When Complex Is As Simple As It Gets:

New implications for pastoralist development in the Anthropocene from *A Guide for Recasting Policy and Management in the Anthropocene* (2023) & *A New Policy Narrative for Pastoralism?* (2020)

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The Question To Be Answered Today

What are some of the new but still major implications that follow from reframing pastoralist systems as critical infrastructure, globally?

Reframing pastoralist systems as a (global) critical infrastructure

--While vastly different technologically, the critical infrastructures with which I am familiar—water, energy, telecoms, transportation, hazardous liquids—share the same operational logic: The system's real time operators—call them reliability professionals—seek to achieve low and stable output variance (the continuous and safe provision of electricity, water and telecoms) by transforming the high input variance they face (including variability in factors of production and climate) by means of applying high process variance (i.e., application of a great variety of options, resources and strategies to convert inputs into outputs).

--The upshot is that having a variety of resources and strategic options, including being able to assemble, improvise or invent them, is a way to match and manage problem complexity to achieve by and large stable outputs. This is especially critical for the Anthropocene.

--I submit pastoralist systems are, in respect to this logic, *infrastructural*; and as pastoralists and their systems are found worldwide, so too is pastoralism a global infrastructure. To be sure, not all pastoralist systems share this logic; nor are all pastoralists real-time reliability professionals; nor do all pastoralist systems reduce to this logic, only.

Different but highly relevant policy & management implications from pastoralism as a global infrastructure (1/5)

1. The infrastructure framework suggests that instead of talking about environmental risks associated with pastoralism (e.g., the climate risks of land degradation and methane production), we should be comparing the environmental footprints produced by the respective global infrastructures (e.g., roads globally, electricity globally, dams globally. . and so on).

Because pastoralisms 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 far beyond pastoralist impacts on drylands and rangelands.

2. No large critical infrastructure can run 24/7/365 at 100% capacity and be reliable, and pastoralist systems are no different. This means comparing pastoralist livestock systems to a benchmark of "optimized" grassland ranching or intensive dairy production is ludicrous, if only because the latter are themselves likely to fail, sooner than later.

Different but highly relevant policy & management implications from pastoralism as a global infrastructure (2/5)

3. Restocking schemes are routinely criticized for returning livestock to low-resource rangelands. Yet the infrastructure for government commodity buffer stocks (e.g., storing grain, wool or oil to stabilize the prices of those commodities) are just as routinely recommended by experts, be the countries low-resource or not. Think of restocking schemes as buffer stocks.

4. A livestock raid undertaken by one pastoralist group on another in order to restore its herd differs from the livestock raid undertaken as an emergency response to its entire herd disappearing because of some other systemwide calamity, like a drought. The policy and management implications differ because in one you are restoring back to an system's existing normal operations, whereas in the latter you are recovering to a new normal for the system, which requires far more and different stakeholders.

5. Pastoralist systems are routinely criticized for high inequality of holdings and ownership. But does that mean redistribution of herd numbers has to be a major centerpiece of producing "equally sustainable livelihoods"? Wouldn't requiring more equality in terms of stable outputs mean having a very different production system or systems (e.g., social protection programs) than one centered around inputs and processes for livestock herding and rearing primarily?

Different but highly relevant policy & management implications from pastoralism as a global infrastructure (3/5)

6. Start with the conventional wisdom: Pastoralists, including their reliability professionals, are being displaced from their usual herding places by, e.g., land encroachment, sedentarization, climate change, mining, or other other factors.

Now focus on that subgroup of displaced pastoralists who are reliability professionals.

One major question then becomes what are the compensation, investment and steering policies of government, among others, to address this displacement. That is, where are the policies to: (1) compensate such skilled herders for loss of productive livelihoods, (2) upskill these herders further in the face of eventually losing their current employment, and (3) efforts to steer the herding economies and markets in ways that do not lose out if and where new displacement occurs?

The answer? With the odd exception that proves the rule, no such national policies exist.

So what? It's these missing pieces that should be on the UN agenda for the 2026 International Year of Rangelands and Pastoralists.

Different but highly relevant policy & management implications from pastoralism as a global infrastructure (4/5)

7. The key problem with the notion of “rangeland carrying capacity” is the assumption that it’s about livestock. That notion invites you to conjure up livestock shoulder-to-shoulder on a parcel of land and then ask you: How could this not be a physical limit on the number of livestock per unit of land? You can’t pack anymore on it and that has to be a capacity constraint. Right?

Wrong.

Livestock numbers on a piece of land are not an infrastructure system. The number of its pipes, rods and valves are not an operating nuclear power plant. Yes, livestock systems that provide continuous and important services (like meat, milk, wool. . .) have limits. But these limits are set by managing physical constraints, be it LSU/ha or not. More, this management combines with managing other constraints like access to markets, remittances from household members abroad, nearby land encroachment, and much else. (This is the same point we just made about why redistributing herd numbers may not be the better strategy for producing sustainable livelihoods over a diverse set of cases)

Can herders make management mistakes about numbers? Of course. That is why pastoralists-to-pastoralists learning is so important around the notion of sharing and modifying better management practices.

From our infrastructure perspective, it’s not “rangeland carrying capacity” we should be talking about, but “rangeland management capacity”. Better yet, “rangeland management capacities,” as there is not just one major type of pastoralism.

Different but highly relevant policy & management implications from pastoralism as a global infrastructure (5/5)

8. As a final illustration, let's look at how to reinterpret "rangeland restoration" through the lens of our infrastructure and management framework.

"Restore" is a big word in infrastructure studies. It's been applied to: (1) interrupted service provision restored back to normal infrastructure operations; (2) services initially restored after the wide failure of infrastructure; and (3) key equipment or facilities restored after a non-routine "outage". Now think of "rangeland restoration" in these terms of specific examples for 1 – 3, e.g.:

#1: Stall feeding, which is here part of normal operations, is restored after an unexpected interruption in its version of a supply chain. Trucking of water and livestock, which are also part of normal livestock operations there, are temporarily interrupted.(Again, remember "normal" operations do not mean invariant; they full of ups and downs.)

#2: Grasslands have been appropriated for other uses (by those infamous agriculturists), requiring indefinite use of alternative livestock feed and grazing until a better solution is found, if at all.

#3: A large veldt fire—lightning strikes are a common enough occurrence though unevenly distributed—takes much of the grasslands out of use, at least until the next rains. Herders respond by reverting to more intensive alternative grazing practices for what's left to work with.

So what? Here's one implication: The issue of overgrazing can be a sideshow distracting from what is going on infrastructurally. Because normal operations—remember, it's the benchmark used here for comparisons—always has had overgrazing in its operations. What, for example, do you think the sacrifice grazing around a livestock borehole is about? There is nothing to "restore" the immediate perimeter of this borehole back to. In fact, that "overgrazed perimeter" is an asset in normal operations of the livestock production and livelihood systems I have in mind.

Again, so what? As I read them, calls for "rangeland restoration" are a contradiction in infrastructure terminology, namely: "rangeland recovery back to an old normal." Recovery in infrastructure terms is a massively complex, longer term, multi-stakeholder activity to recover to a new normal, without any guarantees that will happen.

Chief Upshot of Rethinking Pastoralisms Globally in Infrastructure Terms

- Pastoralism-as-infrastructure provides the world a key critical service: Like other major (globalized and globalizing) infrastructures, pastoralisms seek to increase process variance—think, real-time management strategies and options—in the face of high but unpredictable or uncontrollable input variance (all manner of Anthropocene variabilities and instabilities) in order to achieve low and stable output variance (no longer just herd size and offtake but bundles of different outputs).

- 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 the 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," i.e., a group or networks of herders/pastoralists with real-time understanding of the system and its specifics).

- That key service—boosting and amplifying process variance, especially real-time management strategies and options—is foundational, I argue, for world economic development in times of high uncertainty and complexity as we in the Anthropocene.

Sources

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