

# Building resilience of human-natural systems of pastoralism in the developing world: interdisciplinary perspectives

*Edited by Shikui Dong, Karim-Aly S. Kassam, Jean François Tourrand and Randall B. Boone*

Springer International Publishing, Switzerland.

ISBN 978-3-319-30730-5; ISBN 978-3-319-30732-9 (e-book). doi:10.10007/978-3-319-30732-9

2016, 298 pp. Price: hardcover €167.98, e-book €130.89

Reviewed by *Wolfgang Bayer*<sup>A</sup>

**Additional keywords:** climate change, conceptual models, insitutional dynamics, livelihoods, modelling, vulnerability.

This book, focused on issues of resilience in pastoral systems, gives much food for thought, and brings many new faces into the international debate on pastoralism. According to the institutional affiliations of the 24 authors, they come from nine countries and 18 research institutes. The book is divided into eight chapters, each authored by one to nine persons. At least one of the four editors has authored or co-authored each chapter, Shikui Dong being party to four chapters, Karim-Aly Kassam and Jean François Tourrand to two each, and Randall Boone to one.

The introduction starts with the well-known “facts” on pastoralism, based on FAO statistics and reports, such as 200 million pastoral households, 100 countries with pastoral systems and over 25% of the Earth’s land area used by pastoralists. A differentiation is made between a productive dimension of tending grazing livestock, and a livelihood (subsistence) dimension of pastoralism in dry or cold rangeland areas. Probably not everyone will agree with using the term “subsistence”, since the pastoralists classified as such often trade livestock or livestock produce for grain and other daily necessities.

In the section of the introduction on forms of pastoralism, a distinction is made between nomadic, transhumant and pastoral farming (ranching). Another section is devoted to the origin and history of pastoralism, with convincing arguments for multiple centres of origin. The section on geographic distribution of pastoralism is broad brushed but fairly complete, mentioning Europe (Alps, Great Britain and Scandinavia), Asia (Central Asia, Near East, Southern Asia) and Africa (North, West, East and a combined paragraph on South and Horn of Africa). However, the Horn would better be treated together with East Africa, because of the geographical proximity and the many links between pastoralists in, e.g. Kenya, Ethiopia and Somalia. The part on South America concentrates on ‘indigenous’ species (alpaca and llama) in the Andes, whereas in the case of North America, the focus is on cattle on the Great Plains, in mountainous areas and on public land. For New Zealand and Australia, the

focus is on pastoralism using free-ranging cattle and sheep. The term ‘developing world’ in the book’s title is obviously defined very broadly.

In the section on characteristics of pastoralism, ‘peripatetic’ groups that move with pastoralists and provide services for them without being pastoralists themselves are mentioned, an interesting aspect that is rarely mentioned in other literature on pastoralism. It is good to see attention given to gender issues, but the heading ‘sex in pastoral society’ should be renamed ‘gender roles in pastoral society’. The contribution of pastoralism to Gross Agricultural Product in several (particularly African) countries is explained in some detail, as well as other functions of rangeland such in maintaining biodiversity, storing carbon and water, and maintaining cultural values. These are illustrated with numerous photos. The chapter ends with deliberations on the future of pastoralism, including a summary table on ‘factors influencing pastoralism in the 20th century’, although the book was published 16 years into the 21st century.

Chapter 2 on ‘Vulnerability and resilience of human-natural systems of pastoralism worldwide’ starts with definitions of resilience (in terms of stability, recovery and transformation), vulnerability (in relation to hazard, as a state, and as a component of a community) and human-natural systems. It then discusses resilience of human-natural or social-ecological systems, with a table listing the ‘ingredients’ of resilience thinking. A key to the book is the three-dimensional framework proposed to assess the vulnerability and resilience of a pastoral system, with a vertical axis for agro-ecology (ranging from fragile at the bottom to robust at the top), a diagonal axis on pastoralism depicting its importance as source of livelihood for the group in question (ranging from abundant to limited) and a horizontal axis for institutional capacity to respond to pastoral crises (ranging from low to high). The authors suggest that this model be combined with a pressure-state-response model.

One case study is from central Asian steppes and societies, which are still recovering from the collapse of the Soviet Union.

Another is from northern China, where institutional change is weakening the capacity to respond to crisis, and leading to lower agro-ecological and livelihood resilience. In the case from the Asian highlands, climate change, population increase and policy change with respect to sedentarisation and grazing rights are described as putting pressure on the sustainability of pastoralism. In the African Sahel case, expansion of cultivation and possibly climate change are putting pressure on pastoralism. In the European highlands, outmigration from rural areas and land abandonment are identified as major pressures. In South America, land reform and modernisation are the major threats to pastoralism whereas, on the Great Plains of North America, crop-farming development and climate change are seen as key pressures. In this case, advantages of common property ownership of land are pointed out, this being state land leased conditionally to groups of farmers/ranchers. Only two pages are devoted to 'Australian drylands: degradation of pastoral systems with production-oriented management'. The authors find that a production orientation reduces the vulnerability of pastoralism with respect to agro-ecology and livelihood but increases vulnerability with respect to the institutional dimension, especially trade ratios and price ratios of inputs to outputs.

The final case study in this chapter is on reindeer pastoralism in arctic regions, where the main pressures differ from country to country. In Russia, pastoralists slaughter only few animals because of low prices. In the Scandinavian countries, land-use planning for other purposes restricts animal movement, and climate change puts pressure on reindeer pastoralism. The chapter ends with considerations of causes and effects of vulnerability and resilience and on ways to enhance resilience of these pastoral systems.

Chapter 3 on 'Maintaining the human-natural systems of pastoralism in the Himalayas of South Asia and China' includes three case studies: from Nepal, India and the Qinghai-Tibetan Plateau. In the Nepal case, local institutions including indigenous property rights are important in view of poor cooperation between government and pastoral society. In the Indian case, new (to this reviewer) information is brought in the form of a listing of all pastoralist groups in India and discussion of their additional activities, such as seasonal cropping, during the transhumant cycle. This cycle covers basically three locations of grazing: in the spring and autumn around settlements (where part of the family also cultivates crops), high mountain pastures in summer, and lowlands (where other ethnic groups cultivate crops and raise their animals) in winter. The main challenge in this system comes from land-use changes in the lowlands, making it more difficult for pastoralists to find winter pastures. Although government services do not support pastoralism, strong indigenous institutions and collective actions certainly do. The Qinghai-Tibetan Plateau case discusses rangeland degradation because of high grazing pressure and climate change and considers the merits of adaptive grazing management, including multi-stakeholder partnership and networks of pastoralists, formal researchers and government authorities.

Chapter 4 on 'Sociocultural and ecological systems of pastoralism in Inner Asia' includes case studies from Xinjiang and Inner Mongolia in China and from the Pamirs of Badakhshan in Afghanistan. In the Xinjiang case, the unequal distribution of livestock ownership among households is stressed, as well as

the need of many households to generate additional income (through crop production, trade, working as hired herders, wage labour, poverty subsidies, etc.). The authors argue that programmes for settling pastoralists reduce their welfare, and that fluctuations in livestock prices may put additional pressure on their economic wellbeing.

The case study on Inner Mongolia looks at the effects of well-intended government programmes such as the Grassland Ecology Protection Project (GEPP) and the Livestock and Grassland Double-Contract Responsibility System (LGDCRS). In essence, these programmes led to rangeland privatisation, fencing and increased stocking rates for economic reasons and – after dust storms – to withdrawal of some pastures from grazing. On these spared pastures, it appears that the incidence of poisonous plants increased; at the same time, the non-fenced areas were very heavily grazed. GEPP also led to an increase in conflicts between pastoralists and government officials and thus to an increase in pastoralists' vulnerability.

The third case study in this chapter looks at the role of ecological and sociocultural diversity in the Pamirs of Badakhshan, an area used historically by pastoralists, agropastoralists and farmers. Crop farming is practised by the Shugnīs in the high valleys (2500–3500 m a.s.l.), often through glacier-fed irrigation, whereas mobile pastoralists (Pashtuns) use a much wider range of altitude (500–4000 m). Despite religious differences and living in a war zone, the two groups have maintained a symbiotic relationship through strong indigenous networks, although both groups maintain their cultural distinctiveness. A threat for both groups comes from regional government commanders who acquire land rights and then lease them to pastoralists at high prices.

Chapter 5 on 'Building new human-natural systems for sustainable pasture management in South America' has seven authors (two each from Argentina, Brazil and Uruguay and one from France) and includes three case studies: the development of the grazing industry of Uruguay, involving also cultivated forages; the social-economic dynamics of pasture management in southern Patagonia, Argentina; and the dynamics in eastern Amazonia, Brazil. The chapter explores similarities and differences between the three cases. All three areas have been marginal to the world economy in precolonial and colonial times; eastern Amazonia was 'opened up' only in the late 20th century. The areas differ with respect to climate and forage (Patagonia is cold and dry, Uruguay temperate and Amazonia tropical) and suitable animals (Patagonia and Uruguay were suited for animal breeds and species that settlers from Europe had used before emigrating, whereas it took a while before it was recognised that zebu cattle and water buffaloes would do far better in the tropics than European cattle and sheep). An entire section is devoted to fitting the case studies into the above-mentioned three-dimensional model, another section is on thresholds and adaptation, and yet another on mental models of human-nature relationships in South American pasture management.

Chapter 6, by nine authors (six from Egypt), is devoted to only one area: the north-western coastal zone of Egypt, with one social system: the Mediterranean Bedouin. For centuries, the pastoralists used this area seasonally, also grazing their herds on cropland during non-cropping periods. This system has changed

in recent years, with pastoralism becoming less dominant. High pressure on pastures, *wadi* agriculture (cropping with run-on rainfall), irrigation and intensive poultry raising, together with job opportunities in nearby cities, led to a diminished importance of rangelands and extensive animal husbandry. Changes in land rights and social structure (tribal societies and integration into the modern state) are discussed. The rainfall regime (150 mm average annual rainfall, range 50–400 mm) and traditional (so-called Roman cisterns) and modern ways of managing hydrology are presented, and several scenarios for the future are discussed. This is the first chapter in this book in which a graph showing the variability of annual rainfall over a long period (63 years for one station) is presented.

Chapter 7 deals with modelling coupled human-natural systems of pastoralism in East Africa. It makes interactive use of two computer models: an older ecosystems model called SAVANNA and a newer household decision-making model called DECUMA. Data for both models were collected by surveys and observations (weather stations) and combined with existing data (e.g. distribution of photosynthates into roots, stems and leaves) for several Samburu village areas. Two scenarios are reported: the effect of an increase in wildlife on livestock numbers and household income, and the effect of immigration of other livestock keepers after drought. An increase in wildlife leads to a decrease in livestock. Samburu people do have some income from wildlife, particularly from renting out land to wildlife tour operators. The authors conclude that the current income from wildlife cannot compensate for loss of income from a decrease in livestock numbers. In the second scenario, they conclude that an influx of drought refugees would lead to a moderate reduction in the number of tropical livestock units (TLU) per adult living in the area. This is the first time in this book that this indicator is mentioned. A low number of TLU/adult indicates that the pastoralists need additional income from other sources in order to survive.

The last chapter gives a good overview of the preceding chapters. The general trend described is that pastoralists aim at stability and predictability. With this emphasis, many discussions about pastoralism that have been carried on in international conferences and journals over the last couple of decades are ignored, e.g. about limitations of the concept of carrying capacity, about assessing yield per animal versus yield per unit area, or about applying the equilibrium versus non-equilibrium approach. Also fire as an important tool in pasture management is not mentioned in this book. The importance of the price ratio between animal liveweight and grain for calculating the economics of pastoralism is likewise not mentioned. If grain is cheap in relation to animals, it may make economic sense to supplement grazing animals on pasture, as is the case, e.g. in the Maghreb countries (Morocco, Algeria, Tunisia). If animals are comparatively cheap in relation to grain, then grain-based fattening of livestock does not pay, as is the case in sub-Saharan Africa.

A few errors are irritating. Under Table 1.1 'Pastoral species and management strategies', yaks should also be included under agropastoral systems (yaks are used, e.g. for ploughing fields in the southern part of the Tibetan Plateau). This omission could be an uncritical citation. For Figure 1.17, no dimension is given; there should be a percentage symbol to indicate what the bars and figures show. On one page, the scientific name for reindeer is misspelled. In Chapter 4, Inner Mongolia cannot have an area of 183 million km<sup>2</sup>, as this would be more than the Earth's total land area. It should either be 1.83 million km<sup>2</sup> or 183 million ha.

Despite these limitations, the book is well worth reading. It is clearly aimed at academics. In view of its substantial price, the book is probably intended primarily for libraries of universities and scientific institutes rather than for private collections of individuals.

*<sup>A</sup>Wolfgang Bayer studied agricultural biology and holds a doctorate in animal agriculture from the Technical University of Berlin. He did postdoctoral research in pasture science with CSIRO in Townsville, Australia. He then worked for over 35 years as researcher and freelance development consultant in small-scale livestock and forage husbandry, range management and pastoralist development. He is now retired and lives in Goettingen, Germany.*