

Action Plan for the International Year of Rangelands and Pastoralists (IYRP): The Case for Mexico

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Key words: communal land, complex socio-ecological systems, co-generation of rangeland knowledge

Abstract

Drylands cover over 50% of the Mexican terrestrial land; their high spatial and temporal dynamics reflect the constant coupling and decoupling between ecology, culture, economics, and policies, and thereby humans and land, i.e. pastoralists and rangelands. Since the Mexican Revolution at the beginning of the last century, a large fraction of these rangelands has become communal, so-called *ejidos*, where *ejido* members have the right to use the land for livestock production. These land reforms included important shifts in institutional arrangements and land governance structures favoring a large rural peasant population including pastoralists. In 1992, however, the amendments in Article 27 of the Mexican Constitution – driven by neoliberal policies – launched a wave of transformation in rural land tenure with strong impacts on the multifunctional pastoralist–rangeland landscape systems. The privatization of communal land had immediate biophysical consequences through the fragmentation and fencing of land: the building of earthen dams, high grazing intensity, land degradation, alteration of ecohydrological processes and landscape function, and the provision of rangeland ecosystem services for pastoralist communities and human well-being at large. Besides, the limited access to land triggered social conflicts and the disruption of pastoralist social structures, to the point of jeopardizing the future of the *ejido* as a local institution of governance.

A general disconnect of the general public from nature, high poverty and migration levels, an amounting degree of insecurity associated with illicit drug trafficking, together with inadequate land use policies in the light of climate change and socio-environmental contexts and the competing interests in land use such as urbanization, mining, investment in renewable energy are major obstacles for pastoralists to be perceived as key stakeholders and decision makers to achieve sustainable production in rangeland landscapes.

Newfound interests to strengthen communal efforts should target rangelands as social-ecological systems and providers of multiple biotic and cultural ecosystem goods and services, whose demands will eventually stimulate the generation and maintenance of highly diverse multifunctional landscapes. Fostering and incorporating local knowledge systems with participatory research will naturally lead to adaptive (to drought, price shocks, etc.) management and local innovations and thereby enhance local food security, pastoral livelihood development, and rural sustainability.

Introduction

Mexican rangelands and pastoralists are highly diverse, interconnected socio-ecological systems spreading across a wide range of latitudes, altitudes, meso-climates, physiographic regions, soils, and ecoregions. The desert grasslands (US denomination) or semiarid grasslands (Mexican denomination) encompass the southern extension of the vast contiguous North American Grassland biome spreading from Canada through the United States to Mexico. These grasslands have evolved over millennia under nomadic grazing by large bison herds, recurring natural fires, and highly variable climatic conditions. With the introduction of domestic livestock during colonial times, large cattle herds (in tens of thousand) owned by large haciendas, gradually displaced the bison herds and expanded from the grasslands to the more abundant shrubland ecoregion (scrubland, matorral). With the expansion of the rangeland types, livestock production got increasingly diversified (goats, horses, donkeys, mules, among others). The current extension of rangelands in Mexico corresponds basically to the drylands covering of up the 50% of the terrestrial surface. Marked social upheavals triggered by the Mexican Independence (1821) and Mexican Revolution (1920) did not only transform the socio-political arena of this country but had strong transformative influences on the rural sector, a large peasant population and the dryland landscape.

With the introduction of land reforms and new land ownership legislation, the communal land-tenure system (*ejido*) was created to provide usufruct rights to peasant communities (called *ejidos*) under the oversight of federal government and involving cumbersome bureaucratic pathways including the registration process, i.e. official acknowledgement of the *ejidos* in a National Agrarian Registry. However, in the wave of the emerging neoliberal economic capitalist model, the large peasant population locally organized in communal land tenure systems and the subsistence agricultural sector suffered increasingly from retractions

of government support, which ultimately culminated in the 1992 legislative change in the Mexican Constitution (Art. 27) opening the communal/ejidal land to privatization and sale. These profound transformations in the socio-political structure of the Mexican agrarian sector over the past 100 years, greatly impacted the Mexican rangeland socio-ecological system both as an institution and as a sustainable production system with clear impacts and divergences in the implementation of management, conservation and development practices compared to the North American grassland and rangeland counterparts in the United States of America and Canada. Hence, we consider it worthwhile to treat the Mexican rangeland region as a separate case study with the larger North American region, where we highlight the differences and similarities both with the North American rangelands from a biological/ecological perspective and with Latin America from a historical shared socio-political background (Grünwaldt et al. 2016). Identifying and acknowledging this apparent transitional position of Mexico from a socio-economic and ecological/biophysical perspective may open opportunities to bridge cultural and socio-economic differences, encounter hidden opportunities of synergies in sustainable development and pave the road for transboundary and cross-regional partnerships.

The contemporary rangeland/pastoralist landscape and perspective of Mexico

Local rangeland socio-ecological systems have coevolved over many centuries representing diverse land tenure systems in different ecoregions. This process of coadaptation has shaped a great diversity of pastoralist livelihoods and generated profound local, environmental and indigenous knowledge on wild, semi-domesticated and domesticated animal husbandry, drought adaptation, animal breed functions, husbandry conditions, among others (Mora Ledesma 2016). Pastoralist communities are nomadic, semisedentary or sedentary depending on whether they raise livestock only or combine livestock production or wild animal care (whitetail deer, bighorn sheep, in form of “Unidades para la Conservación, Manejo y Aprovechamiento Sustentable de la Vida Silvestre”; UMAS) with rain-fed agriculture in case of agro-pastoralists. Local and regional animal breeds were originally selected for their functions, and only those that adapted best to the environment, husbandry conditions, and the demands of their holders survived. Increasing growth in the commercial production of livestock in response to increasing beef markets worldwide, in particular in the United States and Europe, however has drastically shifted the original vocation of rangelands in Mexico. While attractive from a local household economy perspective, high heterogeneity in rangeland production potential has contributed to a pronounced inequity among livestock producers and rangeland condition. While private ranchers own vast productive semiarid and arid grassland (short-grass steppe or desert grasslands), communal rangelands expand in less productive ecoregions dominated by desert scrub and succulent shrublands. Hence, it has been the rancher class (*ganaderos*) that practices livestock production in the more productive semiarid grasslands that has been actively responding to trade opportunities such as the North American Free Trade Agreement without suffering land degradation, while ejido land has undergone greater pressure from people and livestock with pronounced declines in their potential to provide ecosystem goods and services and on their well-being (Martínez et al. 2020).

However, it is fundamentally important to maintain highly diverse rangeland ecoregions as life-support systems for a large rural population mostly depending on livestock production (65% cattle, 29% goats, 5% equines) to avoid urban and cross-border migration (Leighton Schwarz and Notini 1994). The current state and integral condition of Mexico's native rangeland socio-ecological systems in the drylands regions, is poorly understood. The grassland biome of Mexico is a great exception, as national and international organizations and U.S. agencies have invested great efforts to protect and conserve the biodiversity of these ecosystems and promote their sustainable use (CEC 2015). In Mexico, 63% of natural grasslands are privately owned, 29% are communal land, and 7% is federally owned land (55 Natural Protected Areas) (CEC 2015). No comparable statistics are available for the Mexican shrublands, covering up to 70% of Mexican drylands, including UNESCO Biosphere Reserves, which are however the most abundant rangelands used by communal pastoralist communities, with little to no alternative income (besides occasionally remittances or ecotourism) (Martínez Tagüeña et al. 2020).

Land use pressure has mostly affected communal rangelands, human population growth and strong competing economic interests in development have promoted urbanization, mining, megaprojects such as greenhouses, windparks and solar panel infrastructure, fossil fuel extraction through fracking, among others. Increasing degree of land degradation /desertification, frequency of droughts, national one-size fits all government programs (e.g. PROGAN, PROCEDE) have maintained many farmers in dire production – degradation socio-ecological traps, which often enhances overexploitation, poverty, land abandonment and migration. The previously mentioned recent shifts in land tenure from communal to private land, promoted by the capitalist government program PROCEDE has opened *ejidoland* in the land market with opportunities

for livelihood diversification, however at the cost of rangeland parcelation and fragmentation, requiring an increasing number of installations of watering points including the establishments of earthen dams thereby drastically modifying rangeland ecohydrological processes and consequently the erosion of the provision of ecosystem goods and services. The conversion of communal to private rangelands is ongoing with yet unforeseeable mid- and long-term risks of the loss of resilience of pastoral communities and rangelands as integrated socio-ecological systems. While the privatization of communal rangelands is ongoing and driven short-term economic incentives, the fundamental communal based social organization of ejidos is directly linked to and dependent on landscape scale issues. Under these most recent socio-political transformations new questions arise: As local institutions, what new social status will pastoralist ejidos adopt in decision-making on the use, management and conservation of rangelands? What role and opportunities will the local, state and federal government agencies commit to and promote in the light of guiding Mexican rangeland socio-ecological systems through the United Nations Sustainable Development Agenda, the Decade of Ecological Restoration and the Decade of Family Farming. Aiming for collective multistakeholder participation such as the formation of local, regional (co-generating rangeland knowledge within United States of America and with Latin American pastoralist countries), and transboundary partnerships could foster urgently needed alternative rangeland/pastoralist development pathways that prioritize the local needs, interests and opportunities and that enrich and feedback on a comprehensive understanding of the great diversity and adaptive capacity of local livestock farming systems (Tenza et al. 2019, Martínez et al. 2020) and the emerging regional role of local rangeland stewardship to tackle climate change by linking people to nature and by sustaining local cultural links to rangelands (Chapin 2020).

The International Year of Rangelands and Pastoralists could and should help shape the future of Mexican rangelands as sustainable lifelines for diverse pastoralist communities that strengthen human well-being at large; as a reservoir of high genetic, taxonomic, endemic, biotic, functional, socio-cultural diversity linked to diverse complementary knowledge systems; by bridging and connecting among diverse groups and stakeholders, mental models, conceptual pitfalls and epistemological, ontological and teleological debates and narratives, disciplines, watersheds, policies, i.e. hard, soft and geographic and regional boundaries to the North and South.

Hence, we propose the following priority areas for raising awareness and reducing knowledge gaps:

Issues affecting rangelands and pastoralists

- Privatization of communal land and fragmentation of rangeland socio-ecological systems
- Lack of recognition and hence support of (nomadic) pastoralist identity, social organization and governance structures
- Land use change driven by megaprojects and interfering with transhumance pastoralist groups
- Climate change consequences including mega-droughts and flooding coupled with strong wind and water erosion
- Remoteness from central decision making and lack of access to basic services (health, education, communication, infrastructure, energy, water, food)
- Migration and loss of local generational pastoralist knowledge
- Lack of access to existing markets and of capacity to commercialize alternative rangeland products and services

Knowledge & science gaps about pastoralism and rangelands

- Understanding rangelands as complex socio-ecological systems and their multi-scaled nature
- Decipher (historic) land management signals from inherent landscape heterogeneity for the development of best management practices
- Insufficient participatory research to collectively assess the socio-economic, cultural, and ecological values of rangelands to ranchers/pastoralists
- Lack of understanding of impact of adaptive management practices in diverse rangeland ecoregions on the linkage between the carbon and water cycles as a proxy for climate change mitigation
- Lack of recognition of (changing) pastoral identity, and significance of mental models and traditional knowledge in ranching practices
- Lack of understanding of evolving impact of inappropriate government help programs, land tenure policies on rangeland condition, landscape – watershed function, restoration and communal (social) organization
- Lack of knowledge of high diversity of local traditional adaptive livestock production systems including locally adapted breeds

- Lack of attention to local needs and interests of ranchers/pastoralists in diverse rangeland landscapes
- Lack of research on the synergistic role of pastoralism in achieving sustainable development goals

Actions proposed to acknowledge and foster stewardship roles of pastoralists to sustainably manage diverse rangelands

- Promote transdisciplinary partnerships (academia, pastoralists, public sector) that advocate and support low income/subsistence seminomadic ranchers/pastoralists and their role as rangeland stewards
- Lobby for rancher-science-policy nexus to foster policies for sustainable development grounded on complex socio-ecological systems understanding
- Develop participatory rangeland monitoring-assessments protocols with pastoralists and user-friendly field-based data collection technology as a hands-on tool to understand and manage variability
- Assess the impact of privatization of ejidos on pastoralist household economies, social organization and rangeland functioning
- Promote awareness-raising of high diversity of traditional rangeland-pastoralists systems through IYRP
- Co-generate a participatory research agenda to promote pastoralist partnerships to contribute achieving the sustainable development goals (climate action; equity: gender, economy; food security; rangeland conservation; among others)
- Co-assess potential pathways for a new rangeland/pastoralist narrative from resilience to transformation as an adaptation to climate change
- Propagate rangeland biosphere reserves and natural parks as socio-ecological flagships for biodiversity conservation
- Develop a dynamic map of rangeland biodiversity hotspots
- Generate and support virtual and in situ pastoralist-to-pastoralist exchange programs to foster cross-fertilization of farming experiences under changing climates, between the North American and Latin American region and cultures
- Support young pastoralists in diversifying their livelihoods linked to complex socio-ecological production systems
- Encourage and establish local governance institutions that are nationally acknowledged and supported
- Identify all socio-political and economic cross-scale interactions that influence and control local rangeland/pastoral systems

Acknowledgements

We thank the International Network for Dryland Sustainability (RISZA) and PRONATURA Noreste for supporting the initiative of the International Year of Rangelands and Pastoralists.

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