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The XX International Grassland Congress took place in Ireland and the UK in June-July 2005.

The main congress took place in Dublin from 26 June to 1 July and was followed by post congress satellite workshops in Aberystwyth, Belfast, Cork, Glasgow and Oxford. The meeting was hosted by the Irish Grassland Association and the British Grassland Society.

Proceedings Editor: D. A. McGilloway

Publisher: Wageningen Academic Publishers, The Netherlands

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Recreating pastoralist futures

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Abstract

Research experience in southern Africa is used to reflect on key determinants of pastoral futures and how they might need to be addressed. The paper begins with a brief review of what we mean by marginality. A set of observations on key issues defining the option sets for pastoralism in the future is then presented. The first of these is that only a small number of structures or processes actually control the behaviour of social-ecological systems such as pastoralist systems. A second observation is that the future is so uncertain that there is a need to learn to design for robustness across plausible futures. Coupled to this is the observation that a reliable understanding of how we might manage adaptive capacity in pastoral people and communities is needed. Lastly it is suggested that a vital frontier in research is the set of relationships between cognition, emotions and behaviour at the scales of the individual and society.

Keywords: plausible futures, adaptive capacity, cognition, mental models, robustness

Introduction

We peer into the future with great uncertainty. We are familiar with the present and the recent past and so we tend to think of the future as being very much like the present. But the future may be something entirely different. As Allen (1990) noted many years ago, “The future is not what it was.” What might the future be like for pastoral systems? What research do we need to be doing now to meaningfully contribute to expanding the options that pastoralists of the future face? The focus of this paper is on outlining some tentative answers to these questions. The answers are posed with the hope that they will stimulate our thinking about pastoral systems in the future and thence guide us to developing better research agendas. The suggestions and ideas presented in the paper are strongly influenced by my work in southern Africa.

I have structured the paper in the following way. Firstly I explore what I understand by the concept of marginality. I suspect that for many researchers marginal means something to do with ecological productivity. It is my contention, however, that marginalisation may come from many other dimensions of the pastoralists’ world. Ecological marginality may not be the dominant marginalisation process. I then discuss in turn four ideas that I believe to be of consequence for our collective thinking about pastoral systems in the future. The first of these is the notion that we cannot know the future and therefore need to think about pastoralist systems being robust across all plausible futures. The second idea has to do with the belief that there are at most a handful of a processes or system structures that govern the behaviour of complex adaptive systems (Gunderson and Holling, 2002). We need to understand these and their relationship to the state of the system to understand what the future might be like. The third idea is that of adaptive capacity. The general concept is understood but we need to think through what it is, what impact it has and how it should be measured. Lastly I feel it important to improve our understanding of the way people perceive the world and how individual perceptions are mediated or altered through social processes. The mental models that pastoralists and in fact people at large have and how these influence our behaviour seem

crucial determinants of understanding how people, such as pastoralists, interact with their world. In each of these discussions I seek to highlight what I believe to be some of the key unknowns or uncertainties and hence areas where research or investment might well be warranted.

What is marginal to you may not be marginal to me

To people discussing pastoralism or pastoralists, marginal usually mean something related to being on the verge of not being able to sustain a livelihood or being on the verge of slipping into greater poverty. Although we often talk of marginal lands or marginal areas or marginal environments, we need to be cautious in thinking about marginalisation as being a purely ecological or a purely political or a purely economic process; it is more likely to be an inter-related mixture of all three (Blaikie and Brookfield, 1987; PASTORAL, 2003). Even within a given community there may well be differentiation and some people or families may be more economically, politically, socially or ecologically marginal than others (Findlay, 1996; Wisner, 2005). Closely associated with the concept of marginality is the idea of vulnerability; the livelihoods or general well-being of marginal groups or people are vulnerable to perturbation.

What is important to acknowledge is that marginalisation is firstly a relative concept. Marginalisation is conceived in relation to some metric or distribution. We need to be clear what that metric or reference distribution is, who is using it and for what purposes. Secondly marginalisation, in the sense of being on the verge of not being able to sustain an adequate quality of life, can come about through many combinations of demographic, economic, social, political or ecological factors (Blaikie and Brookfield, 1987). Marginalisation may be temporary or a chronic condition.

Marginal groups or individuals may play an important role in some societies and may in fact not perceive themselves as being marginal. Many of the great leaders and thinkers of society have come from what the societies of those times or places have called marginal groups; particularly from a religious perspective individuals, such as Buddha or Muhammad, were marginal in their societies (Armstrong, 2000; 2001). Marginal is measured with respect to a norm or reference and often means on the edge or fringe. For some people or groups this is a choice and having sectors of society living different lifestyles and values can be an important source of innovation and resilience. We need a better understanding, therefore, of the distribution of the marginal condition across a population as well as the impacts of this distribution. Is the modal value within the region that is accepted as marginal or is there just a lower tail of the distribution that is within that region? What is happening to the distribution through time; is the lower tail extending to the marginal or away from it? Is the modal value shifting toward the marginal or away from it?

We also need to understand what it is that makes people marginal. Inadequate production systems, environmental degradation, insecure resource rights, low use of external inputs and credit, lack of public investment in agriculture, remoteness and risky and limited markets have been noted as principal determinants of food insecurity (Scherr, 2003), and these are probably true for most forms of marginalisation, but there are also very strong social and cultural factors that bring about marginalisation. Why does the proportion of people or families in the marginal section of the distribution not self-organise away from that section? What are the processes or forces that keep them in what is essentially an undesirable state? Is it in fact an undesirable state? Unless we have a clear understanding of these processes or forces, we are

unlikely to be able to generate solutions that will shift the distributions from the marginal end to the viable end. Even when we do understand the processes and forces, we need to be very clear on what the implications of our interventions will be on the distributions that we faced at the start. Shifting one group of society across a marginal threshold may only result in their replacement by another group. Does the society need a marginal group for it to remain viable? These are hard questions to answer but we need to be honest and open to the nature of the systems we are trying to understand and help people manage.

Implicit in some of these thoughts is the degree to which society writ large has the right to determine who is marginal and thereafter to enforce its perspective on sections of society. Western society has taken on for itself the role of keeper of global values. Whilst I concede that in many instances people perceive themselves to be marginal and would like to change to a better state, it has also been my experience that there are many instances where external agents drive the push away from marginality. We need be very cautious in so doing.

What keeps people in an undesirable state of being? This is the subject of the next section in which I explore the major determinants of a system's behaviour and how these recreate the same conditions unless they themselves are fundamentally altered.

System governing structures and processes

It has been suggested that a handful of key process or structures, that generally change quite slowly, largely determine the behaviour of complex adaptive systems such as pastoral systems (Gunderson and Holling, 2002; Walker *et al.*, 2004). A logical consequence of accepting this proposition is that unless there are fundamental changes in these system-governing structures or processes then the basic dynamics of the system under investigation will not change outside of the behavioural boundaries set by the interactions of these system governing structures or processes. Where these system governing structures or processes are determinants of marginality then they have to be addressed before system level change can occur.

As an example, I reflect on research experiences with colleagues in the semi-arid Zambezi Valley of Zimbabwe. We were working on a project (the Mahuwe Project) to improve the management of vegetation resources in an agro-pastoral system in a semi-arid area of northern Zimbabwe. In a workshop of local leaders and villagers that was designed to identify the factors that prevented the community from achieving its goal of "conserving our natural, grazing and browse resources", the villagers articulated that it was the current allocation of land to crop production, housing and grazing areas, as well as the corrupt processes through which this land allocation was achieved and maintained, that were the major factors preventing them from achieving their vision. We therefore had to restructure the project to firstly address these underlying system constraints. Any attempt to alter vegetation management practices on top of the dysfunctional (from the community perspective) land allocations and land allocation processes would not have been likely to achieve their objectives. We, therefore, went through an eighteen-month process to firstly get the community to accept a re-planning of their area and then reallocation of land as well as the removal of illegitimate village leaders. Only then were we able to begin the original process of addressing resource management issues.

Perhaps we were lucky in being able to address the system governing structures or processes. There are likely to be many more instances where these are outside the control of the people

to address. But what do you do when you cannot address the system-governing structure or process? It is these situations that provide the greatest problems for research and management. Solutions are likely to be restricted to mitigation or adaptation; learning to live with undesirable but essentially unchangeable situations.

Robust across plausible futures

We cannot predict the future with any useful degree of certainty. The further into the future we peer, the greater the uncertainty. With several of the major drivers of change in pastoral systems (e.g. climate and markets) expected to change quite markedly but in as yet highly uncertain ways, the future seems even less certain than it was. How should we deal with this situation?

One approach is to analyse the major determinants or drivers of the future and establish which of these are likely to have high impacts and which are likely to be highly uncertain in their impacts or occurrence. The high impact and high uncertainty drivers are those that are most likely to split the future into alternative pathways or trajectories. With these drivers identified the future can be explored through creating storylines of alternative future worlds based on the separation of these drivers along major axes – the axes of discrimination. For example, in the Gorongosa – Marromeu component of the Southern Africa Millennium Ecosystem Assessment (SAfMA-GM), two future scenarios were developed to explore the future of that region of Mozambique (Lynam *et al.*, 2004). The central discriminating axis was a combination of governance; from centralised and corrupt to devolved and locally responsive. Economic investment flows into the region were seen as being linked to the governance state. Scenarios were also developed with local communities (Table 1) and provided a rich opportunity for these groups to explore the robustness of their livelihood systems in each future world (Table 2).

Table 1 Major drivers of change (to 2030) for future scenarios in Vunduzi, Gorongosa District, Mozambique and the relative impact scores for each driver. Scores range from 1 (lowest) to 40 (highest) and are subjective representations of the perceived likely impacts of these drivers (Lynam *et al.*, 2004)

Driver	Relative impact score
Amount and type of armed conflict in Mozambique	40
Amount and timing of rainfall in Vunduzi	25
Relation of government with Vunduzi community	22
Amount of trade in Gorongosa District	20
Amount and type of agricultural commercialisation in Vunduzi	15
Condition of road between Vila Gorongosa and Vunduzi	15
Population of Vunduzi	13
Understanding among people in Mozambique	12
Amounts and types of international projects in Vunduzi	10
Movement of people in and out of Vunduzi	10
Amount of manufactured products available in Vunduzi	9
Numbers of non-locals living in Vunduzi	9
Prices of agricultural produce in Mozambique	9
Amount of greed / covetousness among people of Vunduzi	1

Table 2 Indicators of human wellbeing for the Nhanchururu community under the Patronage scenario. The villagers scored 31 human well being indicators now and in 2015 under the two different scenarios. A score of 10 in 2003 indicated the baseline and from there the villagers used an open ended scoring to identify likely changes under the scenario to 2015. Higher scores generally mean a positive change and scores less than 10 mean a negative change.

HWB Indicator	2003	2015	Explanation
Land for houses	10	10	Land for houses will still be readily available
Land for cultivation	10	10	Poverty or no poverty, there will still be adequate land for cultivation
Houses	10	20	Houses will increase in number as our children establish homes of their own
Water for household use	10	9	Quality of water will not change, but it may become a little drier
Crop production	10	8	Decrease initially ascribed to poor governance and increased drought, subsequently restated as a lack of coordination between government, NGOs and communities
Agricultural equipment	10	6	Under poor economic conditions it will not be easy to purchase agricultural equipment in Vila Gorongosa
Agricultural inputs	10	4	If all crops are sent to Maputo it will become difficult to find seeds locally
Credit/funds for agriculture	10	3	Credit will become less accessible as people will borrow money, have difficulty in paying back and then will not be able to take any more
Knowledge and technology	10	10	Ploughs and tractors have never been used here and are unlikely to be introduced
Livestock	10	2	Livestock such as goats, pigs and dogs will decrease due to conflicts caused with neighbours who will either kill or chase away the offending animals
Hunting of wildlife	10	1	Although only minimal hunting is carried out at present (e.g. cane rats in fields), in future there is likely to be stronger prohibition and control by park rangers
Fishing	10	10	Currently possible to secure a permit to catch fish within the park, and we hope that this will continue
Collection of wild foods	10	10	Currently possible to secure a permit to harvest natural resources within the park, and we hope that this will continue
Grinding grains for food	10	10	The situation will not change – there has never been any grinding mill here and none will come
Cooking of food	10	10	There are so many trees here such that firewood will still be readily available
Sleeping mats	10	14	We will have more children, so there will have to be more sleeping mats
Household items	10	12	Young people will come with new ideas and improve on what we use at present
Access and transport	10	10	The road will remain in its current poor state
Selling of crops	10	13	Increase in crops will be due only to the population increase, and not from any other factors
Selling of livestock	10	1	Livestock numbers will be strongly reduced, so there will be few to sell
Selling of natural resources	10	12	This will increase due to population increase
Purchases from shops	10	10	There are no shops here at present and they will not come
Local employment	10	11	Limited increase due to the increase in population which will create additional opportunities for local employment
Formal employment	10	10	There have never been any formal employment opportunities here and they will not come. Some may go to seek employment outside, but opportunities are restricted as people prefer those who can write nicely. Our life is based on agriculture here.
Education status	10	11	School is satisfactory at present, and will continue. The teacher is a problem, but we will manage to replace him, and this will improve the education
Health status	10	10	There are no formal health facilities in the village at present. When we are sick we must go to Vila, and this will continue.
Status of traditions	10	10	These will continue without change
Status of government regulations	10	10	These will continue without change
New activities	10	13	People say that this area is good for tobacco – maybe tobacco farmers will come and then we can start to grow tobacco too
Social differentiation	10	15	Some families will be able to increase crop production and sales, but others will not – this will lead to greater differences between families than at present
Village population	10	17	Population will increase due to natural growth: Firstly, the age of marriages is decreasing (from 20/21 years before to 18/19 years now) and, secondly, polygamy is increasing. We do not expect any families to leave Nhanchururu, but some will come from outside to settle here. This is already happening, and we will accept them, and show them where to put their houses and where to make their fields

Examining livelihood systems in the framework of future scenarios (Peterson *et al.*, 2003) can provide opportunities to explore what adaptations (social, institutional or technical) would be required to maintain (or enhance) specific human wellbeing objectives in the alternative futures. But what is important is the potential to explore these adaptations in a relatively low risk, simulated environment.

The capacity of individuals or communities to adapt to changes, either proactively in anticipation of changes or reactively in response to changes, is an important determinant of the resilience of people and communities. This is the focus of the next section of the paper.

Understanding and enhancing adaptive capacity

Changes occur and people adapt through mechanisms such as altering the rules governing resource use, altering or developing new technologies or changing consumption. In some situations human adaptations improve overall wellbeing but in many others human wellbeing decreases. Why is this? Why are people able to adapt without loss of wellbeing in some situations but not in others? Why are people in some situations not able to adapt at all? Understanding the determinants of adaptation, at both an individual and a community level, is clearly of importance to our ability to deliver research that might enhance the ability of people to make wellbeing-enhancing adaptations and to avoid wellbeing decreasing adaptations.

In this section I explore, largely from a conceptual perspective, some aspects of human adaptation. We need to be clear what it is we mean by adaptive capacity. In his classic treatise “Adaptation and natural selection”, George Williams (1966) considered adaptation to be “an aspect of a phenotype (structure, behaviour, physiology or mind) that was designed by natural selection to serve a specific function” (Symons, 1989). Williams (1966) was very clear that adaptations must be considered in relation to the environmental factors that they were the consequence of. From this evolutionary perspective with enough time, adaptive capacity could be considered to be almost infinite. This is not particularly useful when talking of pastoralist societies that are currently in existence. However, it does tell us that we have to express adaptive capacity in relation to some response time. In the context of current pastoral peoples or societies, we need to be clear whether we are referring to the adaptations of current (extant) individuals or populations or we referring to their societies. We can clearly adopt a much longer timescale with the latter. In this paper I will use the term, adaptive capacity, to refer to the capacity of individuals or society to generate responses to changed circumstances that are intended to sustain or to improve their wellbeing. These might, for example, be behavioural, institutional, technological or consumptive responses.

It is important to recognise that this is not purely a positive set of responses. When there is no other recourse, people have to reduce their consumption to damaging levels (i.e. resulting in malnourishment) in order to continue. This is an adaptation. When people talk of adaptive capacity, I get the sense that they do not mean this response of last resort.

What then are the determinants of this capacity to adapt? I suggest that there are two major determinants; exposure history together with the society’s or individual’s memory of the history and resources as measured along axes of human, social, natural, financial and physical capital.

Throughout their existence societies and individuals experience a great variety of change situations. This is their exposure history. If we express these change situations as frequencies

of change events of different magnitudes, we might expect the great majority of events or processes to be on the left end of the x-axis (the small events end) with only a relatively few large magnitude events or processes. For most people and societies their experiences of change will be largely in the range of small-scale events or processes. Only very occasionally will they have to face (adapt to) large-scale events. The more common and thence by definition largely small change events will become part of their normal routines – intra-season drought in southern Africa, for example. Adaptations to these change situations, such as moving livestock to distant grazing areas, will be largely institutionalised. The more common a change event the more learning the individual or society will have had a chance to do and the more likely they will have the adaptive capacity to respond to these situations. Experience provides learning opportunities. The more difficult situations are those that are rare and thence likely to be very much larger events. Where there is no previous experience, of either the same or similar class of change events, then I expect the capacity to adapt to be much less well developed. However, experiential history may also wear down the capacity of a community or individual to adapt (Hobfoll *et al.*, 1995). With repeated stresses, individuals or societies may not have the time to recover and thence may be even more vulnerable to change events that would not usually make much difference to them.

In part this last point reflects a second important determinant of adaptive capacity; the availability of resources to buffer the individual or society from changes that have emerged. Resources provide for alternative pathways for recovery or adaptation from a change situation. When grazing shortages impact Australian outback graziers, they lease grazing elsewhere, load their livestock onto trucks and move them to the new grazing. Southern African agro-pastoralists do much the same thing but walk the animals to new locations. As noted earlier, repeated high magnitude disturbances will erode the resources (social as well as financial or natural) available to an individual or society. Where there are no resources, there can be little adaptation other than altering consumption.

This brief outline of adaptive capacity leaves me with many more questions than I am able to answer. What, for example, are the links between local (individual) and social adaptation or adaptive capacities? How do we measure adaptive capacity? What do we understand by the more complex concept of transformative capacity or the capacity of societies or communities to transform themselves into something entirely new (Walker *et al.*, 2004)? Perhaps most important of all is the question of how we might go about enhancing human adaptive capacities? Clearly the majority of opportunities available to us are associated with the provision of resources. Of these it would appear that knowledge and social capital in the form of networks, governance, trust, the capacity to visualise alternatives and plan their implementation are key. These were important aspects of the success of the Mahuwe Project mentioned earlier and in many respects are associated with cognition – how people understand or conceive of the world and work with these conceptions to manage the world and their place in it. This is the subject of the next section of the paper.

Cognition, emotion and mental models

People have an extraordinarily well-developed ability to conceptualise, in quite abstract ways, the world they seek to manipulate or manage in order to live and satisfy their goals and aspirations. These mental models (Johnson-Laird, 1988) of how the world works, and their attitudes and beliefs as to what is important and relevant in the world, appear to be a major determinant of human behaviour. This is a large field of research that spans a number of disciplines that I cannot adequately represent here. I would, however, like to outline what I

believe should be a major area of enquiry in relation to pastoral systems. This is the area of the relationship between human mental representations of the world and human behaviour. It is my thesis that without a reasonably reliable understanding of this domain we stand little chance of understanding human decision-making or human behaviour at either an individual or collective scale. I furthermore suggest that human cognitive and emotional processes underpin much of what I have discussed so far in this paper and we, therefore, need a greatly improved applied understanding of these processes in order to guide the emergence of successfully adaptive policies and management options for pastoral societies.

Virtually all human interactions with the world are mediated through our cognitive and emotional systems (Johnson-Laird, 1988; Goleman, 1996). We construct, manipulate and update mental (simulated) representations of the world and from these draw conclusions on what actions to take, stimulate the physiological, physical and mental processes needed to take actions as well as monitor progress and adapt our actions to improve performance. Our emotions appear to play crucial roles in this process through acting as the equivalent of programme interrupts to halt or switch cognitive processing (Johnson-Laird, 1988), or fast and parallel processing systems that bypass the slower cognitive processes to achieve rapid results when these are needed (Le Doux, 1989; 1998). This rapidly developing field of research that integrates psychology, neural and brain research and human behaviour has a number of important lessons for research and policy in any field of human endeavour. We have a collective responsibility to bring the findings of this exciting frontier into our mental models of how pastoralists view the world. We need to understand the relationships between these mental representations and human behaviour. As importantly, we need to understand the relationships between individual mental models and social constructions of reality and action. Rather in the sense of the thinking of Kuhn (1970) on scientific paradigms, I believe that societies maintain collective mental models of how the world works that incorporate attitudes, beliefs and values. These collective mental representations act as attractors for the thinking of people living within that society. They usually change only very slowly but are capable of very rapid changes across paradigmatic thresholds such as when societies gear up for war.

People do not necessarily alter their behaviour when provided with information on the benefits of different behaviours. Participatory research methods have been successful because they involve working with people in ways that, I believe, develop revised cognitive representations of the world. The mental models or at least small parts of them are re-coded. I believe that the acknowledged successes of model-building for altering the understanding of modellers are due in large to the same processes. But I suggest that we need a better understanding of how this happens and how stable these revised representations are. We also need to better understand what combinations of information, participatory learning and action will yield the most reliable and useful cognitive and emotional systems for pastoralists dealing with the many changes they face in the coming decades. But it is not only the pastoralist mental models that need to be understood and altered. We, as scientists as well as elected representatives of society, need to rework our cognitive and emotional processing systems. Are we sure that we are in the best attractor of cognitive representations?

Conclusions

I have suggested that pastoralists form part of a larger society that, when viewed at some scales, we are also a part of. As such they face similar problems and issues that many of us do, albeit at different times and perhaps without the buffering that our relative wealth across several scales of measurement provides us. I have identified a handful of concepts which I

believe are of significance to our thinking about pastoralists and therefore that compel us to act in particular ways or to adopt particular attitudes or beliefs. The first of these is that for many systems there is only a small number of what I call system governing structures or processes that fundamentally control the behaviour of the system. We need to pay attention to these because unless we alter them the same system behaviour will be recreated. To fundamentally alter the way a system behaves, we need to address these system-governing structures or processes. Where we cannot alter these system-governing structures or processes, and they are creating undesirable behaviours, we can only hope to mitigate the consequences of these behaviours.

A second observation made was that, because we cannot know the future (and neither can most pastoralists), we need to start thinking about what interventions are likely to be robust across a plausible range of alternative futures. We should examine the likely outcomes of any intervention across a number of futures. Many pastoral societies are on the edge of social and economic viability. They are not in a position of taking great risks. Few of them have large capital stocks to buffer them when interventions go wrong. We need therefore to think of them in terms of resilience (*sensu* Holling, 1973) rather than production.

The third observation that I made was that, if we accept the conclusion that we need to design for robustness across plausible alternative futures then a crucial determinant of that robustness will be the capacity of people and the society in which they exist to adapt to change. I believe that there is a major gap in our understanding in relation to our ability to measure and improve the adaptive capacities of pastoralist peoples and societies.

Finally I have suggested that much of the research we do, the policy formulated and the behaviour of pastoralists themselves is determined by a complex web of cognitive and emotional models of the world. I argue that we need a far better applied understanding of these models and their relationships to individual and collective behaviour. This latter strikes me as one of the major research challenges in the coming decade.

A common thread throughout this paper is the unknown relationships between individuals and the collective. Science seems to have hit a wall in its ability to deal with scale. Although great strides have been made in thinking about scale, we are far from having a workable understanding of the relationships among small-scale and large-scale (in both a spatial and temporal sense) structures or processes. This is research frontier that beckons enticingly, hydra-like.

Acknowledgements

The Mahuwe Project was funded by the United Kingdom Department for International Development (DFID) for the benefit of developing countries (R7432 Livestock Production Programme). The views expressed are not necessarily those of DFID. The SAfMA-GM Project was funded by a grant from NORAD to the Millennium Ecosystem Assessment.

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