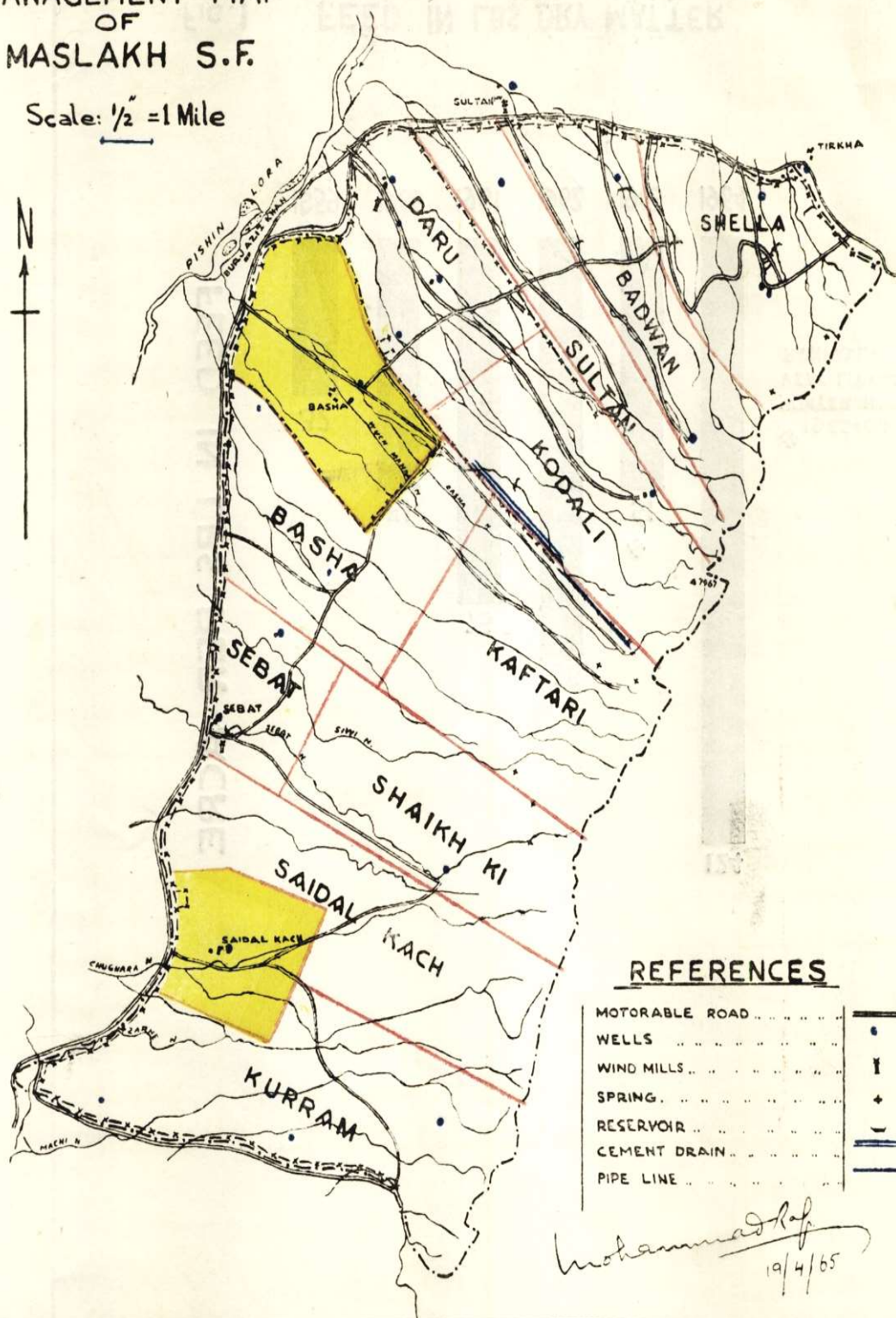


FIG.1 **FEED IN LBS DRY MATTER**
MASLAKH RANGE PROJECT

MANAGEMENT MAP OF MASLAKH S.F.

Scale: $\frac{1}{2}$ " = 1 Mile



REFERENCES

MOTORABLE ROAD	
WELLS	
WIND MILLS	
SPRING	
RESERVOIR	
CEMENT DRAIN	
PIPE LINE	

Mohammad Rafiq
19/4/65

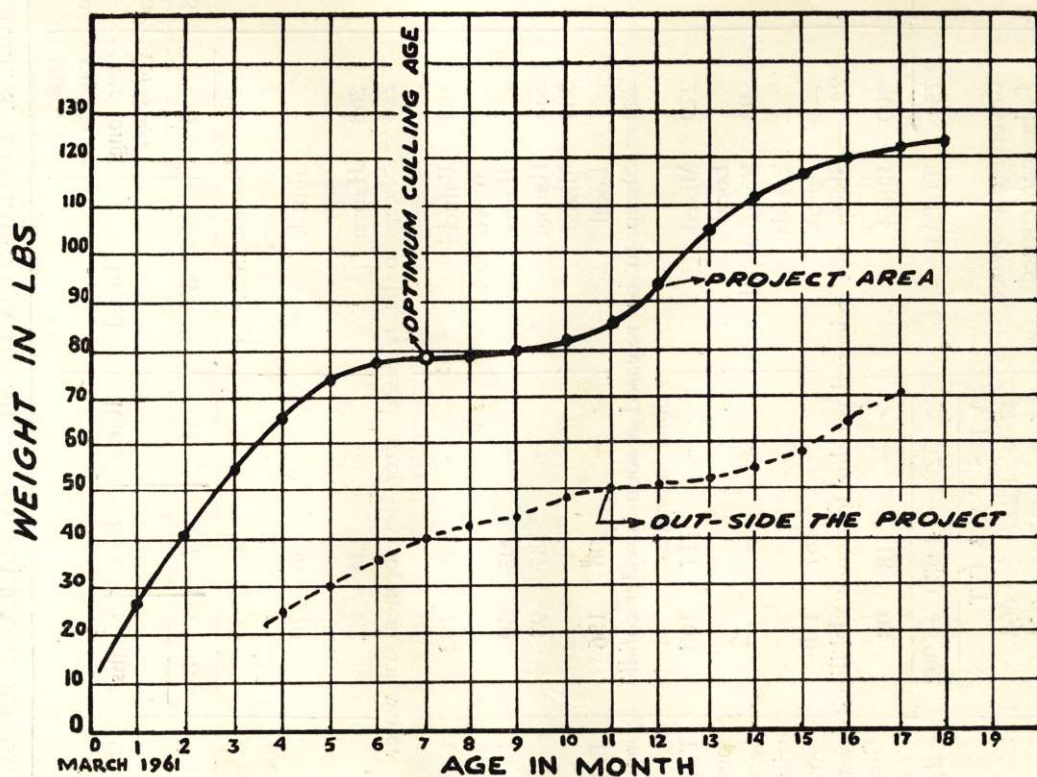


FIG. 3 **GROWTH CURVE OF 1961 BIBRIK LAMB CROP
MASLAKH RANGE PROJECT**

TABLE 3. DISTRIBUTION OF SHEEP IN MASLAKH RANGE PROJECT ON 31-8-1964.

Sl. No.	Allotments	Area in Acres	Grazing capacity year long for 1964	Breed	Rams	Ewes	Lambs	Ownership	Date of release	Purpose.
1.	Shella	7,693	292	Rambouillet Baluchi. Bibrik.	—	78	17	Government	Nov: 1961.	For trial under local conditions.
2.	Badwin	7,216	268	Harnai	—	2	—	"	Jan: 1959.	—do—
3.	Sultan.	7,357	228—	Sheep to be released after development of water	—	134	82	"	Nov: 1962.	Range Management demonstration.
4.	Daru.	7,140	183	Baluchi Mixed local Harnai	—	138	142	Government	June, 1963.	—do—
5.	Kodali.	7,515	255	Harnai	—	295	50	"	Apr: 1964.	—do—
6.	Kafari.	10,941,	339	Mixed Local	—	137	93	"	June, 1963.	—do—
7.	Basha.	8,909	280—	Sheep to be released as soon as water conditions improve.	—	296	156	Tribesmen.	Jan: 1961.	Range Management Extension
8.	Sheikhkai	8,549	279	Mixed Local	—	117	168	Tribesmen.	June, 1961.	—do—
9.	Sebat.	3,584	98	Rams of all breeds. Bibrik.	52	—	—	Govt. & tribes-Govt.	Feb: 1963.	Range Management demonstration.
10.	Saidal Kach.	9,124	223—	Sheep not released yet due to non-availability of water	—	157	116	Govt.	Apr: 1963	—do—
11.	Kurram.	9,664	309	Bibrik.	—	118	98	Government.	Mar: 1963.	Range Management demonstration.
		87,592	2,754	TOTAL:—	52 + 1,630 + 992	118	98		= 2,674	
				Government owned Tribesmen owned.	A B S T R A C T					
					47 + 1,217 + 668					
					5 + 413 + 324					
				Total:—	52 + 1,630 + 992					

The distribution of sheep by allotments, breeds and ownership is given in Table 3.

The main limiting factors affecting the grazing management adversely in the area are high fluctuations in forage yield due to erratic rains, lack or shortage of water supply, presence of predators, severe cold winds and snow during winter and hot sun during summer. However, the experience gained so far indicates that it is possible to raise a lamb crop of marketable size in one season from February-March to October-November of the same year while local people take 30 months to do so. Similarly, there is considerable improvement in lambing percentage, average weight of lambs and the rate of mortality (Fig. 3). The increase in production, therefore, is manifold.

LIVESTOCK BREEDING AND DISEASE CONTROL

Livestock breeding and disease control is being done by the Animal Husbandry Department who have been actively cooperating with the Forest Department in this Project since 1959. A Veterinary Assistant Surgeon who is on deputation to the Forest Department, looks after the breeding and disease control work under the general supervision of the Animal Husbandry Department. He is assisted by local field staff some of whom have since been trained as stockmen. The main diseases of sheep prevalent in the tract are sheep-pox, liver-fluke, lung worm, pneumonia and anthrax. Constant vigilance is essential to safeguard against livestock losses.

TRAINING AND EDUCATION

The success in expansion of range management operations will be determined

mainly by the availability of trained personnel to administer the programme. This project is the first one in the country to introduce the subject of range management as one of the responsibilities of the Forest Department. The fundamental contribution made by this project is that it has made some legislators, administrators, technicians and a small segment of the public conversant with the problems of grassland management and utilization.

The achievements of Maslakh Range Project in this field may be listed as below:—

- (a) Three officers received training in range management in U.S.A.
- (b) Five Officers attended International Range Management Short Courses held in Iran and Iraq.
- (c) All students of the Superior Forest Service Course, Forest Ranger's Course, Forester's Course, and in some cases Forest Guard's Course have received some on-the-job training during the last 8 years.
- (d) Two seminars in range management were held at Quetta on all West Pakistan level.
- (e) A number of groups of livestock owners, administrators and press correspondents visited the project to acquaint themselves with the range management programme.
- (f) A Range Plant Hand Book containing information regarding important grasses, shrubs and herbs was published.

PAST REVENUE AND EXPENDITURE

The past revenue and expenditure for the period of ten years is given in the following table:—

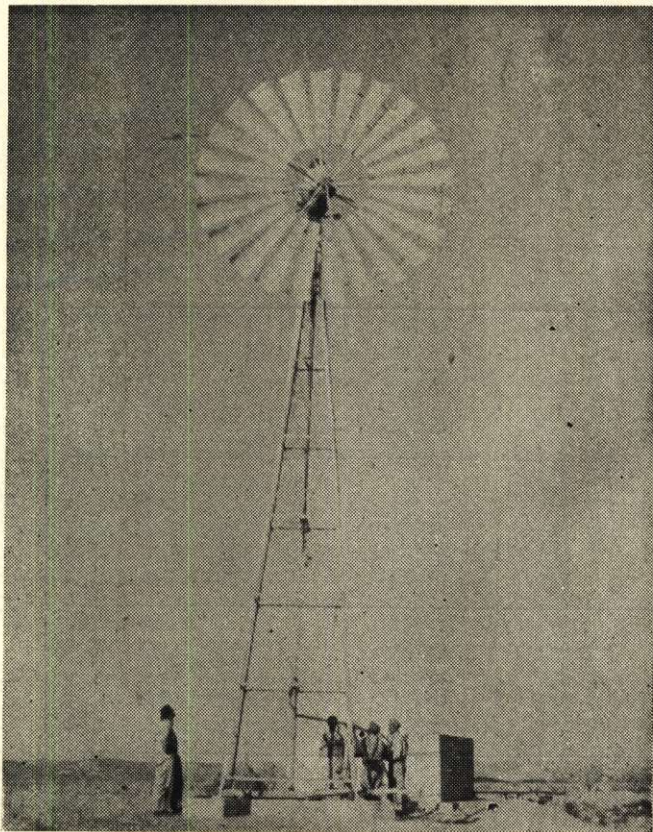
TABLE 4. PAST REVENUE & EXPENDITURE, MASLAKH RANGE PROJECT.

Year	Expenditure		Revenue
	Internal (Rupees).	External (Dollars)	(Rupees) :
1954-55	1,53,790	—	440
1955-56	1,81,670	49,150	4,040
1956-57	1,38,220	13,560	2,870
1957-58	1,32,990	33,750	7,480
1958-59	1,63,510	20,850	2,350
1959-60	1,64,170	25,580	38,240
1960-61	1,80,170	9,000	2,260
1961-62	1,70,330	—	3,780
1962-63	1,64,780	—	24,500
1963-64	1,64,590	—	11,800
TOTAL:—	16,14,220	1,51,890	97,760

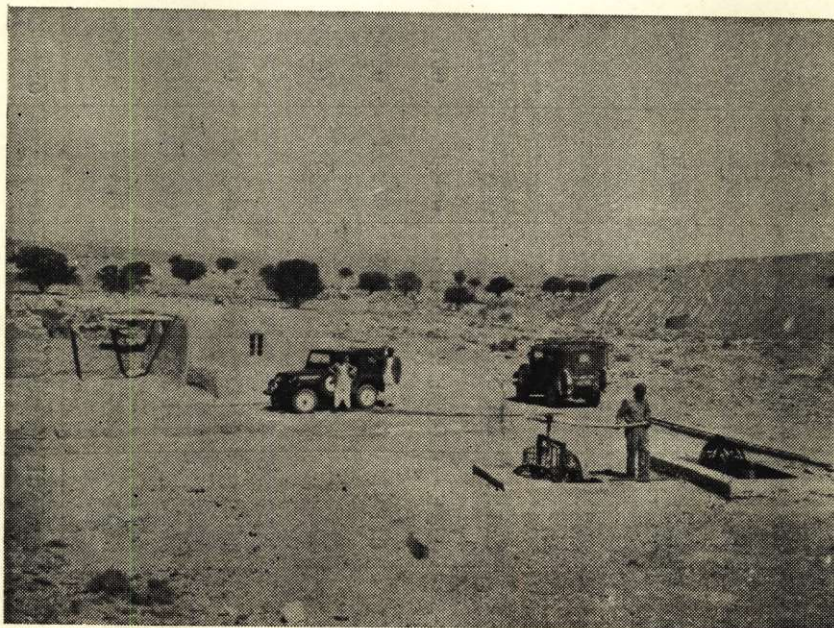
The following table gives the breakdown of expenditure under various items:-

TABLE 5. DETAILED PARTICULARS OF EXPENDITURE OF MASLAKH RANGE PROJECT, 1954-1964.

Particulars	1954-55	1955-56	1956-57	1957-58	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64
Administrative costs	15,890	49,870	53,210	54,510	80,020	73,490	73,920	61,600	64,610	73,220
Stores & equipment	16,540	10,000	13,420	13,980	23,720	11,600	13,350	10,150	17,440	7,790
Range Improvement	15,000	24,750	24,270	14,570	22,880	30,730	23,420	28,450	11,090	4,300
Cultural Operations										
Fencing	—	17,050	2,670	5,980	16,870	9,700	—	260	200	190
Water Development	33,190	17,940	7,510	35,300	4,620	17,620	29,150	22,360	16,110	17,660
Supplemental Feed	—	—	—	1,120	160	890	1,130	3,130	3,260	4,770
Maintenance of livestock.	—	—	—	—	490	3,420	3,880	9,330	15,870	15,910
Purchase of livestock	—	—	—	—	—	—	1,480	1,700	27,400	20,330
Buildings	57,670	20,030	20,670	329	3,650	1,000	25,550	20,990	2,000	6,310
Roads	14,210	10,000	7,920	2,851	2,010	5,000	3,450	6,030	1,300	1,610
Misc: including running charges of vehicles	1,290	22,030	5,550	4,350	9,000	5,720	4,840	6,330	3,700	12,600
Total	153,790	181,670	135,220	132,990	163,510	164,170	180,170	170,330	164,780	164,590



5. Ground water is available only in the valley. A windmill for lifting water from a surface well.



6. A small persian wheel is a cheap and practical device for lifting water from a surface well — can be worked by shepherd alone.



7. Spring water found in the foot.hills transported by open surface drains lined with cheap mortar and stored in masonry tanks. G.I. pipes are expensive.



8. Sheep.sheds provide protection against predators and inclement weather especially cold winds and snow.



9. The experimental introduction of fine wool Rambouillet sheep from USA in Maslakh Range Project proved to be unsuccessful due to poor feed, hot summers and very cold and dry winds during winter.



10. Local sheep breeds with fat tails have shown remarkable response to better feed and improved management — Bibrik flock introduced in the Project during 1959 as seen during October, 1964.

CONCLUSIONS AND RECOMMENDATIONS

The Maslakh Range Project has provided considerable experience in various aspects of Range Management. It has shown that fencing is very expensive. Hence we can not afford it for the management of our grasslands. However, small demonstration areas must be fenced to show the possible improvements to local people. We have not been successful in reseeding grasses under conditions prevailing at Maslakh. Similarly, most of the cultural operations have given negative results. Only pitting with complete closure to grazing for a minimum period of five years has resulted in reasonable improvement. We know now that the major limiting factors in grazing management are high fluctuations in forage production, stock water, predators, cold winds and snow during winter and hot sun during summer. Supplemental feed and hay are essential when range area is in the condition of the Maslakh Range.

The recommendations for future management of our grasslands may be summarized as below:—

1. Effective protection of the areas against illicit grazing and lopping is a pre-requisite to the success of any management programme. Since fencing is too expensive to use, co-operation of the local people is essential to enforce effective protection.

2. In deserts, fodder trees and bushes help in tiding over famine years because they can withstand drought bet-

ter than grasses. Efforts should, therefore, be continued to evolve cheap and practical methods of growing local adaptable species like *Pistacia khinjuk*, *Fraxinus xanthoxyloides*, *Prunus eburnea*, *Contoneaster* sp and *Zygophyllum atriplicoides*.

3. The storage of supplemental feed such as hay and grain is essential to tide over famine years. The use of hay, concentrates and mineral supplement for breeding rams during breeding season and for pregnant ewes during winter is essential and pays for itself.

4. Water development by digging surface wells has not proved successful. Transport of water by surface drains is cheap and practical. Additional research water in deep and covered reservoirs. on water development is needed. Cheap methods should also be worked out to save losses by evaporation by storing

5. A small persian wheel is a cheap and practical water-lift device and can be worked by shepherd alone.

6. Predators need to be controlled. A pair of sheep dogs—a male and a female—should always accompany each flock of sheep.

7. Portable woven-wire sheds should be used during summer to enable the shepherds to shift sheep at short intervals. Shade should be provided for passing mid-day time if shade trees are not available nearby. Winter pastures should be provided with sheep-sheds made of mud. The northern side should be provided

with a thatch-roofed verandah for shelter from rain, snow and cold winds.

8. All field staff particularly Foresters should be trained as stockmen so that they can look after the livestock themselves. They should be supplied with adequate stock of instruments and medicines for treating ordinary ailments.

9. Milking of mother-ewes for making butter should be discouraged because it affects the development of lambs adversely. It may be better to maintain a couple of goats with each flock for providing milk for the shepherd and the dogs.

✓10. Seasonal migration of livestock should be stopped except where the summer grazing grounds are too high and cold to allow wintering of livestock. However, seasonal migration would be necessary when a local range does not produce forage year round.

ACKNOWLEDGMENTS

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