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Pastoral Rangelands in Sub-Saharan Africa: Strategies for Sustainable Development

The sustainable use of communal rangelands in Sub-Saharan Africa demands more effective range management. Between 1945 and the late 1980s, overgrazing was the prime cause for approximately half (49%) of the 494.2 million hectares of degraded land in Africa. A re-examination of the assumptions underlying range management and pastoral development has led to a set of propositions with respect to carrying capacity, vegetation succession, range composition, land degradation, and some aspects of the planning and implementation of range management projects. The study, **Sahel Operational Review : Status and Lessons Learned**, emphasizes the merits of refining and adjusting, rather than eliminating, traditional pastoral range management practices.

Carrying Capacity

One of the important reasons for the failure of range management projects is that there does not seem to be consistency in the definition of one of the pertinent variables in ecology: carrying capacity. Simply put, this represents the number of animals that a certain rangeland can sustainably support. The measure of carrying capacity is important as it determines whether the range is eventually regenerated or destroyed.

Until now, the mainstream approach has been the 'succession theory,' defined as the orderly and directional process whereby one association or community of plant species replaces another. This theory assumes that a single, persistent and characteristic vegetation type would dominate a particular location based on the climatic condition and soil type. If this vegetation was disturbed, it would return through a successional sequence. It was thus necessary to balance grazing pressure and the natural regenerative effort of the plants. Carrying capacity was previously determined by the density of the livestock population at which this balance is achieved.

Wildlife population biologists have always had a broader definition of carrying capacity, which may have important implications for pastoral range management. Plant and herbivore populations are compared at alternative stocking densities to arrive at technically feasible combinations of plant and animal densities. Ideally, the increase in animal numbers will be checked by the declining availability of biomass.

The ecological carrying capacity is the point where the rate of forage production equals the rate of its consumption by the animals. The livestock population ceases to grow due to limited feed supplies resulting in death rates equalling birth rates. At this point of equilibrium, there is no surplus production of animals or biomass. However, the animals may not necessarily be in good condition.

Denser vegetation and healthier animals can be obtained by maintaining fewer animals, as at the economic carrying capacity. Managers need to maintain different offtake levels in order to support different combinations of animal densities. A sustainable offtake rate can be defined as the point of maximum sustainable yield. It occurs at the point where the animal population is increasing most rapidly. The stocking density at this point is referred to as the economic carrying capacity. Increases in animal population beyond this point causes the offset to fall as high rates of mortality and falling birth rates reduce the possibility of offtake maintaining stable animal numbers.

Non-equilibrium in Systems

This discussion of carrying capacity assumes that the conditions for plant growth remain the same. In practice, physical factors such as rainfall and temperature do fluctuate and cause changes in plant growth. If such changes are intermittent and consequently peripheral, it may still be valid to analyze such a system as being in equilibrium. However, if the disturbance is frequent and seems to dominate events, then it can be considered as part of the system, and due weightage can then be assigned to it.

Ecological Heterogeneity, Herd Mobility and Species Composition

Two strategies that pastoralists have traditionally used to manage livestock in the presence of ecological heterogeneity is herd mobility and adjustment of species composition. As a natural response to range heterogeneity, pastoralists have moved their herds. The strategy for herd mobility is to move herds sequentially across a series of environments such that each reaches its peak carrying capacity at the time of visit. Thus, mobile livestock producers are able to maintain a larger population of herd within a wide geographical region than several separate herds confined to their individual locations. Herd mobility can be considered as one of the important strategies in range management. Allowing flexibility of movement by pastoralists therefore enhances the optimal use of a heterogeneous environment.

Managing a variety of species helps to take optimal advantage of the heterogeneous nature of ecosystems. The pastoral strategy is to use a broad array of species (cattle, camels, sheep and goats) which utilize different parts of the forage and have varying resistances to drought. In such a multi-product setting, where a pastoralist operates different livestock production systems, a decision must be made as to the stocking rates for each type of system. This can also be considered as a decision to diversify sources of income and is consistent with risk management.

Involving Local Pastoralists

Previously, pastoral activities were considered counterproductive and ecologically destructive. Their land and resource management activities were consequently suppressed. Some of the actions taken against them include delimiting boundaries and restricting livestock. Current thinking indicates that pastoralism is an effective response to the uncertainties of a difficult natural environment and to eventually increase the productivity of land.

For example, pastoralists are known to destock and restock in response to droughts and other hazards. Experience and analysis indicate that the livestock numbers associated with these traditional responses rarely reach a proportion that can cause irreversible damage.

Experience also suggests a movement from blueprints handed over from government offices towards adaptive learning, involving pastoralists. When policies are mainly directed from the central government, they have usually not been successful. The involvement of pastoralists is important in the planning and implementation stages of range management and pastoral development programs. This will facilitate the adaptation and dissemination of these practices.

Key Propositions

Some conclusions that have emerged on the basis of past experience are:

- The carrying capacity of a rangeland does not depend solely on botanical characteristics but also on the management practices of rangeland users. The ecological carrying capacity may differ from the economically profitable stocking rate, the latter being more sustainable.
- Dryland ecosystems may not necessarily be at equilibrium, given that animal and plant population ratios are constantly changing, due to varying weather conditions such as rainfall, and hazards such as fire. These changing conditions make it difficult to predict the status of an ecosystem at a particular point in the future.
- The ecological heterogeneity in African rangelands, leads to spatial variability in the production of biomass. This is explained by the differences in productivity (high and low range productivity), elevation (up-slope and down-slope), soil type, soil moisture content and soil fertility.
- Land degradation is not necessarily the result of pastoralism, as has previously been assumed. The perceived factors leading to environmental degradation can be listed as:
 - unfavorable weather conditions, such as variations in rainfall patterns;
 - recurrent drought;
 - civil wars and conflicts; and
 - economic decline.
- Range management projects must be designed with the involvement of local pastoralists in the planning and implementation stages.

Some guiding principles of an institutional nature for range management project design include the following:

- Long time-frames (15 years or more) are needed for the planning stage, given its iterative nature with the involvement of pastoralists.
- Projects must usually start small and build up, focusing on local institutional capacity building.
- Since these projects are generally experiments, there might be a need to change course. Institutional and organizational flexibility are important to allow such responses.

- There is a need to build up sound monitoring and evaluation mechanisms and learn from experience.
- A diversity of different organizations may be needed to tackle the complex challenges. These may include pastoral organizations, service NGOs, producers' federations and government.
- A sound macro-policy environment is essential.

Less centralized regulation, the devolution of control over resources to local users, the servicing of local needs and the systematic monitoring of the implementation of rangeland projects and programs are key to effective range management. Redesigning current pastoral development policies in the context of the recommendations made by this study will go a long way towards ensuring the sustainable development of pastoral rangelands in Sub-Saharan Africa.

Associated Studies

Behnke, R.H. and Ian Scoones 1992. *Rethinking Range Ecology: Implications for Rangeland Management in Africa*. Working Paper No. 53. Technical Department, Africa Region, The World Bank, Washington, D.C. Also in R.H. Behnke Jr., Ian Scoones and Carol Kerven. 1993. *Range Ecology at Disequilibrium*. Overseas Development Institute, London, U.K.

Scoones, Ian. 1993. "New Directions in Pastoral Development in Africa." In *Living With Uncertainty*. 1993. Intermediate Technology Publications Ltd., London, U.K. Collection of papers presented at a workshop co-funded by the World Bank, 1993.

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Lusigi W. J. and John Buursink. 1994. ***Sahel Operational Review: Status and Lessons Learned***. AFTES Paper # 11. Environmental Policy and Planning Series. Technical Department, Africa Region, The World Bank, Washington D.C. For copies of this study, please contact Ms. Leita Jones, Room J3-263, The World Bank, 1818 H Street NW, Washington, D.C. 20433. Tel.no. (202) 473-5030.

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