

# Discontinuity in pastoral development: time to update the method

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## Summary

Most off-the-shelf basic methodological tools currently used in pastoral development (e.g. technical definitions and conventional scales of observation) retain underlying assumptions about stability and uniformity being the norm (i.e. 'equilibrium thinking'). Such assumptions reflect a theoretical framework which had been questioned since the 1970s and was openly disproved in scientific circles during the 1990s, when it was shown to be fundamentally inadequate. Today, lingering equilibrium assumptions in the methodological legacy of pastoral development get in the way of operationalising state-of-the-art understanding of pastoral systems and drylands. Unless these barriers are identified, unpacked and managed, even increasing the rigour and intensity of data collection will not deliver a realistic representation of pastoral systems in statistics and policy-making. This article provides a range of examples of such 'barriers', where equilibrium assumptions persist in the methodology, including classifications of livestock systems, conventional scales of observation, key parameters in animal production, indicators in the measurement of ecological efficiency, and the concepts of 'fragile environment', natural resources, and pastoral risk.

## Keywords

Agricultural statistics – Dryland variability – Ecological efficiency – Ecological fragility – Methodology – Natural resources – Pastoralism – Productivity – Risk – Scale.

## Introduction

In Mongolia, a dangerous equivalent to drought is the 'snow disaster', or *zud*. The Mongolian Meteorological Service defines *zud* with reference to snow cover. Mongolian pastoralists, however, define *zud* in relation to an inaccessibility of pasture or water, and the consequent burst in livestock mortality; this definition includes a snowless type of *zud* ('black *zud*') when surface water is made inaccessible by freezing (1). Pastoral groups in Africa also define drought and the wet season in relation to herd conditions and accessibility of pasture, rather than the amount of rain (2). A record from Kenya is particularly telling: 'One of my Turkana staff, who knew the Kitale area of the Kenya highlands, told me that it was the wet season up there all the year round. I explained that there was a dry season of at least about three months. He replied, "It is not a matter of rain, it is the grass. Plenty of grass makes a wet season. There is no dry season at Kitale"' (3). Some

analysts are now arguing that the gap between the drought experienced by pastoralists and the drought of scientists, governments and humanitarian agencies is ontological more than epistemological, that is, it concerns a different reality not simply a different way of understanding (4).

Technical definitions are meant to highlight 'the difference which makes a difference' (5). When defining drought and *zud*, pastoralists focus on relationships and context (accessibility of pasture or water implies *by someone under certain conditions*) whereas official definitions focus on discrete 'states' (the meteorology of snow cover or rainfall). Herders cannot change meteorological phenomena, and the amount of green pasture in any given location at a given time cannot be altered, but the *experience* of the accessibility of green pasture and water can, through mobility. Sahelian pastoralists can 'stretch' the wet season by moving their herds south to 'meet' the new green pasture as early as possible in the year, and then tracking back north following the rains for

as long as possible (2, 6). Similarly, mobility can change the impact of drought relative to the experience of the moving herds, and reduce losses. Highly mobile pastoralist groups, such as the Wodaabe in Niger, are reported to have suffered fewer losses from the droughts of 1931 (7), 1969–1973 (8, 9) and 1984 (10) than other pastoral groups (Tuareg) with stronger entitlements to land and water but less mobility. On the back of the great Sahelian drought of the early 1970s, geographer Henri Barral (who worked for the forerunner of the French Institute for Development – ORSTOM) talked of '*l'indispensable re-mobilisation des éleveurs Saéliens*', i.e. the necessary return to mobility by Sahelian pastoralists that governments had encouraged to settle (11). The strategic, economic role of mobility in pastoral systems has been at the centre of attention in the study of pastoral systems since the mid-1990s (12, 13, 14, 15), following numerous isolated observations all throughout the 1980s (16, 17, 18). A recent book on pastoralism on the French Alps makes a similar point (19).

One would expect the notion of drought used in pastoral development and early warning systems to reflect 'the difference which makes a difference' to people in pastoral systems. Along these lines, an observation-based definition of '*pastoral drought*' would focus on relationships rather than states, accessibility of pasture rather than the amount of precipitation, and include the capacity for mobility as a key variable. Instead, although pastoralists are considered particularly vulnerable to drought, definitions of 'drought' and 'drylands' commonly used in pastoral development focus on precipitation and moisture levels. Classifications usually follow Wilhite and Glantz (20), distinguishing four categories of drought: meteorological, hydrological, agricultural, and socio-economic, all based on water scarcity (21, 22). None of these categories can accommodate '*pastoral drought*'.

Drylands are defined on a scale of aridity, calculated on the basis of the ratio of annual rainfall to potential evaporation (23) or on the basis of the 'length of the growing period', i.e. the length of the period in the year when rainfall is sufficient for the growth of crops or vegetation (24, 25). The concept of 'length of growing period' has made the conventional measurement of aridity more meaningful for crop farming but retains the assumption of a fixed location. In pastoral systems, the length of the 'green period' is not given but relative to the mobility of the herd. How can pastoral development operate with definitions of 'drylands' and 'drought' that ignore that 'difference which makes a difference' for pastoralism and its logic of production?

The definition of drought is but one example from many similar incongruences between the methodological legacy in pastoral development and what we know about pastoral systems. The scientific understanding of drylands and pastoralism is today almost the opposite of what was

mainstream in the 1970s, but change at the methodological level is lagging behind. This article examines this gap, highlighting a range of cases where methodological tools based on old ideas get in the way of operationalising state-of-the-art understanding of pastoral systems and drylands. Unpacking these barriers has become a pressing challenge. Unless they are identified and managed, even increasing the rigour and intensity of data collection will not deliver a realistic representation of pastoral systems in statistics and policy-making.

## Methodological infrastructure

Theory and methodology in science are meant to go hand in hand, with the latter designed to reflect and serve the former. However, in periods of intense revision of foundational principles, the theory tacitly at work in the methodology can get out of sync with the new framework of understanding. New theoretical paradigms take root slowly. During this time, sometimes decades, researchers and practitioners necessarily operate within a methodological context that by and large pre-existed the change and goes unnoticed in the background. This is what is referred to here as '*methodological infrastructure*'.

Since the beginning of the 20th Century, the balance of scientific enquiry has gradually been shifting away from the Newtonian world of 'things' and clockwork determinism, towards a better understanding of complex processes (26, 27). Under the influence of the Newtonian paradigm and 18th Century free-market theories, classical ecology had represented nature in terms of relatively closed systems self-regulated to a point of stability. Starting from the 1970s, overwhelming empirical evidence and theoretical reflection on the importance of variability (as well as cyclical processes and oscillations) led to a fundamental reconsideration of the assumption that this 'equilibrium' model had universal relevance (although equilibrium thinking was later revived by neoliberal ideology). The development of resilience theory, with its emphasis on complex dynamics and the constructive role of instability, played a key role in this paradigm change, calling for a science capable of engaging with unpredictability as the norm (28, 29, 30, 31, 32).

This theoretical development in ecology eventually led to a fundamental revision in the scientific understanding of dryland food production systems and pastoralism in particular (see 33 for a summary). Following the shift, environmental variability in drylands is no longer seen as a disturbance but as a defining trait. Pastoral systems are no longer seen as economically irrational and ecologically disruptive, or as a precarious way of life in which variability is a problem *to cope with*, but rather as sustainable food production systems adapted to *make use of variability* (22,

34, 35, 36, 37, 38). Building on this new understanding, the African Union's first policy on pastoralism moves away from the tradition of representing pastoralists as 'wandering in search of water and pasture' and talks instead of 'strategic mobility' (39, emphasis added). Similarly, the first policy for the development of drylands regions in Kenya defines pastoralism as a specialised production system that 'take[s] advantage of the characteristic instability of rangeland environments' (40).

Notwithstanding these important achievements, even when the classical emphasis on stability and predictability is abandoned in the theoretical framework, it often lingers on in the methodological infrastructure of pastoral development. Equilibrium assumptions remain embedded in off-the-shelf tools at all scales of operation: from technical definitions, systems of classification, conventional indicators, scales of observation and procedures for data collection, to wider processes of standardisation involving a broader perspective (e.g. agricultural development or early warning systems) and the production of statistical data for public use. The practical dependence on this legacy of equilibrium thinking in pastoral and drylands development continues to fuel misconceptions about the functioning, performance, and service capability of drylands food production systems, with important consequences for policies and interventions.

## Methodological barriers

Whereas input-intensive agriculture operates by sealing off the cycle of production from the natural environment – and is therefore 'at home' in equilibrium thinking, with its assumptions of stability and uniformity – adaptive food production systems in drylands concentrate on the *relationship* with the environment (41, 42). In the first case, a command-and-control approach to agricultural production focuses on states, things and direct causation, and aims at stabilising (or neutralising) the natural environment *before* using it. In the latter, a relational approach creates a niche of relative stability *through use*, by matching variability in the environment with variability in the production system, e.g. when herders match the movement of their herds with the sequence of short-lived concentrations of pasture quality on the range, resulting from patchy and erratic precipitations (after the rains, nutrients in the pasture peak for a brief period before being used by the plants for their own reproduction). Rather than resisting or trying to prevent the spatial and temporal changes in the availability of green pasture, pastoralists' adaptive strategy has been to embrace environmental variability and work with it.

For pastoral development to reflect in its analyses such a fundamental difference in the logic of production, new methods of observation and representation are necessary.

Crucially, analysis must focus on processes, relationships and context, and resist or correct the assumptions of stability and uniformity that are inherent in the methodological infrastructure. The concept of 'social–ecological systems' used in resilience thinking (43) – to express the idea that the link between humans and nature, or the social and ecological dimensions, is circular and inextricable – is exemplary of this commitment to capture complex and less evident forms of causation (e.g. circular, relational/systemic, or multiple causation). The notion of drought based on average precipitation uses direct causation; the notion of drought based on pasture accessibility uses relational causation. The legacy of equilibrium thinking in the methodological infrastructure of pastoral development is often apparent in the tools used, as they are designed to represent the world in terms of things, states, and direct causation. The rest of this article discusses a few examples of such tools.

## Scale of observation

Scale-dependence has long been seen as a core problem in ecology (44), but calls to pay more attention to issues of scale in drylands studies persist (45, 46). Key aspects of what makes pastoral systems productive, resilient and sustainable (e.g. mobility, livestock breeding, cross-border trade, rural–urban links) are only manifest at relatively large scales of observation (geographical, temporal, social and economic). When the bigger picture is obtained by aggregation rather than scale-specific observation (e.g. using data collected through household-level surveys, sets of localities [e.g. villages], or temporal snapshots) such key aspects are misrepresented or missed out altogether. In a well-known example, cost–benefit analysis of land-use options based on a 'hectare per hectare' comparison fails to capture economically valuable interdependence: access to relatively small dry-season grazing reserves enables pastoralists to use the large areas of wet-season pasture by keeping the system going when the latter are not available (47, 48). Similarly, population censuses and agricultural surveys, typically household-based, use standard definitions of 'household' which are rarely representative of the discontinuous residence patterns and large-scale social organisation of pastoral contexts. Definitions of household by relation to 'dwelling of housekeeping' (e.g. 'all those eating from the same pot') are known to multiply female-headed households in the data set and distort other parameters that are crucial to the analysis of pastoral systems, such as livestock holdings and mobility (49, 50; for a general discussion see 51).

## Classifications

In mainstream classifications of livestock systems, definitions of pastoralism continue to focus on a single attribute, be it the degree of mobility, crop-farming,

modernisation or market orientation, the extent to which livelihoods depend on livestock (the economic definition), or the average rainfall associated with an 'ecological zone' (cf. 52, 53). These definitions assume perfect overlap between cultural identity and economic activity, or management and ownership of livestock, an assumption that has never been generally true and is certainly not tenable today. Colonial observers pointed out that virtually all livestock in French West Africa was managed by people they referred to as 'nomads', whether it was owned by them or by sedentary farmers (cf. 54, 55, 56). Today, many people with a pastoralist background do not manage or even own livestock, and many owners of livestock kept in pastoral systems do not manage it and perhaps are not, themselves, from a pastoral background (57, 58). With the exception of the economic definitions and a few recent attempts to build new foundations (e.g. 39 and 40), definitions of 'pastoralism' continue to be 'by subtraction', i.e. by highlighting a presumed absence (e.g. of crop-farming, of integration with the market economy, etc.). Concerned as they are with what pastoralism is *not*, these definitions fail to engage with what pastoral systems *do* and what makes them adaptive, namely their specialisation in taking advantage of environmental variability (50). Finally, these definitions represent drylands production in terms of rigid systems separated by clear-cut boundaries (e.g. 'farming', 'agropastoralism', 'pastoralism'), thereby hiding from view the important permeability and dynamic interconnections between strategies of production. In this regard, a misleading focus at the scale of the farm in definitions of crop–livestock integration (mixed-farming) remains common (59), even though, in the drylands, livestock mobility has historically supported a multitude of paths to crop–livestock integration between specialist crop-farmers and specialist herders. This type of integration allows for discontinuity over time and space, at a variety of scales, and with little trade-off in specialisation, i.e. well beyond the confines of 'mixed farming' (42, 60, 61, 62, 63, 64).

### Measuring productivity

When designing livestock-sector development strategies for drylands regions, definitions of production parameters must be capable of capturing what matters in the drylands, and particularly in pastoral systems. At present, key technical parameters such as 'production', 'productivity' and 'performance' are defined by an assumption of stability and control over the environment. These definitions are suitable for input-intensive systems but fail to represent adaptive dryland systems. For example, the way 'performance' defines production in relation to time assumes an absolute value of time across all different production systems; but in drylands production systems, output per unit of time will vary depending on the time of year. Thirty days during the dry season and 30 days during the wet season are identical for the clock but incommensurable vis-à-vis the

system of production. Pastoralists distinguish between dry season and wet season milk production (65), but rarely are these differences reflected in the scientific measuring of milk production. Where resources and outputs are highly variable in space and time, an adequate representation of the production process requires higher definition than the level conventionally associated with these concepts. In an effort to achieve this, substantial work has been carried out to adapt stratified sampling methods to take spatial and temporal variability into account (e.g. 66, 67), but these approaches remain exceptional. The shortcomings of technical definitions of productivity are just one aspect of the overall inadequacy of current agricultural measurements: despite the acknowledgement that pastoral systems produce value in several forms, e.g. financial services (68), ecosystem services and cultural services (69, 70), agricultural productivity measurements continue to look solely at *animal* products.

### Ecological efficiency

Most methods for measuring the efficiency of animal production systems focus on the rate of conversion of feed input into output, assuming non-feed inputs such as fossil-fuel energy to be substantially the same for all systems, but pastoral systems hardly use any. With this approach, pastoral systems score worse than intensive livestock production systems. However, when non-feed inputs are included in the analysis, ranking is reversed (71). Similarly, range managers and administrators calculate the ecological efficiency of a livestock system based on production (output) over consumption/impact on natural resources (input). This is consistent with the input parameters most commonly used in farm economics, where land is supposed to be the most scarce, hence most valuable, input. When land input is replaced with water input (the most scarce input in the drylands), pastoral production systems rank higher in efficiency than standard forms of intensive agriculture (72).

### Natural resources

Grasslands historically used by pastoralists consist of grazing reserves, signs of herding and migration itineraries, fodder plants (the diversity and distribution of which is relevant to the pastoral system), salt licks, water points and innumerable, if light, other traces of man-made landmarks (e.g. traces of old camps). When able to operate at optimal capacity, pastoral systems are known to play a role in controlling shrub growth, dispersing seeds, improving seed germination and breaking up hard soil crusts (69). Pastoralists and their livestock have contributed to the development of these ecosystems through millennia of co-evolution (13, 73, 74, 75, 76), which is why, when pastoral systems are affected (either positively or negatively), there is a knock-on effect on their ecosystems as a whole (22).

Defining pastoral rangeland as a 'natural resource' not only ignores the history of co-evolution, and gets in the way of a resilience-aware understanding of drylands as social-ecological systems of which humans are an integral part (77), but also frames pastoralism as a 'foreign body', a disturbance in its own home. This conceptual separation of pastoral ecosystems and pastoralists lays the foundations for their separation in practice, e.g. through land-use conversion programmes, fortress conservation, and ecological 'restoration' programmes through 'resettlement' of historical users (78, 79, 80, 81).

## Ecological fragility

Development literature characterises drylands as 'fragile environments'. The United Nations Development Programme Global Drylands Imperative talks of 'managing fragile environments' (82). A review of evidence on dryland pastoral systems and climate change, published by the Food and Agriculture Organization of the United Nations (FAO), refers to the 'sustainable and adapted management of these fragile ecosystems' (83). According to the organisers of the 11th International Conference on Dryland Development, 'dry areas of the world have highly fragile ecosystems' (84). The understanding of fragility as a biophysical characteristic of the environment is a legacy of the classical equilibrium model, where 'fragility' referred to precarious stability, the presumed ecological balance being prone to disruption (85). From that perspective, drylands 'fragility' was simply 'variability' understood as a structural limitation. References to 'fragile environments' have been at odds with scientific practice for over 20 years, and 'fragility' in ecology no longer refers to a biophysical characteristic but to a relationship: a set of circumstances triggered by a particular kind of management being used in relation to a particular kind of environment. In a common definition: 'fragility implies a mismatch between human use and biophysical conditions' (86). According to Wood *et al.* (87): 'a sloping, moderately watered, hillside with light-to-medium-textured soils could be extremely "fragile" under one use, but under another, based on better adapted technologies and management practices, could be quite productive, even over the long-term'. Similarly, Hiernaux and Turner (88) conclude that, 'risks of environmental degradation are moderate and mainly climate-driven in pastoral systems at the drier edge, while they are serious and mainly management-driven in the crop-livestock systems of the southern Sahel'.

Today, ecologists no longer consider instability and resilience as opposites, but talk of 'resilient drylands' and recognise variability as structural (89, 90, 91). In the current understanding of fragility as a relationship, variability can be an asset as well as a problem, depending on the production strategy in use (14, 63, 92). Evidence of resilience in drylands agriculture is substantial (22, 42, 77, 93, 94, 95, 96, 97). That the drylands are still described

as 'fragile ecosystems', therefore implying a biophysical characteristic, even amongst analysts who theoretically have ceased to rely on the classical equilibrium model, is a source of confusion. Consistently focusing on a relational understanding of fragility would be helpful.

## Pastoral risk

The traditional approach to the analysis of risk in dryland agriculture equates it to variability (98, 99), therefore, fundamental changes in the understanding of dryland variability have important implications for the understanding of pastoral risk. With risk equated with variability, as a disturbance to a system assumed to be in balance, 'risk management' is logically about minimising disturbance: avoiding variability or, when impossible, reducing it or coping with it. A study for FAO, for example, finds that, 'Risk management strategies can be sub-divided into risk reduction, risk mitigation and risk coping strategies. In principle the preferred approach should be first to reduce the likelihood of risks, then to mitigate the negative impacts of a shock (i.e. a materialised risk), so that the need for coping strategies is minimised' (100).

The analysis of pastoralists' risk management from this perspective translates virtually all aspects of pastoral production into 'coping strategies'. Halstead and O'Shea classify coping strategies into four categories: mobility; diversification; physical storage; and (economic) exchange. The internal tension in this model becomes manifest in the discussion of mobility, where variability/risk (described as 'resource failure') is simultaneously something to avoid or reduce, and a source of advantage: 'Mobility is the simplest of these responses [to variability] and works by taking advantage of the spatial and temporal structure of resource failure' (98).

On closer inspection, the mechanisms supposedly 'designed to lessen the impact of variability' usually introduce additional variability (cf. 38). Mobility introduces variability in the set of possible resources for production. Diversification introduces variability in the choice of strategic options – whether diversification of livelihood strategies (e.g. by introducing farming or trading), the structure of the herd (multiple species or lineages), or of herd management (herd splitting, livestock loans). Physical storage introduces variability in the timing of consumption and sale. Exchange introduces variability in the nature of the product to be stored or sold, including the possibility of 'storing' it as cash. In Halstead and O'Shea, this contradiction is acknowledged but normalised into the familiar narrative of drylands' structural limitation: 'All four categories of buffering mechanism *exploit favourable aspects of the temporal and spatial structure of variability* to mitigate the risk of scarcity. Mobility and diversification use local abundance to counter local scarcity, while storage

balances seasons of plenty against lean seasons and good years against bad. Exchange secures a stable food supply by playing off temporal variability against spatial variability' (98). The image of one kind of variability being 'played off' against another is a hint in the direction of the current understanding of the adaptive logic in dryland agriculture: namely, engaging the variability in the environment with variability embedded in the production system through management (38).

Just as the mechanisms assumed to manage variability by reducing or buffering it actually introduce additional variability, the mechanisms supposed to manage risk by minimising it often involve 'taking risk' (associated with higher returns). Working amongst Andean pastoralists, Barbara Göbel recorded how her informant emphasised the need to 'test luck', i.e. to take risks: 'the most important reason why it is better to have mixed herds is, that in this way you can test luck... Maybe you have luck only with one type of animal and not with the others' (101). In their analysis of the traditional risk-aversion model in pastoral development, Roe *et al.* point out that, 'Rather than being risk averse in trying to avoid hazards altogether, pastoralists accept and even take risk' (102). A recent book on pastoralism, markets and livelihoods opens with the following quote: 'Stability, gentlemen, is the one thing we can't deal with' – attributed to a Chicago Board of Trade official in conversation with corporate agribusiness executives in the 1980s, but also applicable to pastoralism, according to the authors (103). In pastoral settings, managed risk-taking is a constitutive part of the functioning of the production system.

In sum, it is necessary to update the definition of risk in pastoral development in accordance with the new definition of variability. A definition of 'pastoral risk' should represent it in relation to time and space, and to a subject: risk is always *for someone under certain conditions*. As in the case of variability, whether risk is a problem or an opportunity depends on the terms of such a relationship. Different risks can be played against each other: a risk can be avoided by taking another risk, or managed by taking it together with another risk. Representing risk as a relationship, therefore necessarily involving a subject within a context, also opens up a window on gender-specific dimensions of risk and opportunities that are invisible to impersonal and purely quantitative notions of risk. Blanket risk aversion aimed at the elimination of variability by control and stabilisation can be expected to get in the way of pastoral risk management rather than help it.

## The link to policy

The challenge of updating the methodological infrastructure of pastoral development is particularly important in light of the current ongoing global revision of agricultural data. The

Global Strategy to Improve Agricultural and Rural Statistics (104) paves the way for a new generation of agricultural data, integrated within national statistical systems and standardised for national and international users. The revision affects the way livestock systems are represented in statistics, and consequently understood in policy-making, both in relation to other food production systems (e.g. crop-farming and fisheries) and to the environment (e.g. water and forestry). At the moment, agricultural data collection systems for public use – agricultural and livestock censuses, household income or expenditure surveys – are weak on livestock and blind to pastoralism (105). The infrastructure beneath the process of appraisal, i.e. tools such as definitions and indicators, and the methods used to operationalise them, with their assumptions about what is what, and what needs to be measured, will determine how pastoral systems will be represented within the new generation of integrated and standardised agricultural data. Meaningful appraisals of pastoral systems cannot be done exclusively at the level of an individual animal or even at herd level, but need to include higher scales, such as the livestock breeding populations at the level of the extended family and the wider social networks (e.g. the clan), taking into account temporal and spatial relationships. Even with a new wave of appraisals carried out by the book, and extended to cover dryland regions, simply carrying on using off-the-shelf methodological tools that were developed on the basis of equilibrium thinking would still lead to the misrepresentation of pastoralism. Worse, a critical mass of new data generated through off-the-shelf processes of appraisal would greatly decrease the chances of improving the representation of pastoral systems in public policies.

Integration of different forms of knowledge, including pastoralists' knowledge, in participatory transdisciplinary research offers a promising avenue for revealing the underlying equilibrium model still hidden in the methodological infrastructure. A transdisciplinary approach differs from the multidisciplinary approach in that the latter merely 'adds up' the contributions from each discipline without creating a new way of thinking about the issue. This *additive* approach differs from the *systemic* approach of transdisciplinary research, which aims at producing a unity that is both new and more than the sum of its parts (106, 107). When communicating across different knowledge systems, academic and non-academic stakeholders must be aware of potential language problems and pay particular attention to the differences between technical and ordinary meanings (27).

## Conclusion

There is an urgent need to engage with the methodological dimension of the appraisal of pastoral systems and the development of resilient drylands. This article has shown

how key elements of the methodological infrastructure of pastoral development retain underlying assumptions about stability and uniformity and that these assumptions are a legacy of a theoretical framework which does not reflect how things work when variability is the rule rather than the exception. As long as such tools continue to be used in the identification of problems and solutions, pastoral development work and the data collection that informs its policies will remain locked in the past, even when formally embracing state-of-the-art theory.

Operationalising advances in the understanding of pastoralism and drylands, as made possible by looking beyond the horizon of the equilibrium paradigm, requires a corresponding revision of the methodological infrastructure of pastoral development. Most of this infrastructure was developed at a time when the rules of analytical engagement were dictated by the physical remoteness of pastoral social–ecological systems, and by the great methodological difficulties in capturing and representing variability. Today, all this has changed. Computers make it possible to model and analyse variability in ways that were unthinkable for the previous generation of researchers. Pastoralists have access to motorbikes and sometimes cars and trucks. Remoteness is no longer defined by the distance from a road or a settlement but by the proximity of a network mast or

the availability of a solar panel and portable information/communication technology. These changes alone make it imperative to update the methodological infrastructure of drylands development. Such a turning point is also an excellent opportunity to finally leave behind the world of presumed stability and uniformity inherited from colonial observers and administrators, and to welcome the pastoral systems of the future in a world in which, owing to climate change, complexity and variability are rapidly becoming the norm for all of us.

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## La discontinuité du développement pastoral : une nécessaire actualisation méthodologique

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### Résumé

Les outils méthodologiques de base et prêts à l'emploi en matière de développement pastoral (par exemple, les définitions techniques, les grilles classiques d'observation) reposent encore pour la plupart sur un certain nombre de postulats concernant la stabilité et l'uniformité considérées comme la norme (le « paradigme de l'équilibre »). Le cadre théorique reflété par ces présupposés a été remis en cause dès les années 1970 puis ouvertement réfuté dans les cercles scientifiques au cours des années 1990, avec la démonstration de son caractère foncièrement inadéquat. À l'heure actuelle, la persistance du présupposé d'équilibre dans la tradition méthodologique du développement pastoral constitue un obstacle à la mise en place d'une compréhension moderne des systèmes pastoraux et des terres arides. En dépit d'une collecte de données de plus en plus rigoureuse et intense, tant que ces obstacles n'auront pas été reconnus, démontés et levés, il sera impossible d'obtenir une représentation réaliste des

systèmes pastoraux dans les statistiques et les prises de décision. L'auteur présente une série d'exemples de barrières liées aux présupposés persistants d'équilibre dans la méthodologie, en particulier: les classifications des systèmes d'élevage; les grilles classiques d'observation; les principaux paramètres de la production animale; les indicateurs d'efficacité écologique; et les concepts d'« environnement fragile », de ressources naturelles et de risque pastoral.

**Mots-clés**

Efficacité écologique – Fragilité écologique – Grille – Méthodologie – Pastoralisme – Productivité – Ressources naturelles – Risque – Statistiques agricoles – Variabilité des terres arides.



## Discontinuidad del desarrollo del pastoreo. Llega la hora de actualizar el método

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**Resumen**

La mayoría de las principales herramientas metodológicas estandarizadas que se emplean para estudiar el desarrollo del pastoreo (definiciones técnicas y escalas convencionales de observación, por ejemplo) siguen reposando en premisas que hacen de la estabilidad y la uniformidad la norma (el llamado «pensamiento del equilibrio»). Estas premisas emanan de un marco teórico de referencia que fue puesto en tela de juicio a partir del decenio de 1970 y que los círculos científicos desautorizaron sin ambages en los años noventa, tras demostrar que era fundamentalmente inapropiado. Hoy en día, la enquistada presencia de los postulados del equilibrio en el legado metodológico que se utiliza para estudiar el desarrollo del pastoreo supone un obstáculo a la hora de aplicar en la práctica una comprensión moderna de los sistemas pastorales y las tierras áridas. Sin reconocer, desagregar y abordar estos obstáculos previamente no será posible, incluso reuniendo datos de modo más intenso y riguroso, obtener una imagen realista de los sistemas pastorales con fines de estadística o de elaboración de políticas. El autor ofrece una serie de ejemplos de tales «obstáculos», por los cuales los postulados del equilibrio siguen lastrando la metodología, en particular las clasificaciones de los sistemas ganaderos, las escalas convencionales de observación, los parámetros básicos de producción animal, los indicadores que miden la eficiencia ecológica o los conceptos de «medio frágil», recursos naturales y riesgo pastoral.

**Palabras clave**

Eficiencia ecológica – Escala – Estadísticas agrícolas – Fragilidad ecológica – Metodología – Pastoreo – Productividad – Recursos naturales – Riesgo – Variabilidad de las tierras áridas.





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