Sustainable Rangelands in the Near East and North Africa

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Many dryland areas of the world are not suitable for cultivation and should be used for sustained livestock production (Figure 1). Such areas are usually within arid (1–74 growing days) and semi-arid (75–119 growing days) zones (FAO 1987a). One third of the world’s total land area is arid or semi-arid and half is located in developing countries. Even with irregular rain, harsh environment and fragile ecology, drylands have sustained human populations for thousands of years.

Drylands are characteristically over-populated by both human and animals (FAO/UNFPA/IASSA 1982). Advances in health, nutrition, sanitary conditions, and an unprecedented influx of imports, aid, and relief have resulted in a dramatic increase in human and animal populations. According to recent estimates (FAO 1987a), drylands are inhabited by about 300 million people, and half of the area is affected by desertification.

Financial investments to develop African rangelands (McDowell 1984) have failed because range technicians were unable to transfer knowledge to user groups, (ILCA 1987; World Bank 1989) mainly because of a misunderstanding of the interaction between the technical and socio-economic constraints to pastoral systems.

Changes in the Range/Livestock Systems

In arid regions of the Near East and North Africa, rangelands livestock production by the migratory pastoralists (nomads) is a mixed crop-animal production system. In traditional pastoral systems, vegetation supplies livestock energy requirements, and failed crop residues supplement free grazing. This system has almost disappeared in the past 10 years. The animal-vegetation interaction has been interrupted by increases in dryland cultivation, advances in mechanized transport, and water development, resulting in the disappearance of natural forages. Range forages now provide only about 20% of the feed needed by livestock in Saudi Arabia. The remainder is supplied by subsidized barley imports. Even with wheat production increased 96 times from 1969 to 1986 and barley production increased 12 times from 1979 to 1987, the country must still depend on feed imports to maintain livestock production (Kingdom of Saudi Arabia 1987). This scenario is common in Libya, United Arab Emirates, Oman and Kuwait.

In oil-rich countries herding is conducted by hired labour. When livestock owners become absentee stock owners, they are less involved in animal production and their traditional grazing concerns are replaced with opportunistic practices, such as trucking stock to greener areas.

Recent FAO projections suggest that grazing management in developing countries is moving toward intensive production and away from free grazing (FAO 1987b). This is occurring because there are no remaining grazing land reserves in the Near East and North Africa. The expansion in land use was insignificant in Oman, Saudi Arabia and Libya between 1965 and 1985 but population increased 2.0, 2.5 and 2.5 times, respectively.

The maximum projected increase in cultivated area in Saudi Arabia could reach 20% by 1995. This increase will be at the expense of the remaining vegetatively covered areas. The environmental consequences of the evolution from extensive to intensive practices deserve serious and immediate attention.

Constraints and Conventional Remedial Approaches

Interventions to improve and sustain rangelands livestock production systems in arid and semi-arid environments are many, for example: -proper stocking rates; -planting adapted plant materials; -germplasm collection, evaluation, preservation and seed production; -resting over-grazed rangelands; -growing fodder shrubs for dry season feed; -water development and harvesting; -alley farming; cultivation of food crops between rows of fast growing leguminous trees; -processing, conservation and treatment of national feed resources and crop residues; -supplemental feeding; -flock/herd structure based upon the realities of the local environment, the need of the livestock owners and complementary land use; -grazing failed food crops; -livestock upgrading through better herd management and genetic improvement; -understanding and alleviating the administrative and the political constraints; -understanding the socio-economic circumstances of the pastoral communities; -training national cadres; -marketing of livestock.

Problems in project conceptualization and formulation are generally due to limitations of time, money, people and relevant technology. Projects that are implemented with high energy inputs disrupt the traditional practices that evolved with nomads. Following ten years of research...
the International Livestock Centre for Africa (ILCA) could not identify any technological interventions that could achieve significant advantage over the traditional systems (ILCA 1987). Even when projects were judged "successful" the results were not of direct or sustainable benefit to the pastoral communities. Animal production projects supported by donor agencies (e.g., World Bank) or governments failed to achieve proper rangelands and forage production goals, because they were dependent upon subsidized feed supplements.

**The Need for a Comprehensive Strategy**  
*Lessons from successes and failures*

Rangelands in the low potential areas are vulnerable to increasing human and livestock populations. Therefore, a careful balance between conservation of the fragile resources and meeting the growing consumer needs is essential if sustained agricultural production is desirable.

The following are some experiences from dryland rangelands management.

1. The significance of the present scientific and technical “knowledge” is not a debatable question. This type of “institutional” knowledge (Hall and Dixon 1988) is not always taken for granted by the pastoral communities who have their own “local” knowledge acquired through generations and transferred orally between families and communities. Modalities which break the language barrier and which involve the pastoral communities in the process of incorporating institutional knowledge into local traditions should be developed.

2. The concept of approaching the pastoral communities as the *object* of development has proved to be a failure. Most projects and national training institutions rarely devote sufficient time to interact and exchange knowledge with the pastoral communities. This is reflected in the passive non-participatory connotations (e.g., target groups) used to describe the local populations (Hall and Dixon 1988). Furthermore, national professionals and administrators have little sympathy for local traditions, aggravating the problem in rural communities.

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**Fig. 1. World distribution of deserts and drylands.**

The map illustrates the distribution of extremely arid, arid, and semi-arid regions around the world. It shows the extent of desert and dryland areas, indicating the places where such conditions prevail.
3. Range livestock development projects usually cause more problems than they solve (Roe 1989). Members of these projects do not have direct contacts with rural communities and are stationed miles away from government authorities who could mobilize their subordinates if a request was made.

The motive for building several local institutions and Organizations—a.g., the government-supported fenced grazing areas in Libya (Sidahmed et al. 1986)—has been to impose new systems of range management. In this case the new grazing system was not adapted to the environment and this is probably because it was developed for a different society. The duration of most such projects has been short and the commitment to project implementation by expatriates and national teams inadequate.

Examples:

a) In Libya, efforts to establish *Acacia cyanophylla* failed. In this instance knowledge was not a constraint because it was known that new growth was stimulated by cutting. Expatriates emphasized the importance of cutting this fodder shrub at 3-year intervals, but could not identify a practical management approach. The working force in one 11,815-ha area was a limited number of untrained government technicians and alien herdsmen. The local livestock owners were not allowed to utilize the area and were never consulted. Most of the trees died until utilized before their expected life-span.

b) Several development projects in the Sudan were plagued by problems (Thimm 1979). One project attempted to fence 20,000 ha and run it cooperatively with 50 families of settlers. All biophysical and infrastructural inputs, including mobile clinics, were provided. The carrying capacity of the fenced area was far below the number of animals owned by the settled families. Rather than reducing herd numbers, the nomads kept a portion of their animals outside the fences and a portion inside. This solution was a continuation of nomadism.

Both examples are failed attempts in spite of large financial investments. While the herder community was totally excluded in the Libyan experience, the Sudanese project treated the herdsmen as objects whose culture could be readily changed. This was an invalid assumption.

4. In some instances range livestock development programs were focused only on animal, plant, water and soil factors. Traditional resource management practices were ignored and condemned as irrational and destructive.

The rapid increase in the human population in dryland areas has led to herd fragmentation among heirs. The present pastoral families own smaller individual herds or flocks and cannot afford to destock, which could materially affect the family's subsistence. Any future planning to protect the rangelands environment should face the reality that traditional pastoral systems are disappearing. The challenge of the present and the future is how to maintain a sustainable alternative production system.

5. Pastoralists practice several social activities deeply rooted in their traditional lifestyle; some, such as herding and migratory movements have been discontinued or mechanized (e.g., trucking livestock to remote pastures). The social and cultural traditions of marriage, generosity and social gatherings are still maintained and in most situations, exaggerated by the increased wealth (e.g., Gulf States). Family consumption of resources has consequently increased, imposing net losses on small family operations.

6. Nomadic communities practice a selective process of incorporating new technologies into their traditional systems. Proposals which are justifiable from the technical point (e.g., de-stocking, diversification of livestock species) may not be socio-economically acceptable. Some pastoral communities consider rearing camels or cattle of higher prestige than raising sheep or goats. The change in livestock class has been imposed by new governmental policies. The rapid increase in non-conventional production inputs such as transport machinery and feed supplement has transformed traditionally subsistence systems into commercial operations. Pastoralists place great cultural value on tribal communal societies, while the commercial operators develop market-oriented systems in order to satisfy outside consumers (e.g., urban dwellers). The increasing demand for cash is affecting the family herd/flock composition and size. Abundance of water points and availability of trucks to carry small stock to remote rangelands favoured the shift from camels to sheep in Saudi Arabia, Somalia and Libya. The increased reliance on subsidized supplemental feed resulted in a sharp increase in the population of small stock between 1965 and 1988 in Kuwait, Oman and Saudi Arabia. The concentration of sheep and goats in the early spring growing season is degrading vast areas.

7. *Individualization* or the establishment of individual rights to specific grazing territories as opposed to communal territories is becoming an important issue facing governments involved in setting land tenure policies. Herd size per family, social structure and seasonality of resource production, make implementation of the individualization concept in the dryland areas impractical and impossible. Also privatization might encourage dryland farming in locations not suitable for cropping.

8. Government-imposed policies and actions resulting in the abolition of the traditional administration system (e.g., Sudan) without providing effective alternatives, aggravate conflicts between tribes and distort the traditional laws (urfi) governing communal grazing, thus inflicting drastic deterioration on the rangelands. The mutually beneficial relations between the farmers and the pastoralists have deteriorated and trespassing has caused personal conflicts harming both arable and grazing lands.

9. Most of the rangelands development projects invested, to some extent, in training, in-country or abroad. Several countries provide range livestock management curricula. In general, most efforts are less than desirable or ineffective because they are not supported with an institutional infrastructure. Highly trained professionals from low income countries migrate for socio-political
reasons. On the other hand, training in some high income dryland countries was ineffective because national counterparts tend to rely upon expatriates in performing most of the technology transfer and management activities.

**Recommendations**

1. **To adopt a comprehensive approach of Planning, Implementation, Evaluation and Monitoring of Rangelands Livestock Development Projects**

Dramatic changes have afflicted pastoral communities of the overpopulated rangelands (no return to the past). The extent of deterioration and the noticeable failure of several development projects created a growing awareness about the fragility of these resources. The need for a systems approach that generates a better understanding of the complexity of rangelands production systems became essential. However, in most cases implementation was limited to restricted areas. Also, the approaches themselves were not comprehensive (i.e., incomplete teams; restriction to only few phases of the process), or did not stress the involvement of the pastoral communities, or were lacking acceptance or recognition by institutions, governments and planners.

As global awareness for sustained production evolved, comprehensive approaches which emphasized the importance of the “whole” rangelands ecosystem were developed (Winrock International 1984). To implement these approaches the following pre-requisites should be considered seriously:

(i) It must be understood that a “multidisciplinary team” means a thoroughly organized team of local communities, socio-economists, policy makers, administrators and biophysical technologists.

(ii) Flexibility must be exerted when allocating “funds” and setting “time-frames” for the early phases of development, project conceptualization and formulation.

(iii) Any systems approach (e.g., Farming Systems Development) should assist in identifying constraints and priority problems of the stock owners; and should consider protection of the environment during all development processes.

A highly sophisticated level of organization and commitment based on the “appropriate” knowledge must be adopted to assure sustainable rangelands resource production for present and future generations. Here I quote Emery Roe (1989):

Thus the good news for project designers is that livestock rangelands projects are still needed in Africa. The bad news is that the real need is for a new type of project that most livestock rangelands specialists have not been trained to undertake.

2. **To Develop Long-Term Monitoring Systems for Rangelands Ecosystems**

The rangelands ecosystems are diverse, extensive and vulnerable. As the process of improvement intensifies to meet the demands of a growing population, the rangelands ecosystem changes. The National Agricultural Research Centres (NARCs) as well as Ministries of Agriculture must establish long-term monitoring systems for gathering and evaluating information in the following areas:

- Trends in vegetation composition as affected by grazing.
- Trends in the pastoral economy as affected by modernization.
- Trends in family size, communal ownership, consumption needs and habits, family labour, etc.
- Absentee ownership of stock; poor herders; alien shepherds.

3. **To Involve Pastorals in Local Leadership and Administration**

To encourage the involvement of the pastoral communities and the local leadership in the local administrative structures and in rangelands protection and management activities.

4. **To Integrate the Pastoral Sector in the National Economy and Policy**

The central governments could play a decisive role in this regard by encouraging pastoral production systems to achieve stable economic returns without exaggerated subsidies, (e.g., feed supplements in the form of grain or hay). The positive and mutual benefits from the mixed crop-livestock systems should be encouraged. For example, the animals could utilize the crop residues while providing organic nutrients to the soil.

5. **To Establish Legislation Regulating Land Tenure and Communal Grazing**

There are several examples where years of work to improve rangelands were destroyed in one season due to trespassing and unauthorized grazing. Regulations alone are not sufficient. Parallel efforts of community involvement, incentives and rewards as well as effective extension of knowledge should be provided.

6. **To Upgrade the Local Institutions**

To strengthen the technical and administrative presence and facilities in the rangelands areas. As most national government officials prefer living in urban areas, incentives, living conditions and career prospects should be provided to encourage living in the rural areas.

7. **To Restore and Rehabilitate Degraded Rangelands Through:**

a) **Reduction of the stocking rate:** This could be achieved through destocking, a difficult and unpopular alternative which could be implemented through sound management practices, feed security, improved oftake and marketing and reduced imports of subsidized feed grain (i.e., barley in Saudi Arabia and Libya).

b) **Reduction of human population pressure:** by redistribution of surplus (preferably in family groups) to less populated and less vulnerable areas; or through family planning.

8. **To Improve Production and Utilization of Feed from Local Resources**

This approach should help alleviate the pressure on rangelands and at the same time assures sustainability. Examples:

—Processing, conservation and treatment of natural
feed resources. Encouraging fodder harvesting (for hay or silage) and chemical treatment of ungrazed mature annual plants.

—Creating national feedbacks for storage and distribution of surplus feeds (grains, straw). However, this approach is not practical unless carefully planned and executed by the livestock owners.

—Developing an early warning system and a mechanism to forecast grazing and livestock conditions.

—Establishing improved local livestock marketing policies and organizations.

9. To Improve the Efficiency of Livestock Production:

This could be achieved by reducing nutritional, health, management, breeding and socio-economic constraints. A location (or site specific) constraint analysis is a useful tool to identify the priority problems in each pastoral production system.

10. To Strengthen National Institutions for Research, Extension and Training

The National Agricultural Research (NARCs) in the developing countries are relatively underfunded, understaffed and somewhat bureaucratic. They display some bias towards disciplinary basic research, whereas current problems need to be addressed by multi- and inter-disciplinary applied and adaptive research. Also livestock research receives less attention compared to crop research. Accordingly, the number of the national scientists and the technological interventions are very few, particularly in the rangelands livestock sector (ILCA 1987). The challenge to loosen the constraints on sustainable production in these areas falls to the International Agricultural Research Centres of the CGIAR, particularly ICARDA, ILCA, and ISNAR. The NARCs in the Near East and North Africa regions should therefore strengthen their ties with these centres and other related institutions.

National research programmes should be developed based on thorough knowledge of the local experiences and should involve the community members in designing and implementing the field trials. Periodic revisions of these programmes must be undertaken by multi-disciplinary “teams” in order to assess whether sustainability requirements can be met.

—Extension is the most important link between the researchers and the farmers, and is often overlooked when transferring “knowledge” to pastoral communities. As mentioned earlier, there is a language barrier for what is essentially a two-way knowledge transfer mechanism. Extension could be strengthened by involving highly motivated pastoral community oriented “agents”. These “agents” should act both ways reflecting knowledge, experience and problems of the pastoral communities as well as transferring new innovations to the pastoral systems.

—Training cannot be effective unless attached to the local environment. Students at all levels should be required to participate in pastoral surveys and field data collection. Training abroad is equally useful but should be provided to individuals who have already developed good knowledge of the local rangelands conditions. Joint abroad/in-country training programmes should be encouraged in order to provide the national counterparts with the opportunity to interact and exchange experience with other institutions.

Conclusion

Effective technological interventions towards sustainable development of rangelands/livestock systems in the Near East and North Africa regions are insufficient. Sustainable development requires a comprehensive participatory approach, involving pastoral communities, socio-economists, policy makers, administrators and biophysical technologists in all phases of planning, implementation and evaluation of activities. Regional and national institutions are encouraged to strengthen their ties with the international development agencies, and to devote more attention towards multi-, inter-disciplinary applied and adaptive research, strongly linked with extension and human resource development.

Literature Cited


