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Rethinking pastoralists' development from their perspective of disasters-averted

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By identifying the specific disasters and crises pastoralists successfully avert on the ground and in real time, we move beyond a reductive or otherwise partial view of their real-time activities. While the chronic challenges of inequality, marketisation, precarity, marginalisation, and the climate emergency are well-documented, they represent an incomplete and, as such, misleading picture. I argue that the implications of these avoided disasters are critical to local development yet remain largely overlooked in current pastoralist policy, management, and their critiques.

KEYWORDS

always-late capitalism, climate emergency, coping, critical infrastructures, disasters-averted

Introduction

Published in 2020, “A New Policy Narrative for Pastoralism? Pastoralists as Reliability Professionals and Pastoralist Systems as Infrastructure” (Roe, 2020a) established the importance of disaster avoidance by herders as a central theme in rethinking pastoralist development. The contribution below updates and extends that discussion with new material. The proposition here is this: If the disasters and crises actually averted by pastoralists on the ground were identified, we would better understand how short of a fuller picture is reducing pastoralist real-time activities to the chronic crises of inequality, marketisation, precarity, marginalisation, and the climate emergency.

The latter crises are widespread and well-known for pastoralism (e.g., Konaka, Semplici, and Little, 2023). I argue, in addition, that the implications for local pastoralist development of disasters actually avoided under these wider conditions are also very important and often underacknowledged by way of context-dependent policy and management.

An example is helpful in describing “actual local disasters averted.” Barry (2021) reports from his research in Georgia:

“A community liaison officer, working for an oil company, introduced me to a villager who had managed to stop the movement of pipeline construction vehicles near her mountain village in the lesser Caucasus. The construction of the pipeline, she told us in conversation, would prevent her moving livestock between two areas

of pastureland. Her protest, which was the first she had ever been involved in, was not recorded in any official or public documents". (Ibid, p. 103).

Barry found this to be "surprising" (his term) and went on to explain that "my conversation with the villager pointed to the importance of a localised problem, the impact of the pipeline on her livelihood and that of other villagers, and her consequent direct action, none of which is recorded or made public. This was one of many small, fragmentary indicators that alerted me to the prevalence and significance of direct action by villagers across Georgia in the period of pipeline construction, actions that were generally not accorded significance in published documents, and that were certainly not traceable on the internet. At the same time, the mediation of the Georgian company liaison officer who introduced me to the villager was one indicator of the complexity of the relations between the local population, the oil company, and the company's subcontractors". (Ibid, p.104; internal citations deleted).

I believe the phrases "managed to stop," "would prevent her moving livestock," "a localised problem," "consequent direct action," and "generally not accorded significance" illuminate the keystone importance of avoiding very real disasters on the ground, even if not identified by outsiders preoccupied with what has not been averted while doing so.

When local disasters averted are not highlighted and global disasters instead take centre stage in analysis, we frequently end up with development caricatures of herder life-worlds: depastoralised, degraded, and demeaned. This 'corpse-pastoralism' is flogged by herder-farmer conflicts, mummified by intra-ethnic inequalities, buried at sea in waves of liquid modernity, dissolved by the quicklime of late capitalism, and harbours even worse to come under the climate emergency. Even where elements of the caricature seem to hold, the stakes in getting the fuller picture and deeper policy relevance extend beyond demonstrating pastoralists have agency; the challenge also means recognising that the active, intervening management practices of pastoralists are often invisibilised locally by blanket terms like "coping."

One way to make the analytically invisible more visible is comparison across disciplines or fields (for the uses and abuses, see Krause, 2021). You draw on insights in one field to illuminate a functionally similar field. For our purposes here, any avoidance in identifying and accounting for disasters averted is to act as if the lives, assets, and millions in wealth saved each day do not matter when control-room operators of critical infrastructures prevent disasters from happening that would have happened if not managed in real time.

So too disasters averted matters to herders because herders dread specific, on-the-ground events that happen and actively seek to avoid rather than tolerate them. It is important, I argue, to see pastoralist systems and practices infrastructurally for the very same reason: the savings in terms of foregone losses from avoiding disasters represent a substantial investment in pastoralist development.

Summary of the infrastructure argument and findings

This infrastructural focus on averting disasters and its centrality for pastoralists is framed in terms of six connected lines of argument (Roe, 2020b; Roe, 2023):

1. In contemporary societies, large-scale water and energy infrastructures, among others, seek to provide the safe and continuous supply of their vital services to participants, even during (especially during) turbulent times. They seek to preclude or otherwise avoid dreaded events. This is called their high reliability mandate. So too pastoralist systems seek to reliably provide outputs and services vital to their respective members.
2. Pastoralist systems share specific features that characterize large-scale sociotechnical systems, called critical infrastructures, and their provision of energy or water, for example. A central element is the role, practices, and processes of real-time operators in managing system-wide reliability. Such reliability professionals are also to be found in pastoralist systems, today and in the past. As pastoralist systems are found across the world, pastoralism can be viewed as a global infrastructure with its own reliability professionals.
3. As with other globalized or globalizing infrastructures, pastoralist systems seek to increase process variance—real-time management strategies and options—in the face of high but unpredictable or uncontrollable input variance, so as to achieve low and stable output variance—and in these ways sustain livelihoods based on a reliable flow of outputs and services. This process variance is sometimes given the blanket term "resilience" (more below).
4. This means that to provide stable supplies of services vital to society, critical infrastructures have had to enlarge their portfolio of management strategies and options to respond effectively to the increased and changing variability in their inputs brought about by, among other factors, changing climate, globalisation, and the intensified competition and expansion of markets and commodification. These are the very same pressures and interactions documented at work in and on pastoralist systems.
5. It is this logic of high input variance matched by high process variance to ensure low and stable output variance that characterises what reliability professionals do. One may ask "What is 'pastoralist' when a herding household must rely on the support of urban or out-of-country members?" In answer, what has not changed is the logic of the reliability management in terms of input, processes, and output variance.

Let's pause here to take stock of these five points:

- While vastly different in sociotechnical terms, the critical infrastructures with which I am familiar—water, energy, telecoms, marine and road transportation, and hazardous

liquids—share the same logic of disaster avoidance: The system's real-time operators seek to increase process variance (in terms of diverse options, resources, and strategies) in the face of high input variance (including variability in factors of production and climate) to achieve low and stable output variance (electricity, water, and telecoms provided safely and continuously during turbulent times).

- Core to managing system reliability are these reliability professionals who, by virtue of their skills in pattern recognition and scenario formulation, are able to translate the systemwide patterns they see and local scenarios they face into real-time reliability across the system. In this way, they have unique knowledge of the system. [Think here of “team situational awareness” (Roe and Schulman, 2016), that is, for our purposes, herders/pastoralists in networks or groups with real-time understanding of the system and its specifics].
 - To be sure, not all pastoralist systems share this logic, nor are all pastoralists real-time reliability professionals. Furthermore, pastoralist systems do not reduce everything to the logic of disaster avoidance alone. More, it is easy to assemble negative narratives around these five lines of argument. Just assert that herders as reliability professionals are disappearing all over the place while more pastoralists than ever before are left with no option but to cope reactively rather than manage actively. Not only do I argue that any such conclusion has to be established case-by-case (and it hasn't)—I submit instead the sixth and last line of argument.
6. The overall point is that pastoralist systems tender the world a key critical service (and have been doing so for quite some time): These systems, like other globalised or globalising infrastructures, seek to increase process variance in the face of high input variance so as to achieve low and stable output variance. In doing so, they avert disasters, the forgone losses of which are best understood as continuing investments in pastoralist economies. More, they do so by managing non-measurable uncertainties well beyond the capabilities of formal risk methodologies and in the face of unfolding and diversified input variabilities. This key service is foundational both locally and globally in Anthropocene times of great uncertainty and turbulence.

What practical value is added to our understanding of pastoralist systems and the policy and management implications that follow for their development? It is important here to discuss both the bigger picture and smaller canvases. First, the key notion of “pastoralist resilience” is reinterpreted by this infrastructural approach to disasters averted. Second, specific examples in current pastoralist development are recast via the disasters-averted perspective and pastoralist resilience. The latter discussion is important because the follow-on policy and

management implications differ from conventional recommendations.

Discussion

Rethinking resilience in pastoralist systems from the disaster-averted perspective

It would seem obvious that the opposite of the coping herder, who can only react to external shocks, is the resilient herder, who bounces back from the same. But, even where true, that statement does not go far enough from the perspective presented above. Both the coping and resilient herder are at the individual level, but the opposite of the individual is the collective (think again “team situation awareness”), not a different individual with different behaviour.

Reliability professionals in critical infrastructures tasked with averting dreaded events from happening have been observed to undertake four types of resilience at their system level, each varying by stage of operations in the system (see Table 1).

Resilience in these ways is plural not singular (for other versions of multiple resiliences, start with Semplici et al., 2024). Options, processes, and strategies deployed by the system's real time managers are tied to the state of system operations in which they find themselves mandated to maintain continuous and safe operations. Resilience activities differ depending on whether or not the large sociotechnical *system* is in normal operations versus disrupted operations versus failed operations versus recovered operations.

So too for pastoralist systems as critical infrastructure. Resilience, here, is not a single property of the system to be turned on or off as and when needed. It is not one stable portfolio called “process variance” from which to choose this or that already-existing option depending on the stage of pastoralist operations. (Improvisation in the face of unexpected contingencies and assembly of options just in time are instead found, though never guaranteed.) Nor is resilience, as a system feature, reducible to anything like a “resilient” herder, though such herders exist.

Why does it matter that resilience is a systemwide, variable set of options, processes, and strategies? What you take to be the loss of the herd, a failure in pastoralist operations that you say inevitably comes with drought, may in contrast be perceived and treated by pastoralists as a temporary disruption after which operations are to be restored. While you, the outsider, can say their “temporary” really isn't temporary in the Anthropocene, it is their definition of “temporary” that matters when it comes to *their* real-time reliability and *their* disasters averted.

To return to Table 1, herder systems that maintain normal operations are apt to demonstrate what we call precursor resilience. Shocks happen all the time, and normal operations

TABLE 1 Different types of system resilience.

• Reliability professionals adjusting back to within <i>de jure</i> or <i>de facto</i> bandwidths to continue normal operations (<i>precursor resilience</i>)
• Restoration from disrupted operations (temporary loss of service) back to normal operations by reliability professionals (<i>restoration resilience</i>)
• Immediate emergency response (a form of resilience itself) after system failure, often involving actors other than system's reliability professionals; and
• Recovery of the system to a new normal by reliability professionals along with others (<i>recovery resilience</i>)

are about responding to them in such a way as to ensure they do not lead to temporary system disruption or outright system failure. Shifting from one watering point, when an intervening problem arises there, to another just as good or within a range of good-enough is one such strategy. Labelling this “coping” seriously misrepresents the active systemwide management underway.

Pastoralist systems, nevertheless, can and do experience temporary stoppages in their service provision—raiders seize livestock, remittances do not arrive, offtake of livestock products is interrupted, lightning strikes trigger random veldt fires—and here the efforts at restoring conditions back to normal are better termed restoration resilience. Access to other grazing areas (or alternative feed stocks or alternative sources of livelihood) may be required in the absence of fallbacks usually available.

So too resilience as a response to shocks looks very different by way of management strategies when the shocks lead to system failure and onward recovery from that failure. In this case, an array of outside, inter-organisational resources and personnel—public, private, NGO, and humanitarian—are required in addition to the resources of the pastoralist herders. These recovery arrangements and resources are unlike many of those marshalled by way of precursor or restoration resiliences within the herder communities themselves.

There is nothing predetermined in the Table 1 sequence. Nothing says it is inevitable that the failed system recovers to a new normal. It is crucial, nevertheless, to distinguish recovery from the new normal. To outsiders, it may look like some of today's pastoralist systems are in unending recovery, constantly trying to catch up with one disaster after another. The reality for the pastoralists may be that the system is already at a new normal, operating to a standard of reliability different than the outsiders might think.

If you think of resilience in a pastoralist system as “the system's capability in the face of its high reliability mandates to withstand the downsides of uncertainty and complexity as well as exploit the upsides of new possibilities and affordances that emerge in real time”, then they are able to do so because of herders being capable to undertake the *different* types of resiliencies, contingent on the stage of operations herders as a collective find themselves. Here too, nothing predetermines that every pastoralist system will exhibit all four resiliencies if and when their states of operation change.

Now let's shift the discussion from large conceptual issues, like pastoralist resilience, to specific subject matter issues that seem more or less intractable in current terms of pastoralist development.

Rethinking currently difficult policy issues from this infrastructure perspective

Very different insights follow directly for policy and management purposes from this infrastructural focus on disasters averted in pastoralist systems and its reinterpretation of pastoralist resilience.

We see how this works by attending to five currently important topics in pastoralist development: 1. environmental impact, 2. overstocking, 3. benchmarking optimal production, 4. restocking schemes, and 5. pastoralist income and wealth inequalities.

1. It is fairly common to talk about environmental footprints of different kinds of infrastructures. This contribution's perspective implies that instead of talking about environmental risks associated with pastoralism (e.g., the risks that pastoralism poses for the climate via land degradation and methane production), we should be comparing the already-existing environmental footprints produced by the respective global infrastructures, e.g., roads globally, electricity globally, dams globally. . .and so on (for more on the differences between environmental risk exposure and environmental footprint approaches, see Dafermos et al., 2022).

Because pastoralists rely on these other infrastructures, the respective footprints overlap. But the physical damage done to the environment by roads, dams, and power plants are well documented and demonstrably extend beyond negative pastoralist impacts on drylands and rangelands. These complexities, I argue, are much clearer when the “environmental unit and level of analysis” is infrastructure rather than number of livestock units over a given space.

2. In related fashion, the key problem with the notion of “overstocking” is the assumption that it is about

livestock. But livestock numbers on a segment of land are not an infrastructure system in just the same way that pipes, rods, and valves are not an operating nuclear power plant.

From our perspective, it's not "overstocking"—nor, for that matter, "overgrazing"—we should be talking about but "rangeland management capacity directed to averting disasters". In fact, I'm arguing that much more should be done to monetise (imperfect as that would be) the savings/investments produced when disasters are averted that would have happened had they not managed the way they did in real time.

Can herders make management mistakes? Of course. Do they always avert the events they dread, including by last-minute improvisation? Of course not. That is why pastoralist-to-pastoralist learning and interactions are so important around the notion of their respective reliability professionals sharing better practices and increasing their portfolios of management options. Note that doing so is not to increase a blanket "pastoralist resilience" but rather to increase the different types of resilience—precursor, restoration-after-disruption, and recovery-after-failure—for which other pastoralists have developed or modified better practices under like conditions.

3. No large critical infrastructure can run 24/7/365 at 100% capacity and be reliable; pastoralist systems are no different.

This means comparing pastoralist livestock systems to a benchmark of "optimised" grassland ranching or intensive dairy production is always misleading. This is the case if only because the latter are likely to fail or disappear sooner—just look at failure rates in companies, businesses, and other major efforts (famously, Ormerod 2005)—even without those disasters that have yet to be averted, most notably but not only the climate emergency.

4. Restocking schemes are regularly criticised for returning livestock to low-resource rangelands. Yet infrastructure for government commodity buffer stocks (e.g., storing grain, wool, or oil to stabilise the prices of those commodities) are just as routinely recommended by experts, be the countries low-resource or not. Climate change has increased the calls for buffer stocks of food and commodities (e.g., Weber and Schulken, 2024).

Here then, think of goat and cattle restocking as just such buffer stocks. These schemes are to be evaluated in terms of how they increase herder process variance so as to maintain stable livelihoods. It is the disasters averted by taking advantage of any affordances (new opportunities and constraints) brought about by restocking that is the issue.

But, again, the framework used and the details captured matter: According to our perspective, restocking for restoration after a temporary disruption (e.g., through a livestock raid) does not look at all like recovery after systemwide failure to a new but different normal.

5. Pastoralist systems are routinely criticised for their high inequality of holdings and ownership by elites. Fair enough, but does that mean redistribution of herd numbers is to be a centrepiece for producing "equally sustainable livelihoods"?

Wouldn't requiring more equality in terms of stable outputs have to be open to very different production systems (e.g., social protection programs) than one centred around inputs and processes for livestock herding and rearing primarily? And, as for "sustainable", it is not clear whether the more resilient pastoralism (resiliencies as differentiated earlier) is also the more equal one.

The criticism of "elites" is also problematic from the infrastructure perspective. The question for me is this: Under what conditions (if any), do pastoralists, initially poor but today better off, become "elites" in the negative sense familiar to the critics of pastoralist elites? The answer is important because an overarching development aim of the 1970s and 1980s arid and semi-arid lands programs I was involved in was to assist then-poor herders to become better-off.

Unsurprisingly by this point, my answer to the preceding question would now focus on the disasters averted over time by pastoralists, both those who are today's elites and those who aren't. It is essential to determine whether pastoralists with similar resource levels nonetheless differentiated themselves over time through their ability to avert disasters that would otherwise have befallen them.

It also remains an open question—settled case by case in my view—as to whether the persistence of in-kind transfers within a cash economy (e.g., Scoones, 2024a) is more about pastoralist systems that are locally just than it is about the global injustices of the cash nexus (on the significant tensions between local and global justice systems, start with Elster, 1992).

Conclusion

How do the preceding connect with the pastoralist literature and agendas (2026 being the International Year of Rangelands and Pastoralists)? They owe much to the ongoing work in Africa on drought management, dryland economies, conflict negotiation, and living off uncertainty (a fuller list of my citation debts include, in no order, Krätli and Toulmin, 2020; Nori, 2022; Krätli, 2015; Scott-Villiers and Scott-Villiers, 2025; Mohamed, 2022; Benjaminsen and Ba, 2021; Scoones, 2024b).

I am also thankful to colleagues who have referred to elements of the wider infrastructure framework in the 2020 *A New Policy Narrative for Pastoralism? Pastoralists as Reliability Professionals and Pastoralist Systems as Infrastructure* (in no order, Maru et al., 2022; Nori, 2023; Caravani et al., 2022; Tasker and Scoones, 2022; Konaka, 2024; Derbyshire et al., 2025; Hassan and Howe, 2024; Semplici and Campbell, 2023).

For my part, I think the added value of the framework lies in pastoralists as reliability professionals, who principally work in networks and in ways seeking to avert disasters that would happen if they did not manage the ways they did. (For the extended argument on pastoralists as reliability professionals and pastoralism as infrastructure, please see my longer and more detailed 2020 publication.)

As for this contribution, I hope my five examples help illuminate some of the analytic and policy purchase in rethinking pastoralism as infrastructure. It is true that I've not shown how reinterpreting pastoralist resilience and recasting five popular topics in pastoralist development "stick" for policymakers and decisionmakers. The overall aim here has been more modest: Any novelty in my points is aimed at pushing the reader to recognise both that conventional critiques—across the political spectrum—of pastoralist policy and management have gotten us only so far and that other useful ways can push policy and management further.

Data availability statement

The datasets presented in this article are not readily available because there were no datasets, qualitative or quantitative.

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