

Forgotten Services, Diminished Goods: understanding the agroecosystem of pastoralism

- The values of pastoralism are diverse and multi-sectoral: Governments must adopt an overarching policy objective of sustaining and building pastoralism that transcends sectoral policy dialogue.
- Understanding of the multiple values of pastoralism remains poor: Governments must allocate resources to improve understanding of pastoralist systems and to routinely gather appropriate data on the real values of pastoralism.
- Pastoralism is much more than an agricultural system: Governments must promote the environmental services and other indirect values of pastoralism that have implications for the national population.

Introduction

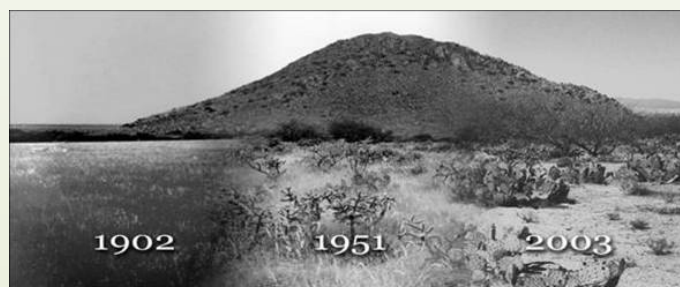
Mobile pastoralism has proven to be an economically efficient land-use system in many rangelands, and alternative uses of the rangelands often come at an environmental and an economic cost. However, the magnitude of those costs is poorly understood and government planners frequently make poorly informed choices over investment and policy in the rangelands. Countries with significant rangeland areas cannot sustainably build their rangeland economies without knowing where the values of pastoralism lie, and if unsustainable alternatives to pastoralism continue to be promoted, the costs will increasingly be felt beyond the boundaries of the rangelands.

Understanding where the values of pastoralism lie and understanding their magnitude are two very different challenges. For practical purposes, the values can be thought of as falling into two broad sets: direct and indirect. Direct Values are those goods and services which can be consumed or processed directly, such as milk, meat, fibre, hides, as well as less measurable outputs such as employment and transport. Goods and services which cannot be consumed or used directly are referred to as Indirect Values, and include measurables, such as inputs to agriculture or tourism and linkages to the wider economy, as well as less easily measured values such as environmental services, culture, and risk management.

Although many of these values are hard to pin down, their loss is felt as a real cost by many people both within and outside the pastoralist system. In many countries, particularly in the developing world, pastoralism is under threat, and the threats are driven to a large extent by the view that there are alternative land-use systems that will generate higher incomes, or will provide more exportable goods. Comparing pastoralism with other production systems on the basis of a narrow range of values, or inappropriate analysis, encourages unsustainable development that increases poverty and environmental degradation. To counter this it is necessary to change the way decision makers view pastoralism, and the rangelands more broadly.

Contribution of pastoralism to national and local economies

Despite the widespread opinion that pastoralism is not an economically viable or rational livelihood activity, it contributes significantly to the GDP of many developing country economies:



Results of 100 years of rest on the Santa Rita Experimental Range near Tucson, Arizona (western U.S.)

for example, about 20% of GDP in Kyrgyzstan, 30% in Mongolia, 8.5% in Uganda and 10% in Mali. In these countries no other drylands production system is more productive or supports as large a population, and although pastoralism faces many constraints it remains the only viable option for many rural populations.

In countries where industrial production and services are the most important and dynamic sectors of the economy, the contribution of pastoralism to national economies is low: for example, pastoralism represents only 0.19% of Spain's GDP and 0.2% of Australia's. In a mineral export country like Peru, Alpaca pastoralism contributes only 1.5% of the country's agricultural GDP, and therefore it may make more sense to base pastoralist policy on the expected returns of alternative uses of marginal land rather than on the contribution of pastoralism to the total national economy.

Basing policy dialogue and planning on the contribution of pastoralism to GDP can be misleading as it inevitably overlooks important values of pastoralism that are not readily captured in national accounts. For example, pastoralism plays a role in maintaining the water cycle in drylands ecosystems which has profound consequences for downstream users, including many fast-growing urban populations that depend on the drylands for drinking water and hydro-electricity. Similarly, the role of pastoralism in promoting rangelands carbon sequestration may have important implications for populations far beyond the drylands. It is therefore more appropriate to take a systems approach to valuing pastoralism, accounting for the multiple values of pastoralism whilst taking into consideration the varying agro-ecological potential of the rangelands.

The environmental services of pastoralism

Rangelands are one of the world's most important ecosystems, covering up to half of the earth's terrestrial surface. They provide globally important ecosystem services such as the provision of food, fibre, forage, fuelwood and freshwater, and regulation of water quality, pollination, seed dispersal, and climate. They include cultural services such as recreation, tourism, cultural identity, landscapes and indigenous knowledge, as well as supporting services of soil development, primary production and nutrient cycling. These services are the platform for human wellbeing of a third of the earth's population: the 2 billion plus drylands inhabitants, most of whom live in developing countries.

Ecosystem health depends on the land management practices of rangelands inhabitants, a large number of whom are pastoralists, and drylands ecosystem services can be boosted by appropriate land-use practices, or lost through inappropriate land-use. Although the predominant discourse on pastoralism and the environment is usually the degradation caused by pastoralists, there are many environmental services that are provided by pastoralists. The challenge in understanding these services is that they are closely interrelated – for example, livestock grazing can contribute to maintaining healthy vegetation, which captures carbon, reduces erosion, maintains soils and facilitates water holding capacity. Disaggregating these values is challenging.

Carbon sequestration: Grasslands store approximately 34% of the global stock of CO₂ and tropical savannas may have a greater potential to store carbon below ground than any other ecosystem (264 Gt C, IPCC 2000). Rangelands cover 1.5 times more of the globe than forests and may reproduce up to 150% of their weight annually. Estimates of the gas regulation function of this biome vary from US\$7 per hectare in one global study to US\$20 per hectare in Scotland and US\$15.6 per hectare in China, where grassland species from alpine desert ranges exhibit the highest capacity for carbon sequestration.

Maintenance of Biodiversity: Effective grazing management can improve biodiversity and be a tool to prevent land degradation and desertification, through stimulation of pasture growth, improved mulching, reduction of invasive weeds and improved mineral and water cycling. Additionally pastoralists practice natural resource management that protects and encourages valuable plant species and other resources, which can improve the provision of goods such as firewood, gum, incense, and wild fruits, with a value in Ethiopia's pastoral areas estimated at over US\$390,000 per year. The value of maintaining biodiversity in China's grasslands has been estimated at about US\$7.5 per hectare per year.

Water holding: Water holding capacity is important in grassland ecosystems and water availability and distribution are essential not only for pastoralists but for millions of people living in or near the drylands, including urban consumers of water and hydro electricity. In China it is estimated that the quantity of water held by different grassland types could be valued as high as US\$1524 Ha per year. The role of pastoralism in maintaining water cycling in healthy rangelands is even more important when considering the international significance of many drylands watersheds.

Maintaining soil: Vegetation cover reduces soil loss and promotes water infiltration, and effective grazing management, particularly based on livestock mobility, has been shown to promote vegetation cover and reduce soil degradation, whereas abandoning pastoralism in many rangelands leads to encroachment of trees and shrubs into grasslands and can increase the risk of soil erosion. Maintaining the soil through sustainable range-management is therefore one of the most important environmental services of pastoralists, and although the value has been estimated at US\$3 per hectare per year in China, the importance of soil health for other ecosystem services means that this estimation may be low.



Promoting pasture growth: Fodder provision in the rangelands has been valued at US\$499 million nationally in Kyrgyzstan and US\$1400 million in Mali. This value is based purely on the value of grasslands to livestock production and does not consider the amenity or biodiversity value of grasslands. The contribution of pastoralism to this value remains unclear, but there is no doubt that in many rangelands, livestock grazing and pastoralist land management can promote primary production of pastures. In Kenya, the cessation of grazing in Pokot for 8 years led to the conversion of up to 80,000 hectares of grassland into thorn shrub with negligible productive value.

Other indirect values of pastoralism

Inputs to tourism

The environmental services provided by pastoralism contribute not only to ecosystem function, but to the amenity value of the rangelands, which in many countries is instrumental for generating significant income from tourism. However, the contribution of pastoralism to the tourism industry of most countries is poorly understood. In Ethiopia, up to US\$300 million per year may be generated from tourism in pastoralist regions, and in Kenya the figure is similar, although in general it is non-pastoralists who capture most of the benefits of this tourism. The contribution of pastoralism to Mali's tourism has been estimated at US\$5 million per year, mostly based on visitors to pastoralist events and festivities, although this ignores the tourist revenues captured directly by pastoralist themselves. Much more work is needed to understand the role of pastoralism in creating and protecting tourist-friendly environments, and their other inputs to the tourist industry.

Climate change, adaptation and agro-biodiversity

Adaptation to climate change may be one of the greatest challenges facing many developing countries. In countries where climatic uncertainty increases or where precipitation levels fall pastoralism provides an option for adapting to climate change, and the rangelands also represent reservoirs of genetic diversity and a precious genetic stock for future adaptations. The rangelands are home to a great diversity of domestic plants and livestock, they are the origin of at least 30% of the world's cultivated plants, and pastoralist livestock breeds retain many genetic traits, such as fertility, vitality, and resistance to diseases and drought that no longer exist in animals kept in industrial systems. These traits are likely to be of increasing value in the face of climate change.

Direct values of pastoralism

Although most decisions over pastoralist systems are based on the direct values of pastoralism, data on these values is scarce and methodologies for data capture are weak. Numerous direct values have been omitted here, including transportation and manure, although in some pastoral economies these values are significant and require greater attention. For example, the value of manure as fuel is over US\$300 for the average pastoralist family in Peru, or US\$7.5 million nationally, per year, and the value of manure as fertiliser in Spain is estimated at between US\$300 and 800 million.

Dairy production

Although the value of milk production in many pastoralist systems greatly exceeds the value of meat production, a much smaller proportion is marketed, and since Governments tend to rely on market data for their statistical records, the mainstay of the pastoralist economy is greatly undervalued. For example, milk production by Ethiopia's pastoralists represents about 65% of the national milk production, but the value assigned to this in official statistics is only US\$284 million and more than three quarters of pastoralist milk output is not captured. Kyrgyz pastoralists produce an estimated US\$144 of milk per person per year, of which a third of all cow milk and over two fifths of horse milk are consumed within the household. Market data on its own is unlikely to give a realistic impression of pastoralist milk production, particularly in developing countries. However, complementing market data with information on household output provides a means of estimating total national production.

Iran's pastoralists produced an estimated 384,000 tonnes of milk per year in 1998. The market price for this product was estimated at US\$1 per litre in 2007, although many pastoralists process this milk before sale and increase the value by more than three times. Spain's pastoralists produce an estimated US\$1215 million of milk per year, the majority of which is sold. The decision whether to consume or sell milk is driven by the access to markets, and the demand for milk of different animals: Spanish pastoralists tend to sell milk (or cheese) from goats and sheep, but consume cow's milk. The capacity to process milk is a key determinant of dairy marketing success, as in Kyrgyzstan where increasing processing capacity has led the country to become the region's only net dairy exporter. Importantly, although many pastoralist societies may have taboos against the processing or sale of milk, cultural constraints often relax over time, as in Afghanistan where certain dairy products that used to be proscribed for sale are now routinely traded.

Livestock and meat

Across a range of countries around the world, the pattern of livestock off-take by pastoralists appears remarkably similar: 34 to 36% of small ruminants are marketed per year while only 6% of larger animals (cattle, camels, yaks) are sold on average. The lower rate of sale of large stock reflects their different role in the economy as well as their longer reproductive cycle. However, national statistics often fall short by failing to capture household consumption of livestock and overlooking informal and illegal livestock transactions. Household consumption of livestock may represent 37.5% of Alpaca off-take in Peru, 35% of pastoralist cattle in Kyrgyzstan, and 30% in Mali. Unregistered sales of livestock may represent over 50% of the total transactions in Kyrgyzstan, and unofficial and illegal cross-border sales in Ethiopia account for approximately 38% of the national total, valued at US\$138 million per year.

Export of livestock from pastoralist systems is significant in many countries, and in Ethiopia, at least 44% of pastoralist cattle, 56% of sheep and 30% of camels are exported, legally and illegally, whilst in Mali the export of live animals in 2006 was valued at US\$44.7 million. However, returns to pastoralists from livestock sales vary greatly. Spain, Mali and Ethiopia have broadly similar pastoralist herds (8.6, 8.4 & 9.8 million TLU respectively), yet the value of sales in 2006 was markedly different: over US\$2,300 million for Spain, US\$428.5 million for Mali and US\$364 million for Ethiopia. These disparities reflect price differences between Europe and Africa, as well as the greater efficiency of recording transactions in Spain.

Skins and fibres

The sale and use of hides and skins is usually linked to the sale of livestock for meat and therefore faces similar challenges in measurement (many transactions are not recorded in the market). In Kyrgyzstan around 3% of cattle, 12% of sheep and 5% of horse skins are retained for home use, out of about 1 million skins and hides produced per year. Nationally, hides and



skins can be very important, accounting for 85% of Ethiopia's livestock exports valued at around US\$600 million. In Spain the production of hides and skins from pastoralist areas contributes US\$101 million to the national economy and about 76% of the hides from cattle kept in pastoral systems are exported, and in Peru, household income from the skins sold and consumed represents about US\$135 per year.

In cold regions, wool and hair production can be important, as in the high Andes of Peru where Alpaca is the main livestock and wool is the main source of income, even though about 10% is used within the production unit. The total value of raw Alpaca wool from Peru is estimated at over US\$26 million per year or over US\$880 per household, and a further US\$180 per household is earned from woollen handicrafts. However, many pastoralists have found their economy undermined by the low price of wool and the growing importance of other natural and synthetic fibres. In Spain, wool production was among the most important sectors of the economy for centuries but in recent times production has become unprofitable and the income from wool is lower than the cost of shearing sheep.

Research gaps

The inadequacies of data on direct values of pastoralism are reasonably easily identified and can be addressed most simply. Statistical bureaux need to know the minimum cost-effective indicators for routine measurement of production of the main commodities, which will differ between pastoral systems but will usually include milk, meat, skins and possibly fibre. This measurement should include a seasonal dimension as well as an annual estimation, particularly in the case of dairy production. The role of research should therefore be to standardise the data collection methodology, clarify which data are important, and build capacities of different agencies for data collection.

Pastoralist data collection in most countries can be improved through the combined use of both market data and household data on production and supply. Data collection at the level of the production unit can be used to ascertain the total output per unit and, more importantly, the proportion of this sold. This would provide a simple multiplier that, in conjunction with market data, would inform national governments of the real levels of production. The resulting figures would be much closer to the true figure than market-based data currently allows.

A greater challenge for research is to understand the value of the environmental services of pastoralism and the contribution of pastoralism to dryland ecosystem services. This requires in-depth biophysical studies in order to estimate the joint production of environmental services in the grasslands. Research is also needed to understand how pastoralists manage grasslands in a way that promotes biodiversity and carbon capture, and contributes to ecosystem services, and the mechanisms that can be used to encourage such management practices.

Above all, research must recognise the 'system' nature of pastoralism, and avoid comparisons of different land-use systems on a per-hectare basis, or on single-product basis. Pastoralism produces multiple goods and services by harnessing diverse resources and this production is not divisible: remove a critical element from the system, such as riverine pasture, and the entire system can be compromised. Research should focus on the overall system value of different land-uses and combinations of land-use, in terms of direct and indirect values (or costs), and the information should be fed into national accounts. Otherwise, the poor standard of data on pastoralist economics and on the multiple values of pastoralism will jeopardise sustainable development not only in the drylands but in other areas that rely on dryland ecosystem services.

Policy recommendations

Governments must adopt an overarching policy objective of sustaining and building pastoralism, and this must transcend sectoral policy dialogue

The values of pastoralism span multiple sectors and may be trivialised in any one of those sectors, leading to aggregate devaluation and loss. It is therefore up to Government to adopt an overarching policy goal of supporting pastoralism, and that goal must inform policy dialogue in all sectors, including the environment, agriculture, energy, education etc. Appropriate investment for sustainable pastoralist development is needed in all sectors, and greater efforts are particularly needed to improve the benefits that pastoralists receive as a result of the multiple services they provide.

Governments must allocate resources to improve their understanding of pastoralist systems, and to routinely gather appropriate data on the multiple values of pastoralism

The nature of the missing values of pastoralism has been well documented in recent years and Governments must act to ensure that statistical bureaux begin to routinely collect the relevant information. This includes disaggregating pastoralist data from other livestock production data, ensuring production data is gathered with appropriate frequency, ensuring that both market and non-market transactions are effectively recorded, and ensuring that indirect values are covered as well as direct values. If data is to be collected in the marketplace then Government should avoid punitive measures that encourage informal and illegal trade.

Governments must view pastoralism as more than an agricultural system and must promote the environmental services and other indirect values of pastoralism that have implications for the country as a whole



Governments need to recognise that undermining pastoralist systems has implications for many non-pastoralists and the environmental services of pastoralism are enjoyed nationally (and internationally). Growing urban populations in particular rely increasingly on dryland ecosystem health, and therefore on effective land management by

pastoralists. Governments must urgently invest in the necessary biophysical studies to estimate the joint production of environmental services in grasslands, and the data should inform national accounting and the work of national Statistics Bureaux.

From valuation to benefit capture

Demonstrating the flow of goods and services from pastoralism is only one step in enabling pastoralists to strengthen their livelihood base and more effort is needed to improve how pastoralists benefit from those goods and services. Markets for both the direct and the indirect goods and services of pastoralism are poor or non-existent, although they may be improving. In many countries, the proportion of end-market value that pastoralists receive for their commodities is felt to be unacceptably low, for example Kyrgyz pastoralists receive less than a third of the final end market value of wool and only 20% of the end market value of milk. Pastoralists in Kenya receive only 40% of the end market value of livestock whereas some experts suggest the figure should be closer to 70%. However, it is not possible to judge the equity of this benefit capture without more information on the nature of the value chain, particularly given the challenges to marketing in many pastoralist regions and their remoteness from consumers. Brokers and traders provide an important service to pastoralists and any decision to undermine this should not be taken lightly.

Nevertheless, more can be done to improve the penetration of pastoralist products into national and international markets, to increase value addition at the production unit, and to increase the value of pastoral output. In particular, Governments can act to improve the access to markets and between markets and to reduce market distortions. Governments should also support pastoralist associations to allow trading of products at larger scales, increase bargaining power and reduce excessive rent-seeking behaviour.

The future sustainable management of rangelands in many countries depends on pastoralists capturing more benefits from the indirect values of their system. The challenge is that the values are often felt far beyond the boundaries of the drylands system and may even be enjoyed by a global consumer base. Market-based compensation, such as carbon finance, provide one way through which the environmental services of pastoralism can be rewarded, if the necessary international mechanisms are made to work in the pastoralist context. Some environmental services however may need direct public sector payments, for example from governments whose urban populations rely heavily on dryland ecosystem services. Investment is also required to promote local entrepreneurship that directly capitalises on the environmental services of pastoralism, for example through eco-tourism or through development of high value 'eco-products' such as organic foods.

Recent years have seen a profound change in the way pastoralism is perceived, but it is important to challenge the continuing perception that pastoralism is simply a meat production system. By overlooking the indirect values of pastoralism, those values are being eroded, and this will have an increasing impact on drylands environments and on people who depend on those environments, including many urban dwellers. By underestimating the value of the multiple goods of pastoralism, or by treating them commodity by commodity rather than as a bundle of inter-related goods, their value is undermined and opportunities for sustainable livelihood development are ignored. It is crucial that policy makers and researchers change the way they view pastoralism and begin to see it as an agro-ecosystem that uses whole landscapes to produce diverse goods and services that cannot be divided up into components without increasing both environmental degradation and poverty.