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Confronting Uncertainties in Pastoral Areas

Transforming Development from Control to Care

Abstract: Pastoralists must continuously confront uncertainties, responding to high levels of variability and volatility where the future is unknown. Yet mainstream modernising development in pastoral areas aims to create stability through control, enacted through restrictive plans and policies. Through a series of case studies, this article explores pastoralists' own sensitive, flexible and caring responses, attuned to the instabilities of pastoral settings. The cases show how uncertainties can be seen as intersecting constructions of knowledge, materiality, experience, embodiment and practice, where flexible, often collective, caring approaches are central to pastoralists' lives. These insights have wider implications for other contexts where people inhabit uncertain worlds, and so suggest a fundamental challenge to the controlling approaches of conventional development.

Keywords: development, herding, pastoralism, uncertainty, variability, volatility

This article reflects on how pastoralists – livestock-keepers using extensive rangelands across the world – negotiate diverse uncertainties, emerging from high levels of variability and volatility of environmental, market and political factors. Uncertainty refers to the condition of knowledge where future outcomes are unknown and remain unpredictable (Stirling 2010). This arises from contexts of variability, which refers to variations in conditions between defined bounds, and volatility, which refers to often sudden changes with no clear baselines (Krause and Eriksen, this issue). Such diverse uncertainties – related to drought, floods, prices, disease or conflict, for example – fundamentally affect the lives of pastoralists and must be central to any understanding of pastoral practices. Drawing on a diverse, cross-disciplinary literature, we can see how uncertainties are not simply the result of 'natural' processes, but are produced via material relations, through human and animal bodies and emerge as a result of social and political dynamics over time and across scales (Eriksen, this issue; Scoones 2019). Uncertainties therefore have many dimensions: as constructions of knowledge, materiality, experience, embodiment and practice (Scoones and Stirling 2020) – all themes that are drawn out below.

Through case study examples from different pastoral settings, this article contrasts two approaches to confronting uncertainties. One attempts to suppress uncertainties through exerting control via plans, regulations and the ordering of the world through development interventions, imposed through the power of the state, science, political and business elites and development agencies. The other takes a more open, caring approach, navigating through and productively making use of variability and volatil-

Social Anthropology/Anthropologie Sociale (2023): 1–19 © The Author(s)
doi:10.3167/saas.2023.04132303
Published on behalf of the European Association of Social Anthropologists

ity, embracing uncertainties and so being more attuned to the complexities of a turbulent world. Such a caring approach, where uncertainties become central to ways of life, suggests a more flexible, agentive, responsive stance, opening up possibilities and grounds for hopefulness. This in turn stands in stark contrast to the disciplining restrictions of stabilising control, whereby the unruly is closed down and rendered governable (Scott 1998).

Learning from pastoralists about how responses to uncertainty are articulated suggests a different approach to 'development' where, given diverse uncertainties, there can be no singular version of modernity and progress, but always a much more contested, plural view. Learning from those who live with and from uncertainties – like the world's many pastoralists as well as inhabitants of river deltas – suggests an alternative perspective on how to confront the many uncertainties of today's world in ways that go beyond the disciplining violence of development as improvement and control (Li 2007).

Pastoralism: Exploiting Temporal and Spatial Variability

The rangelands of the world, covering over half of the world's surface, are characterised by high levels of spatial and temporal variability in ecological, economic and political dynamics (ILRI et al 2021; Scoones 2021; Reid et al 2014). Due to climate change and processes of economic globalisation, for example, conditions are increasingly volatile, requiring continuous transformation of practices to respond to rapid change (Krause and Eriksen, this issue). Pastoral areas are typified by marginalisation, often on the edge of nation states, with a lack of state control and support. Processes of colonisation, border formation and the assertion of national state authority through the dynamics of incorporation and 'pacification' have often resulted in instability, tension and conflict. As home to millions of pastoralists, whose animals must seek out nutritious fodder to generate livelihoods, rangelands across the world are perhaps a quintessential 'volatile' environment (cf. Krause 2018).

Whether the high montane rangelands of Central and East Asia and parts of Latin America, the dryland savannas and semi-deserts of Africa, the Middle East and South Asia, the mountains, hills and plains of Europe or the arctic tundra of the far north, such rangelands very often demonstrate features of 'non-equilibrium' ecologies. As with the 'fluidscapes' of deltaic South Asia (Mukherjee et al, this issue), the system is never stable, always in flux. While animal populations may rapidly increase, they also crash just as dramatically in times of stress. Droughts and heavy snowfalls, for example, can cause major collapses, while a run of good years may reverse this. The result is that pressure on environments is limited and 'carrying capacities' may never be reached (Behnke et al 1993).

Pastoralists are livestock keepers who live with and from these uncertainties (Scoones 2023; Krätli and Schareika 2010; Scoones 1994), making use of spatial and temporal heterogeneity through careful herding practices, usually involving movement (Krätli et al 2016). Rangelands are not uniform stretches of grassland but a sequence of dynamic patches, varying over space and time (Wiegand et al 2006). In often harsh

environments, where fodder is scarce and for large parts of the year of low quality, the challenge is to seek out nutritious grazing and water to keep animals healthy and in good condition. Characterised negatively in some settings as 'wastelands' (Davis 2016), rangelands are, in fact, full of variety and sites of intensive, skilled management. The grazing patches, key resources, seasonal and daily movements to different sites all add up to a highly sophisticated approach to production. Variable and indeed volatile conditions therefore become resources, and uncertainty is a permanent condition.

This has implications not just for the system of production at the core of pastoral practice, but the wider social, economic and political organisation that goes with this. Making use of variability, and regular fluctuations over space and time, as well as volatility, where changes may be sudden and rapid with no expected bounds, and so embracing uncertainty in all its dimensions, suggests a fundamental challenge to long-established mainstream practices of pastoral development.

Development as Control: the Failures of External Intervention

The standard elements of external intervention in rangeland areas in the name of modernising development and progress very often run counter to these principles. Indeed, in many respects many standard interventions in pastoral areas – whether fencing to create ranch-like paddocks, feedlots, reticulated water points, fixed markets or single-location service provision – undermine pastoralists' capacity to respond to uncertainties. Derived from a very different framework of understanding, usually from temperate climates and settled organisation, the focus of development is to seek control through suppressing variation, creating stability and asserting order (Li 2007).

Very often, modern states and their colonial predecessors are informed by settled farm settings, while pastoralists rely on a mobile logic to make a living. Pastoralists also frequently live on the margins of national territories, crossing borders to seek grazing and markets, and may be seen as a threat to the settled state. Viewed as the unruly 'barbarians' outside state control, the mission of development, as colonialism, is often assumed to be to civilise, incorporate and suppress what are seen as backward practices and societies, prone to conflict and secession (Scott 2017). The remote rangelands of the world in turn are often cast as being in 'crisis' – of poverty, land degradation, conflict and so on – and in need of rescuing through the civilising, controlling mission of modernising development.

Early anthropological enquiry in pastoral areas was frequently deployed in the mission to control pastoral areas, bringing such areas into the realm of state-directed development. Yet such studies often created a fictitious vision of the exotic native, living in an egalitarian society, with a huge array of unusual customs (Waller and Sobania 1994). This 'othering' of pastoralism through early anthropology failed to understand the core practices of pastoral production, and how these were both efficient and effective and highly attuned to a difficult setting. Only later did narratives change, as ecologists and anthropologists joined forces to explore the dynamic realities of pastoral ecologies and economies (e.g. Scoones 1994; Galaty and Bonte 1991; Ellis and Swift 1988; Dyson-Hudson and Dyson-Hudson 1980; Dahl and Hjort 1976). Although some-

times framed in terms of functionalist adaptation to harsh conditions, other studies went beyond this to show how social, ecological, economic and cultural facets are all intertwined, conditioned by wider structural forces and political economies (Scoones 2021; Scoones et al 2020).

The failure to understand the complexities of pastoral systems, and the focus on exerting control and establishing order at the heart of the dominant colonial and post-colonial development project, meant that pastoral areas were deemed backward and unproductive and in need of radical transformation (Homewood 2008; Fratkin et al 1994). Very often, this project was supported by a crisis narrative that relayed a tale of destruction and chaos, with the finger-of-blame pointed firmly at pastoralists. Pastoralists were seen as keeping too many animals, overgrazing the land, moving in ways that are unproductive and so the solution was to settle, manage herds within limits and prevent movement through installing new technologies, such as fixed water points, paddocks and so on. Exotic breeds of animals were offered as a route to increasing production and efficiency, while a gamut of fodder crops were grown to provide higher quality forage (Krätli et al 2016). Narratives of desertification in pastoral areas first appeared in the 1930s and have become a central trope in environmental discourse since (Swift 1996), leading to an industry in environmental rehabilitation and restoration projects, including 'green belts', soil conservation and massive tree-planting projects across the world.

These interventions have widely failed and continue to do so (Catley et al 2013; Sandford 1983). The external attempts to control, order, regularise and make stable run counter to the reality that such environments are variable, volatile and uncertain (on river control in Australia, cf. Strang, this issue). Of course, this characterisation of mainstream pastoral development leaves out attempts to create more locally rooted and participatory alternatives that are more attuned to local contexts and pastoralists' livelihoods (e.g. Waters-Bayer 2005) and accept the importance of variability and mobility in pastoral systems (FAO 2022, 2021). However, these arguments, while increasingly gaining purchase in some international organisations as well as among researchers and some NGOs, intersect with a wider policy environment, particularly within national policy-making processes, that is dominated by the mainstream control-oriented approaches discussed above, as many critiques of such policies outline (e.g. Nori 2022, 2019; Gabbert et al 2021).

The remainder of this article asks what might an alternative paradigm, rooted in pastoralists' own understandings and practices, that was centred on embracing uncertainties and living with and from variable and volatile conditions look like? This perspective emerges from a long-running debate in studies of pastoralism that identify the importance of thinking about instability in environmental conditions (Behnke et al 1993; Ellis and Swift 1988), and so the condition of uncertainty in pastoral development (Scoones 1994). Further, the article draws on the important work on 'valuing variability' in pastoral settings (FAO 2021; Krätli 2019) and on how pastoralists can generate reliable outputs from highly variable inputs (Roe 2020), as well as how pastoralists' practices translate into dynamic, relational resilience (Konaka and Little 2021).

The discussion here takes the debate a few steps further. First by connecting to wider discussions around the social and political implications of understanding uncertainty as a basic condition of the contemporary world (e.g. Nowotny 2015; Stirling

2010; Wynne 1992), highlighting how uncertainty is at once a condition of indeterminate knowledge but also central to material relations, human experience and emotion, embodiment and practice (Scoones and Stirling 2020). By exploring these intersecting dimensions of uncertainty, a deeper understanding is developed of how pastoralists respond to and make productive use of variability and so generate reliability.

Second, this essay also goes a step further than existing discussions on pastoralists' responses by connecting to debates about 'care' as an alternative to modernising 'control' (Arora et al 2020). Care is understood as a way of locating responses to uncertainty within egalitarian, social and political practices, always located in situated contexts. Caring relations are necessarily wrapped up in the technological and material world, which is always fluid and full of surprises (Mol et al 2010). 'Matters of care' are in turn concerned with neglected and marginalised perspectives and thus committed to imagining how things may be different, offering hope not despair (de la Bellacasa 2017). By refusing a narrow, controlling vision such a perspective therefore encourages openness, humility, flexibility and adaptability, engaging with diverse human affective experiences and complex relationships between humans and nature (de la Bellacasa 2017). Such perspectives on care draw from diverse feminist as well as indigenous understandings, making the case for an alternative logic of care for plural yet partial knowledge and action (Bauhardt and Harcourt 2018; Whyte and Cuomo 2016; de la Bellacasa 2012; Haraway 1991). By contrasting 'control' with 'care' as ways of seeing development and so responding to uncertainty, very different outlooks, with profound political, social and practical consequences, are therefore suggested (Scoones and Stirling 2020; Stirling 2019), as discussed through examples from pastoral settings in the following sections.

Living from Variability and Volatility: Embracing Uncertainty

This section examines four themes that show how pastoralists' practices make use of, rather than try to suppress, uncertainties, and so are more compatible with a logic of care rather than a commitment to control. Drawn from a variety of case studies, the examples highlight how the five different dimensions of uncertainty introduced earlier are embraced. These in turn suggest a set of principles that may help guide future thinking around 'development' in the rangelands, in ways that fundamentally challenge the illusory vision of development as control, stability and order.

Mobility and Movement

Mobility is central to pastoralists' strategies for living with and from uncertainty. Indeed, flexible movement is the core of their successful production strategy, fashioned in ways that a stable, sedentary system could not achieve. In non-equilibrium rangelands, pastoralists move animals across a range of different environments making use of them at different times to assure production. Herding thus emphasises 'exploiting environmental heterogeneity rather than attempting to manipulate the environment to maximise stability and uniformity' (Behnke et al 1993: 14–15).

A number of different types of movement are important: the day-to-day routines of life intersect with the synchronous rhythms of the seasons and with more sudden adjustments to shocks and surprises. Each require caring responses sensitive to herders' livestock and environmental contexts that run counter to the impulses of mainstream development to plan, control and restrict mobility.

Pastoralists may move herds over long distances each season as part of a regular transhumance – for example to more humid areas during the dry season in the savannas or up mountains to summer pastures where grazing is not available in the winter months. These are the classic and well-known forms of movement requiring navigation across multiple territories and negotiation with many different land users. There are numerous examples of such transhumance patterns. These range from the classic the mountain transhumance in the European Alps or Pyrenees, to the West African latitudinal dry season movements from semi-arid Sahelian areas towards more humid Sudanian and Guinean savanna zones or towards major wetlands such as the Inland delta of the Niger (Netting 1981; Turner and Schlecht 2019).

These patterns of movement may reflect differences in soil type and underlying geology. In Zimbabwe, for example, savannas may be classified as 'dystrophic', where nutrients are limiting and the soils are poor, or 'eutrophic', where there are plentiful nutrients in rich soils, but water may limit grassland production (Frost et al 1986). Herders know about these contrasts, supported by intimate knowledge and a vernacular nomenclature of soils and plants, and manage animals accordingly (Scoones 1989). Seasonal variations in forage quality mean movement is required to sustain the productivity of animals. For bulk grazers like cattle, this often means moving to 'key resources' – the last patches of nutritious grazing available at the end of the dry season (Scoones 1991). Such key resources include wetlands, riverine strips, areas around homes, remaining portions of cultivated fields, places where animal dung accumulates near trees and shaded spots and so on. Sites of grazing (and usually also water) are combined with patches with high mineral content, such as salt licks on sodic soils.

Studies of grazing patterns of cattle in southern Zimbabwe showed that seasonally there was a high preference for such patches, with concentrated herded grazing occurring over several months in key resources, keeping animals alive, with salt licks improving appetite and boosting dry grass consumption in this period (Scoones 1995). Herding cattle was complemented with the management of goats, which have different feeding habits. They were discouraged from moving to such key resource areas, as they could find fodder particularly from browsing trees in this period, especially after the early pre-rains flush of new leaves. Contests can be intense between herders and their livestock over key grazing resources, particularly low-lying wetland patches (Scoones and Cousins 1994).

There are also other movements, even in agro-pastoral settings such as Zimbabwe where classic transhumance no longer exists; for example, in response to a particular crisis, such as a drought or a particular disease in a certain place. The presence of trypanosomiasis in some parts of the country, such as the Zambezi valley, constrains livestock production and the movement of cattle even to good grazing. In order to move, herders have to assemble the labour, connections and capital resources. Early scouting out of potential places to go to, networking among friends, government officials and

others are an important part of an irregular, time-delimited response. Such responsive movements are crucial to sustaining herds. Major droughts in the early 1980s and again in the 1990s in Zimbabwe showed how those who were able to mobilise resources and connections to move outside the area had massively higher cattle survival rates (Scoones 1992). This is a pattern repeated again and again, requiring the sustaining of networks, memories of migration routes and being ready to move if a disaster strikes.

Finally, there are day-to-day movements in and around the home, across relatively short distances; for example, to fields, particular watering points and other sites (Scoones 1989). These are nevertheless vital for improving the harvesting of nutrients from often poor-quality grazing. Here herding is focused, encouraging animals to find particular types of plant, lopping branches to improve access to feed or moving to a watering point by a particular route. Certain plants – even specific parts of such plants, for example, nutritious pods from *Acacia tortilis* trees – may be crucial to providing protein to animals in the dry season, so increasing appetite and the ability to eat dry grazing. Large and small stock may be treated differently, both to reduce competition and to meet different nutritional needs. Livestock kept in pens at home may get special care, as they are weaning young or suckling females, and it is often a different set of livestock management skills, very often associated with women, that become important. Careful herding at a small scale therefore allows animals to gain access to such patches of grassland or sources of browse from trees with higher nutritional value.

Realising production from livestock in such a challenging environment requires an immensely skilled and practised knowledge of spatial and temporal patterns in local settings, requiring sensitive, attuned caring approaches to management. Mobility across space and time in turn requires a deep understanding of the patterning of resources from the regional and landscape scale to the very local, as well as a sophisticated sense of timing. Such temporalities – across years, between seasons and day-to-day – intersect and are experienced very differently by different people (Bear 2016; Guyer 2007).

Since pastoralism is so reliant on mobility, the emotions associated with movement are deeply connected to pastoralists' identity. This may be different across genders and ages, as people take on different roles. For example, among the Rabari of Kaachch in Gujarat, India, pastoralists combine multiple movements, with men, women and youth taking on diverse roles, and having quite different embodied, emotional experiences of uncertainty (Maru 2020). With futures not predictable and so unmanageable through the conventional protocols of planning and linear time, temporalities are more complex, folded and contingent (cf. Ingold 1993), influencing the possibilities and practices of livelihoods in different ways (e.g. Krause 2017; Maru 2020). Seeing mobility as care – involving a sensitive disposition to uncertainty central to daily life – pushes us to recognise how pastoralists' movements are not just functional responses to environmental variation that can be planned and managed but are central to embedded livelihood practices.

Skilled Herding, Breeding and Training

Whether hired or members of the family, herders' skills and knowledge of animals – down to particular individuals in a herd or flock – is vital to successful pastoralism. The

human–animal connection that emerges adds affective layers of deep association and intimate communication between herders and their livestock to the underlying technical skill. This goes way beyond the standard approach to animal breeding or management, which aims to exert control on individual genetics as well as behaviour. Instead, a more flexible, open, caring approach centred on the herd rather than the individual animal is required to embrace uncertainty (Krätli 2008).

Sustaining a herd requires a diversity of animals, selected to maximise opportunities in a challenging environment. For example, among the WoDaaBe of Niger, Bororo zebu cattle are bred to maximise diversity across lineage groups, with the selection of bulls, the contracting out of females and other management responses seen as central to this strategy (Krätli 2008). The focus is not on uniform, high levels of individual production as in conventional breeding, but on the ability of the herd as a whole to make use of environmental variation successfully.

As well as genetic improvement through selective breeding, this also crucially requires training of animals within groups, with around 50 animals grazing together. Reducing stress through a gentle herding approach, along with grooming and other forms of animal care, helps improve production through successful grazing. Habituation and learning over a life cycle and transfer of behaviours across generations adds to social bonds within the herd. Cattle learn new practices through exposure across contracted herds where different styles of management occur. The animals' trust in the herder is key (Krätli 2008), and human–animal interactions are central to an intimate 'multi-species' entanglement (cf. Kirksey and Helmreich 2010).

This type of skilled, intimate herding, animal breeding and training is centred on diverse caring practices, embedded in fluid human–non-human entanglements. Together, these are crucial for any form of mobility. Any herder of any age will explain how they know their animals and how they must respond to their individual moods and characteristics. The social hierarchy within the herd or flock in turn helps with herders' ability to guide animals to particular sources of forage without pressure and stress. Intimate, creative and caring human–animal relationships are thus central to exploiting heterogeneity and variability and confronting uncertainties together.

Land Mosaics and Complex Tenure Regimes

Vital for pastoral production strategies is access to a varied selection of land types, often in highly fragmented rangeland environments (Hobbs et al 2008). Movements, whether long-distance or local, very often involve making use of quite different types of rangelands, and sometimes farmland or even peri-urban and roadside grazing. Composing grazing itineraries across years, seasons, days and hours requires flexible access to multiple, overlapping sites, usually with different tenure regimes applying.

Conventional debates about land tenure in rangelands have counter-posed privatised systems, such as conventional fenced, individually owned ranches and common property use. Challenging the assumptions of Garrett Hardin (1968) that rangelands were open access and so likely to be over-stocked, as individuals increased their holdings on limited lands, Elinor Ostrom (1990) proposed a number of principles underlying the governance of common property systems. In many settings studied by Ostrom

and collaborators, such principles of shared-use but bounded areas with distinct communities applied. But in pastoral settings this is not always the case and the classic formulation of common property falls short, especially under conditions of uncertainty.

Some have argued that rangelands should be viewed in terms of an 'open property' system – not a free-for-all of open access or a highly regulated and bounded common property regime either (Moritz 2016), but an arrangement whereby relationships govern use, but boundaries are not fixed. With large, open rangelands and good knowledge of what grazing is available where and who is using it, pastoralists may distribute animals across the range to assure the production of their animals. There are good incentives not to overcrowd any areas as animals will suffer, so livestock will be spread out thinly over a landscape and by default result in a light impact on the environment. With improved communications facilitated by mobile phones or access to motorbikes, such a system is seen to operate in areas where relatively uniform, spatially extensive grazing is available, such as in the West African drylands or the grassland steppes of Central Asia.

However, in other areas pastoralists have developed a more spatially and temporally focused management strategy to confront uncertainties, making use of multiple grazing sites in a mosaic over time (Robinson 2019). In such areas, use patterns by different groups are overlapping, boundaries are fuzzy and use is flexible, depending on the value and importance of the area, which – as discussed already – varies significantly over time and space.

In the Boran areas of northern Kenya and southern Ethiopia, for example, there are multiple pastoral and indeed farming groups who compete to gain access to the rangelands. But access to grazing is increasingly compromised by inter-ethnic armed conflicts that remove certain areas from use; by infrastructure projects and other investments, including wildlife conservation, that enclose areas; by incremental privatisation of rangelands by elites for individualised grazing, urban settlements or other 'development' projects; and by the encroachment of bush by invasive, introduced species (Lind et al 2020).

Traditionally, clan-based arrangements for controlling grazing access were linked to the management of deep wells, and a wider hierarchy of grazing access was effected through the *deedha* system, which institutionalised patterns of access to different areas (McPeak et al 2011). While these traditional systems of resource access have changed over time, the principle of negotiated access across multiple sites, influenced by social networks and wider clan-based authorities, still applies, although with the wider constraints to access, negotiations around grazing are increasingly complex today (Tache 2013).

The same applies in Amdo Tibet in China where grazing landscapes have been dramatically carved up by new infrastructure developments, the expansion of national parks and tourist areas, as well as the growth of towns and township settlements as part of state-led sedentarisation schemes (Yeh 2003). Pastoralists wishing to move animals between winter and summer pastures must draw on diverse authorities – from the state and the county government officials, from monasteries and from local leaders in the villages. Various government attempts to privatise grazing have occurred over the years but this restricts movement, although local innovations have emerged that

allow some degree of movement through local compromises and innovation. In such cases, multiple sites within and outside formally allocated private land are accessed through an elaborate set of rules that mimic the traditional system of transhumance and flexible movement (Gongbuzeren et al 2018).

Across these and many other examples, it is flexible, opportunistic access to multiple patches within a complex mosaic of land types that is seen as central to pastoral land use and tenure. Here, boundaries overlap and ownership is not formalised in either classic private or common property regimes. Instead, diverse institutions are involved – formal and informal, traditional and modern – and this networked flexibility is fostered through investment in social and political relations (Berry 1989), which assure access through complex social, technical and cultural assemblages.

This form of land governance is therefore well-suited to the complex, spatial and temporal heterogeneity of pastoral systems, and facilitates movement and so responses to uncertainty. Of course, hybrid systems are experienced in different ways by different people, as power is exercised through such institutional arrangements, with both inclusions and exclusions. So, for example, in Boran areas clan identities are especially important but are dominated by well-connected men, while in Amdo Tibet community-based negotiation of grazing arrangements is mediated through village authorities and sometimes influential monasteries. As a result, all such arrangements are continually contested and are always under negotiation, as they are assembled by different people as a form of institutional 'bricolage' (Cleaver 2017), reflecting power relations and patterns of social differentiation locally.

Networks, Social Relations and Moral Economies

Responding flexibly to unfolding, uncertain events and being ready for sudden shocks and surprises therefore means working with others. Connection, networking, collaboration and mutual support are all features of pastoral systems. This is not an idealised version of the equitable society, as there are divisions by gender, age, class, ethnicity and so on that influence such social relations, but it is the social and political dimensions of responding to uncertainty that are central, where trust is balanced with domination and reciprocity with control (D. G. Anderson 2014).

Among Boran pastoralists in Isiolo in northern Kenya, social networks are important for negotiating access for animals to a particular patch of grazing, well or area of farmland. Networks are equally important when responding to a particular uncertain event. When locust swarms arrived *en masse* to the rangelands of northern Kenya during 2020, collaboration among herders was crucial, both to spot swarms as they arrived and to scare them off before they decimated key resource grazing (Shariff 2020). Young men on motorbikes with mobile phones were key, replicating the pattern of informal scouting and knowledge exchange that has long occurred in pastoral societies when scanning the horizon for upcoming hazards and exploring options for grazing.

Sharing animals to support others, but also to allow for expansion of the genetic pool and to encourage learning between herds, is well-established in loan systems and contracting arrangements among Boran pastoralists (Dahl 1979). Again, networks among kin, as well as more distant friends and associates, are important. Gaining

knowledge about how to tackle problems, whether an unknown disease or a particular challenge of fodder management, equally relies on networks that connect pastoralists facing problems to individuals with expertise, including those in other areas and within government services, such as those supplying early warning information. Facilitated by WhatsApp groups and phone connections, informal knowledge exchange and learning among pastoralists in northern Kenya are crucial to keep abreast of unfolding, dynamic change (Tasker and Scoones 2022). Such exchanges contrast with standard, linear information dissemination as they are much more embedded in the two-way social relationships that garner trust and encourage learning, experimentation, improvisation and innovation – all vital features of responding to uncertainty and generating reliability (Roe 2020).

For example, across northern Kenya, livestock marketing is always centred on network relations between producers, processors, transporters, traders, retailers, consumers and others (Roba et al 2018; Mahmoud 2008). Prices for animal products fluctuate often wildly as demand and supply shift and as particular events affect market dynamics. Market volatility is a constant challenge if the aim is to gain a stable source of income. Again, social relationships within markets are crucial. A contact with a trader, a good deal with a transporter or a special arrangement for sales through a retailer, all can make a big difference, with brokers central to complex networks that generate reliability (Ng'asike et al 2021; Little et al 2015). And, when particular challenges strike – for example, movement restrictions imposed by the COVID-19 pandemic – then adjustments and innovations mediated through such relationships are made (Simula et al 2020).

Networked social relations, invested in through kinship, religious association, gender- or age-based solidarities or indeed wider forms of collaboration fostered by external projects and government initiatives, are therefore central to the way people embrace uncertainties. These diverse moral economies are never part of a timeless cultural tradition but are highly differentiated and always changing (Shariff 2020). New forms of solidarity thus emerge as challenges are faced, whether those associated with the COVID-19 pandemic or particular issues around production, herding, land management or marketing (Scoones and Nori 2020; Simula et al 2020). Recognising these forms of moral economy and local ways of generating reliability can be essential when designing social assistance and humanitarian responses that go beyond a standardised, risk-based plan (Caravani et al 2021).

Conclusion: Negotiating Uncertainties

These four themes offer a very selective glimpse of how pastoralists in quite different settings confront uncertainties in highly challenging production and marketing environments. Through these cases, we can see how uncertainties as constructions of knowledge, materiality, experience, embodiment and practice play out (cf. Scoones and Stirling 2020). In different ways, these five dimensions of uncertainty continuously intertwine with the everyday lives of pastoralists, while also conditioning the impacts of external interventions.

In this concluding section, some wider principles are drawn out in relation to the five dimensions of uncertainty. First in relation to knowledge, when we do not know about the likelihood of expected outcomes, the tools of rational risk management are of no use. Instead, pastoralists must draw on multiple knowledges from different sources, both formal and informal, and use these to learn through experience. Rather than following a set routine or recommendation, pastoralists improvise, creating an unfolding 'performance' in response to uncertainty (Flachs and Richards 2018), drawing on a logic of care and a management style that is adaptable and flexible (Wilmer et al 2020). This is a very different approach to the standard version of rational planning, where risks are assessed first and action follows. Embracing uncertainty requires both understanding broader contexts and also tracking what is happening on the ground, so that attuned, flexible responses in real-time increase reliability and so livelihood success (Roe 2020).

Second, as the case examples show, uncertainties also have a material dimension. This is not only significant for resources directly important for livestock production, such as grass and water, but also for the markets that allow pastoralists to realise cash income, for example. Navigating across these uncertain, unruly materialities is a central feature of pastoralists' strategies, as we have seen. The diversity in material features of pastoral landscapes, artefacts and organisational arrangements allows for redundancy and modularity, and so increased resilience in the face of uncertain shocks. Questions of access also arise in relation to material uncertainties, for resources are not fixed features but are socially and politically constructed. Thus, it is structural and historical relationships, along with the wider political economy, that influence who gets what and how and so how vulnerabilities emerge and uncertainties are experienced.

Third, uncertainties are in turn experienced in different ways by different people – across class, gender and generation – and this influences how pastoralists relate to a variable and volatile world. Such immediate lived experience intimately conditions how responses are constructed through emotional and psychological resources (B. Anderson 2014), centred on sensitive caring relations.

Fourth, uncertainties are not only experienced and felt by different people in different ways, they are also embodied in the ways that pastoralists' identities are constructed. Responses to uncertainty – whether a movement of animals, a marketing choice or an innovation – are thus affected by who people are, influenced by multiple, intersecting axes of difference. Relationships between people and animals are also embodied in the more-than-human entanglements and multispecies engagements (Smart 2014) that are part-and-parcel of caring forms of animal training and herding. Such embodiments connect between herder and herd in quite intimate ways and are central to how pastoralists embrace uncertainty.

Finally, uncertainties are also mediated through practice (Shove 2017). As discussed above, the features of flexibility and real-time responsiveness are central to how uncertainties are confronted. This requires navigation and negotiation through challenging situations, mobilising a range of relationships (Vigh 2009). Practices – ranging from herd movement to livestock loaning to disease control – are of course situated within networks, where trust relations, reciprocity, reliable social bonds, forms of col-

lective solidarity, sharing and mutualism are all important. Practices that centre on care are seen to be especially significant, as such collective responses are crucial for addressing uncertainty together, never just alone.

These five dimensions of uncertainty – knowledge, materiality, experience, embodiment and practice – together suggest an alternative interpretation of pastoral practices that challenges mainstream development and policy. What works to address uncertainty is a far cry from the mainstream vision of development centred on stability, order and control. Pastoralists have long learned how to address variability, where variations occur within bounds, and well-established, culturally embedded pastoral practices, involving herd movement and livestock sharing for example, have been repeatedly described. However, responding to uncertainties generated by volatile conditions, where there are no clear baselines, requires, in addition, continuous transformation of practices, rooted in learning and adaptive performance. It means assembling responses, using a diversity of technologies (such as mobile phones, motorbikes or even data from early warning systems) and new repertoires of practices (skilled herding, training animals, moving or growing fodder and so on). Under such conditions of uncertainty generated by volatile conditions, future challenges are unforeseen and surprises are frequent. As has been discussed, confronting these uncertainties requires investing in caring relations across diverse networks in order to forge new arrangements that allow livelihoods to persist and flourish.

Taking seriously the many ways that such uncertainties are confronted challenges conventional development thinking and practice. It means, for example, the need for new methodologies for understanding and appreciating uncertainty (or mess) (Pappagallo and Semplici 2020; Law 2004). It means new approaches in development practice and policy that see responses to uncertainty not just as passive coping, but as active and innovative and part of a sophisticated, intensive pastoral system. In relation to the four themes and case examples discussed above, an alternative approach to development would aim to facilitate mobility in ways that allow for flexible, adaptive responses, rather than controlling movement through sedentarisation, fixed corridors or restrictions on access. Instead of focusing on 'improving' livestock through standardised genetic breeding programmes towards a uniform, 'ideal' animal, an approach to livestock development at the herd and flock level combining genetics with behaviour change is needed, recognising the intimate, entangled relationships between livestock and herders. Complex tenure regimes, rather than trying to fix boundaries and define property rights, would recognise open property and land mosaics, with flexible tenure regimes suited to adaptive response. And finally, recognising the importance of networks and social relations in responding to uncertainties, social assistance programmes and humanitarian responses would need to acknowledge uncertainty and avoid standardised responses, and instead enhance supportive embedded social relations and local moral economies.

In contrast to the framing of much mainstream development in terms of modernising progress, centred on establishing (an often illusory) stability and order through control, such a perspective ushers in a more caring style of development. In order to confront uncertainty this is rooted in contrasting knowledges, diverse material rela-

tions, embedded experiences, embodiments and practices. Such responses to uncertainty mean building on the embedded, mutualistic and networked relational practices that are so central to successful pastoralism.

Rather than closing down through control, a more open, fluid, collaborative and caring approach to development is suggested. Table 1 offers a simple contrast between control and care approaches according to a range of criteria, which have all been discussed in the cases above. Therefore, through an approach to development centred on care, uncertainty, rather than being a constraint to action, can open up spaces for change and transformation, allowing for continuity and opportunity in the face of rapid change (Krause, this issue), and with this a new style of politics (Scoones and Stirling 2020).

An appreciation of uncertainty through the practices of pastoralists across the world, as offered in this article, in turn raises the question as to whether these flexible, practised responses seen among pastoralists are common to all settings where uncertainty is pervasive, whether among delta dwellers, hunter-gatherers, swidden cultivators, dryland farmers, fishers or urban day labourers (Scoones 2022). And maybe, given that uncertainty is central to the human condition even if unrecognised and suppressed (cf. Nowotny 2015), the principles emerging from such settings for confronting diverse uncertainties can assist us all as we navigate an increasingly uncertain and turbulent world.

Table 1. Contrasting approaches to development: control versus care

Control	Care
Predictable risk, stable, static, linear time	Uncertain, non-linear, complex, mobile, diverse temporalities
Technocratic, singular, modernist development	Multiple, alternative development pathways
Top-down planning blueprints	Open-ended, flexible, adaptive, deliberative, participatory
Narrow, disciplinary expertise	Diverse, multiple formal and informal knowledges
Individualised, privatised	Collective, networked, collaborative social relations
Mostly technical interventions	Social, cultural socio-technical innovation processes
Humans and nature separate; independent of contexts	Entangled human–nature relations, embedded in context; emotions and affective relations
Closing down to hubristic, standardised approaches	Humility, opening up to possibility, hope, conviviality

Note: Adapted from a lecture presentation (see https://www.ids.ac.uk/events/why-embracing-uncertainty-means-rethinking-development/); original version from Andy Stirling.

Acknowledgements

This paper emerges from the collective work of the PASTRES (Pastoralism, Uncertainty and Resilience: Global Lessons from the Margins) programme, which is supported by an Advanced Grant from the European Research Council (no. 74032). I would like to thank the PASTRES team for inspirations and examples contained in the paper. The paper was originally submitted in May 2021, and I would also like to thank the anonymous reviewers for the journal as well as the participants at the 'making and unmaking volatility' workshop in January 2021 for helpful comments, notably Franz Krause.

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Faire face aux incertitudes en milieu pastoral : aire évoluer le développement du contrôle au soi

Résumé: Les éleveurs doivent constamment faire face aux incertitudes de l'à-venir et répondre à de haut niveaux de variabilité et de volatilité. Cependant, la tendance au développement moderne dans les zones pastorales vise à créer une stabilité par la mise en œuvre de stratégies de contrôle et de politiques restrictives. En s'appuyant sur une série de cas, cet article analyse les réponses plus sensibles, flexible et attentionnées des pasteurs, en phase avec l'instabilité de la condition pastorale. Les cas montrent comment les incertitudes peuvent être vues comme des constructions de savoir entrecroisant expérience matérielle, incorporation de compétences et de pratiques. Ces approches bienveillantes, flexibles et souvent collectives sont centrales dans la vie des pasteurs. Ces exemples ont des implications plus larges dans d'autres contextes où des populations vivent dans des environnements incertains. Les approches conventionnelles du développement fondées sur le contrôle sont fondamentalement remises en question.

Mots-clés : développement, incertitude, pastoralisme, variabilité, volatilité