CHAPTER 3

PRINCIPLES OF RANGE MANAGEMENT-I

———overall view ———

These are broad guide lines which incorporate all available knowledge of Range Management regarding losses of energy (range resources and production) and relevant management cum improvement operations etc. in a concise, systematic and easily under-standable manner leading to maximum sustained production of Range Forage and Livestock both within as well as above the systems existing potential.

Range is a rather complex system comprising of graziers, site, vegetation and livestock in which graziers largely influence the site and vegetation indirectly through the livestock. The indirect manipulation of the basic resources by man through "somewhat less educated" range livestock complicates the matter; the effectiveness of human role is thus drastically reduced and delayed. Furthermore, relatively increased role of rather untamed natural factors such as climate contributes to the complexities of Range Management significantly.

The Principles of Range Management should, therefore, completely cover the entire spectrum of Range Science i.e. Philosophy, Site Physiography, Soil Science, Biology of Range Plants and Livestock, Economics and Marketing etc. starting from deciding upon the very objective of undertaking Range Management and ending with the sale of range forage and livestock at attractive rates.

In view of the four components of range ecosystem, the Principles of Range Management are classified into four following groups for ease of understanding and clearer comprehension.

Group	Title	Number
A. Principles related to Man (grazier)	Objectives	I
	Seeking active involvement of local people and organizations and ensuring their cooperation.	III
	Sale of Range Products	X
B. Principles related to Range Site	Selection of suitable site	II
	Site Development	
	Site Management	V
C. Principles related to Range Vegetation	Range Vegetation Management	VI
	Range Vegetation Improvement	VII
D. Principles related to Range Livestock	Range Livestock Management	VIII
	Range Livestock Improvement	IX

As is always true with all biological sciences, this classification is not water tight. These principles overlap each other to some extent. Many Range Management and Improvement Operations are covered by two or more Principles simultaneously. This partial overlapping, however, does not belittle the importance and usefulness of this classification.

The following is a brief description of the Principles of Range Management.

1. Objective of Range Management

Selection of a clear cut and correct objective is the key to success. Everything else that follows is

Everything else that follows is geared towards the objective. It is comparable to fixing a target or destination which is to be achieved. It provides not only necessary drive and motivation but also gives a direction. The following are some of the possible objectives out of which one or two should be selected.

a) Ancesstoral profession, sacred, memorial, way of life, status symbol.
b) Recreation, sanctuary, safari park, landscaping.
c) Soil and Water Conservation (Watershed Management)
d) Research, demonstration.
e) Political motive.
f) Commercial enterprize.

Commercial enterprize generally provides most efffective drive and can play a vital role in developing Range Management as an attractive and successful profession.

Q-4

II. Selection of Suitable Site

The proposed site should be either highly productive or be potentially productive. No important factor should either be deficient or in excess. Range lands generally belong to land capability class VI to VII. Most important factors to be considered are:

a) Easy accessibility throughout the year.
b) Type, density, condition and suitability of vegetation for grazing and browsing.
c) Amount of rainfall and its distribution.
d) Availability of stream water, canal water, and underground water, presence of ponds (tobas) etc.
e) Aspect and slope of the area and intensity of erosion.
f) Type and depth of soil.
g) Availability of market.
h) Attitude and rights of local people, incidence of nomadic grazing, number and kinds of livestock owned by people of adjoining area.

Q-6

III. Seeking Active Involvement of Local People and organizations and ensuring their Cooperation.

Active participation and cooperation of local people and organizations etc. in the development process is, therefore, extremely important for the success of the project. Since Range Management is an extensive land use, a large number of local residents and graziers have a deep rooted interest and long term involvement in the area under question. It is very vital to bring a change in their attitude and develop a smooth working relationship with them. It is a long term process. The role of the government or other collective bodies is even more important rather than that of individuals. The following are a few suggestions in this respect.

a) Amicable and peaceful settlement of rights and privileges.
b) Amicable and peaceful settlement of any land ownership dispute, outer boundary dispute and passage dispute etc.
c) Involvement of local people in the range development process in such a way that they also receive some benefits of development.
d) Procuring institutional support for various facets of range development such as developing market, road transport, communication, primary education, health facilities, basic necessities, veterinary facilities, emergency feed, technical education, arranging relief brigade just like fire brigade.

IV. Site Development

A large but variable number of Development Operations are a pre-requisite for undertaking normal Range Management. Some of these are as follows:

a) Establishing approach road, outer boundaries and entrances.
b) Layout and internal fences, paths, roads, trails.
c) Stock water development, dams, ponds and wells.
d) Water spreading, water harvesting and water conservation.
e) Residence and office buildings, stores and pens.
f) Land levelling and terracing.
g) Establishing shelter belts.
h) Providing transport.
i) Discovering and linking new watersheds for feeding tobas (pond).
j) Construction of spurs and bunds for protection against floods.
k) Uprooting old woody vegetation.

Q-7 These operations are usually expensive and are carried out only once or after a few years. These increase range potential.

V. Site Management

These include routine operations with respect to soil, water and atmosphere and are a must for obtaining maximum possible production on sustained basis. A judicious combination of some of the following operations at appropriate time is desired.

Soil Related

a) Harrowing, cultivation and ploughing.
b) Adding organic manures, fertilizers and chemical amendments.
c) Stone collection and contour piling.
d) Deep ploughing.
e) Uprooting stubbles and ploughing in stubbles.
f) Trapping and mixing sand in clayey soils.

Water related

g) Strengthening field boundaries.
h) Field levelling.
i) Pitting, trenching and ridging.
j) Irrigation maintenance, water spreading and soil/water conservation structures such as stone collection along contour lines.
k) Mulching, green manuring,
l) Avoiding soil compaction in heavy soils.
m) Promoting soil loosening in heavy soil by soil fauna.

Atmosphere related

n) Protecting against hot winds (loo).
o) Alternative arrangements during droughts.
p) Planting scattered trees for shade and shelter.
q) Planting tree shelter belts.

r) Erecting summer green houses.
s) Adjusting different operations in accordance with suitable season.

VI. Range Vegetation Management

Vegetation is the basic resource which supports livestock. It represents the combined effect of soil, water and climate. Furthermore it is strongly influenced by livestock and activities of man. In order to have a continuous supply of good quality forage for a long grazing season on regular basis the following points must be kept in view.

a) Protection of vegetation against illicit and excessive grazing, browsing, cutting, lopping etc. by erecting fences, constructing stone walls, establishing live hedges and strengthening watch and ward arrangements, seeking help and support of law enforcing authorities.
b) Selecting suitable livestock comprizing of either one species or a mixed herd keeping in view their grazing behaviour, the present and desired vegetation composition, slope of the area, types of soil, climate and market etc.
c) Determining suitable range use intensity and allowing grazing accordingly. Range use intensity means proportion of a range plant biomass that is to be consumed in a year as compared to the one left standing, in the range for providing a base for next years growth. Most common range use intensity is taken as 50 percent. It depends upon the condition of vegetation, type and growth stage of range plants, slope, soil type, season, rainfall and erosion hazard etc.
d) Determining carrying capacity of the range and allowing grazing according to the estimated capacity. This estimation is done either by comparison with similar adjoining/nearby areas or by sampling based upon pre-determined range use intensity. Carrying capacity of a range depends on many factors and is variable with time. An average rough estimate is good enough. It is a good policy to be conservative in this respect and thus reduce the overall estimate by 5 percent or so. The average carrying capacity of a good well managed range area in Pakistan such as Pothowar plateau is estimated to be about 5 acres per cow. Similar figure for a poor range such as Cholistan is estimated to be 100 acres per cow.
e) Uniform or even grazing throughout the range to avoid over-grazing of certain areas and undergrazing (waste) of other areas. There are numerous factors which contribute to uneven utilization of range forage by the animals. Some of the important ones are as follows.
i. Presence of unpalatable or poisonous vegetation.
ii. Distant location of watering points.
iii. Inaccessibility of certain areas and pockets.
iv. Animal behaviour.
f) Determining suitable grazing seasons by keeping in view the growth cycles of major range forage species and seasons of the year, avoiding grazing during extreme climatic conditions (stress); this being a very strong tool in either promoting (natural reseeding) or suppressing the growth of certain species. Seasons of grazing alongwith frequency and intensity of grazing can thus be manipulated to maintain a desired floristic composition of range vegetation. Season of grazing has a strong bearing on quantity and on nutritive value, palatability and digestibility of forage species.
g) Frequency of grazing during the season or interval between intermittent grazings during the season. Higher frequency (2-4 times per season) may increase the total yield and may also improve the quality as compared to one grazing per season. This is so because many grasses respond very well to frequent grazings and tiller profusely especially under prolonged favourable growing season.
h) Providing periodic rest to the vegetation from grazing (intermittent grazing, rotational grazing and deferred grazing).

i) Forced grazing and tethered grazing.
j) Forage cutting on sensitive exposed areas rather than grazing.
k) Hay making and silage making for stall feeding during non-grazing period.
l) Natural seeding
m) Weeding and cleaning (removal of woody weeds), avoiding overstocking of range by shrubs and trees i.e. stopping a range from gradual conversion into forest.
n) Controlled burning on small scale.
o) Lopping of woody forage shrubs.
p) Fertilization leading to differential growth response and prolonged grazing season.

Q-9

VII. Range Vegetation Improvement

These include occasional, but generally expensive operations which improve the quantity, quality of range forage and prolong the growing/grazing season of the vegetation. The net result is substantial and sudden upward quantum jump in the range potential. Some examples are as follows:

a) Artificial reseeding of local high yielding and palatable grasses for summer and for winter.
b) Artificial reseeding of legumes.
c) Introduction of exotic forage species.
d) Water spreading, water conservation and fertilization of extensive range areas.
e) Intensive forage production with irrigation and fertilization in a restricted cultivated area.
f) Breeding new forage crop varieties.
g) Use of bacterial inocula/mycorrhyzae.
h) Controlled burning on extensive scale.
i) Development of alternatives to grazing such as hay or silage making etc.

Q-10

VIII. Range Livestock Management

It includes all the routine operations required for keeping livestock herd viable, healthy and vigorous. Important points and operations are as follows:

a) Selecting most productive livestock which can efficiently utilize rough forage while keeping in view their physiology, grazing behaviour, climate, topography, type of vegetation, availability of water and market etc. It is always better to keep a mixed herd because it makes efficient use of varied range vegetation and it provides safety against any untowards tragic happening.
b) Grazing according to proper stocking rate of the range. Excessive animals per unit area will result into weaker bony animals which are susceptible to diseases etc. Growth rate of such animals is also slow. Too few animals result in reduced total production and promote undesirable plant species at the cost of desirable species. Carrying capacity of a range depends on many factors and is estimated either by comparison with similar nearby areas or by sampling and calculating after giving due consideration to range use intensity and frequency etc. The estimate may vary from 5 to 100 acres per cow. It is wise policy to allow grazing to a level that is slightly less than the correct carrying capacity of a range.
c) Regular culling in order to have desirable species distribution, desirable age distribution, desirable sex ratio and well behaved, healthy and vigorous herd.
d) Collecting, procuring, preparing and providing suitable feed to animals of each species, of each age class, infants, pregnant mothers and diseased animals by arranging supplementary

feed, mineral mixtures, emergency feed, oil seed cake, general purpose stomach powder and edible oils etc.

e) Providing clean drinking water at reasonable walking distance throughout the year.
f) Providing suitable shelter against storms, hot/cold winds and strong sun etc.
g) Dehorning, shearing, tagging and secluding/isolating sick animals.
h) Controlled and timely breeding.
i) Providing first aid veterinary treatment i.e. dipping, skin disinfection and vaccination.
j) Protection against predators.
k) Timely offtake.

IX. Range Livestock Improvement

It includes a few expensive operations which increase the system's potential and help overcome any unexpected catastrophe. A few examples are listed below:

a) Improving quality of livestock herd by artificial insemination etc.
b) Procuring or importing better quality animals.
c) Arranging emergency feed for periods of femine and use of synthetic supplementary feed such as Urea which will accelerate the growth rate of animals.
d) Arranging transport of drinking water during drought.
e) Arranging necessary veterinary aid for protection against epidemics.
f) Arranging transport of animals out of the drought stricken range to the market for quick disposal; similar arrangements in case of epidemics are desirable.

X. Sale of Range Products

The whole enterprize of Range Management remains incomplete unless various range products are disposed off properly and in time. It is only through the sale of range products that one may consider range objective having been achieved. Efforts should be made to maximize the return by

a) selling as many products as possible i.e. green forage, hay, wool, milk, meat, hides, skins, bones, hooves etc.,
b) selling; as much as possible; 50-70% of the herd be sold,
c) selling at the highest possible prices,
i) by discovering new markets,
ii) by eliminating excessive exploitation of middle men,
iii) by selling at suitable season when demand is high i.e. approaching Eid-ul-Adha.
d) getting last minute gain in weight by developing fattening yards and
e) selling as early as possible.

TEST QUESTIONS

1. Write brief notes on the following.
   Carrying Capacity of a Range, Range Use Intensity, Frequency of Grazing, Uniformity of Grazing, Range vegetation Improvement, Range Livestock Improvement.

2. What is meant by Principles of Range Management ? Give examples.

3. Enlist systematically various Principles of Range Management.

4. What salient points are included in the principle of "Selection of Suitable Site"?

5. Write a note on "Objective of Range Management".

6. Why active involvement and cooperation of "local people and organization" is particularly important for successful Range Management ?

7. Enlist important operations for developing a Range Site.

8. What is meant by Management of a Range Site?

9. Enlist important points pertaining to Management of Range Vegetation.

10. What important points are included in the Principles of Range Livestock Management ?

11. How can one promote sale of Range Products ?