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Livestock , rangelands and grasslands-a specific case for the management of genetic resources for food and agriculture

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Introduction Biodiversity , the variety and variability of animals , plants and micro-organisms at the genetic , species and ecosystem levels , is important to sustain key functions of ecosystems , their structure , processes , and services . Agro-ecosystems are ecosystems in which humans exercise a deliberate selection on the composition of living organisms ; hence they continue to co-evolve with economies , cultures , knowledge systems and societies . They contribute to food security and rural development and provide ecosystem functions and services . Although plant and animal genetic resources interact in many ways , their most direct interaction is in grasslands and rangelands , ecosystems which cover more than 25% of emerged lands and can only be productively used by ruminants . Many rangelands are the result of the co-evolution of livestock activities with other components of the ecosystem , including plants , forests and wildlife . Although they appear natural , some rangelands are very old , and grazing by herbivores has changed the composition of landscape and vegetation even before human interference . Other rangelands are very recent formations , created by man .

There is currently no evidence of direct dependence of specific breeds of livestock on specific plant varieties or vice versa . However , both specific animal breeds and types of rangeland-with specific vegetation compositions-are often dependent on each other as they are both adapted to specific climatic and other environmental conditions . A case in point is the problem of the invasion of grasslands by shrub species as a typical manifestation of degradation and a serious environmental and economic problem . It is now recognised that the natural flora , particularly that of areas under protection for nature conservation purposes , may only be maintained through well managed grazing by livestock . This implies the need to maintain livestock breeds that are adapted to those particular environments .

Threats to biodiversity in rangelands Driven by poverty , population growth and other factors , humans increasingly expand into the marginal land frontier . Currently at least 20% of rangeland are estimated to be degraded . This leads to a decline of rangeland productivity , and subsequently also a decline of livestock productivity , with major economic and livelihoods implications . Besides a loss of biodiversity , there is an evenly unquantifiable loss of ecosystem functions , e .g . C-sequestration or water retention . Because of the marginal nature and location , many rangeland livestock breeds and plant species have not been characterized , and knowledge gaps prevail on rangelands ecosystem functioning and services . Animal and plant genetic resources in rangelands share many of the same threats and risks of erosion . Climate change has recently been recognized as an additional factor driving the erosion of genetic resources . Yet , erosion of genetic resources threatens the ability of pastoralists to respond to environmental and socio-economic changes , including the effects of climate change itself .

Solutions Better characterization and data collection would foster better recognition of the values and manifold roles of plant and livestock diversity in rangelands . Apart from the need to better understand the diversity of livestock breeds and legumes , and their values , we must also gain a better insight into the relationship between both types of genetic resources in rangeland environments . Only then will governments and other stakeholders be able to fully appreciate this biodiversity and make strategic decision for their conservation and use .

The *International Treaty for Plant Genetic Resources for Food and Agriculture* that entered into force in 2004 obliges contracting parties to develop and maintain appropriate policy and legal measures that promote the sustainable use of plant genetic resources for food and agriculture . Some forage species are included in its list covered under the multilateral system of access and benefit sharing . The *Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture* is important to support the Treaty . The *Global Plan of Action for Animal Genetic Resources* was recently adopted by FAO member countries as the first international framework for the sustainable management of livestock biodiversity in all production systems . It puts special emphasis on the ecosystem approach and on the role of small-scale livestock keepers and pastoralists as custodians of biodiversity . The paper will provide an overview on how these instruments can support the sustainable use of biodiversity in rangelands .

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