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# CLIMATIC PLACE: A SOCIO-CULTURAL GEOGRAPHY OF CLIMATE RISK MANAGEMENT

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## ABSTRACT

Between November 2003 and February 2004, I conducted in-depth interviews with graziers in three areas of the semi-arid rangelands of NSW and Queensland. Analysis of these interviews provides insights into some of the socio-cultural contexts of climate information communication between scientists and graziers, as well as the ways in which climate information and knowledge are propagated, adopted, validated and contested within grazing communities. Climate in this sense is not only statistical or physical, but also experiential and inter-subjectively constructed. It can be described in terms of "climatic place" – the way weather is heaped up in the individual and social memory to become construed as a feature of a place. Narratives of climatic place are increasingly inclusive of scientific climate information, often imperfectly translated. Understanding both the socio-cultural contexts of communication and use of scientific climate information can help improve the way information is delivered and integrated into decision-making in the semi-arid rangelands.

## INTRODUCTION

In this paper I explore the boundaries between formal scientific ways of assessing climatic risk, in terms of spatially extensive climatic oscillations like the El Niño Southern Oscillation (ENSO), and the ways that graziers in three areas of the semi-arid rangelands are using various local, regional, international and scientific sources to inform their climate risk related decisions. These decisions are always context dependent and, after providing a brief methodological background to the research, I explore some of the contexts in which climate risk decisions, particularly stocking decisions, are made. With reference to interviews with graziers, I highlight the primacy of situational factors in informing climate risk decisions before examining how anticipatory factors are included in these decisions. Among these anticipatory considerations, scientific climate information appears increasingly prevalent, though the ways graziers relate to this information, and to those who produce it, varies widely between individuals and groups. The use of locally derived anticipatory climate information is similarly variable. Similarities between scientific and local sources of information are described here in terms of the *visibility* and *recurrence* of both *signals* and *patterns*.

Semi-structured interviews highlighted ways scientific climate information, when employed, is used in contingency with a variety of other sources of information and, perhaps most influentially, with local knowledge that is experiential, and socially mediated. The implications of this contingent and context-dependent use of climate information throw into question two common assumptions that have informed the development and dissemination of scientific climate information: that 'uptake' of climate information can be evaluated, and; that seasonal outlooks are only of value if they change a decision.

## METHODOLOGY

Qualitative examinations of the nexus between science and society can provide insights into practices, perceptions and relationships but also into how these are constituted. Where statistically representative, quantitative work in the social sciences has been likened to satellite imagery, providing "a broad overview of public opinion", qualitative studies are akin "to exploration on the ground"

(Kempton *et al.* 1995, pg.18). The 'ground' explored here can be described geographically as the three circular areas, of *c.*100 kilometre radius, centering on Longreach, QLD; Barringun on the NSW/QLD border (between Bourke and Cunnamulla); and Hillston in Western NSW. While these areas have a similar median annual rainfall, there are enormous differences in their seasonality, land systems, production capabilities and numerous other factors. Within the areas, the variety of land systems and grazing operations confound simple comparisons. All three areas, though, are periodically affected by ENSO-related drought and at various times statistical climate outlooks provide a potentially useful tool for managing climate risk.

In this research I have sought out a diversity of managers' perspectives through adapting a purposive sampling strategy aptly named 'rhizomatic sampling' (Stehlik *et al.* 1999). This technique allows rapid development of networks through engagement of key informants who are familiar with the local grazing community. These key informants ranged from stock and station agents and wool brokers to a retired grazier, an employee of a local NGO, a public librarian, and more. They provided contact details for managers who they considered to manage for climate risk in a diversity of ways. They also legitimated 'cold calls' by allowing their names to be cited in initial telephone contacts with managers. A minimum of three key informants was found for each region. Their 'networks' were broadened by requesting other contact details from participants after they were interviewed in their own homes.

While the geographical *areas* might be considered as three collective case studies, they are not. Case studies must be in some way bounded (Stake 2000, pg. 440). Although these areas are geographically prescribed, the social, business and familial networks of their residents rarely are. In the climate risk management tradition of Tyson and Kidman, a large proportion of the participants had one or more properties outside the study areas, and one even had properties in more than one of these areas. Families were often far afield, though even from a distance, business relationships between participants and their families were frequently maintained. These and other features of graziers' business structures affect how climate risk is not only managed but perceived. People's historical, familial and social relationships with other places allow understanding of different local and regional climates and affect how their own climate is understood and managed. Necessarily then, rather than being case studies of areas, this is a study of 'interconnected networks of people' (Neumann 1997, pg. 204) in different places, and of how their knowledges of their climate intersect with scientifically derived climate risk information. The geographical parameters bounding the study areas were defined to make this study practically achievable through delimiting the spatial extent of the networks of participants and key informants, and demarcating areas for closer historical analysis.

## RESULTS AND DISCUSSION

The use of information about future climatic risk, however derived, is always embedded in the situational context. For instance, as illustrated on the left side of Table 1, the majority of participants stated that the most important influence on their stocking rate decisions was quantity and quality of standing feed. This situational factor was rarely measured, quantified or recorded by participants. A small number of interviewees maintained grass-check sites and records but the large majority assessed the feed heuristically as they travelled around their country. Taking measure of the feed on a given property, or the resilience in that country, was less scientific or formulaic, or done using rules of thumb. Instead participants tended to repeatedly gauge the changes in the country as they appeared. Such assessments are usually informed by social and inter-generational memory as well as experiential knowledge of how a body of feed will hold out, depending on an array of factors (see Table 1) which vary from one manager or situation to the next. They are further tempered by the management ethos of an individual, family or group. As such, property decisions are rarely straightforward or prescriptive and, in family operations, are nearly always contingent upon the social, economic and environmental contexts in which the decisions are faced. By way of example, as one grazier put it:

If you walk into a bank and are looking for finance, I've yet to meet a bank manager, who will say: "Is your wife on side?". And that is the most critical point of any management decision to be made in arid land management. Because if you haven't got the backing of your partner and the family, everything breaks down. So you might say, "well, what's this got to do with forecasting?" or whatever, but it has everything to do; as to whether you take any notice of all this, or whether you *can* take any notice of this (male grazier, border area, QLD).

This analysis, then, recognises the importance of various situational factors that influence such things as stocking rate decisions, but draws focus on the anticipatory factors, such as long-term climate outlooks, and how they play a role in such decision-making.

The right side of Table 1 condenses and categorises the most common responses to a question about how managers assess the risk of drought or dry conditions in coming months or seasons. Here the responses are based both on sources of scientific information and on local observations and experience. While keeping track of the Southern Oscillation Index (SOI) ranks highest among these factors for all the areas together, this trend is not apparent in individual areas. It must be stressed at this point that these frequencies are descriptive rather than statistically significant and are included here as a way into the more detailed qualitative analyses which provide insights into, for instance, the way different factors are weighted as 'decision stakes'.

Table 1. Ranking of the first ten factors (all areas) that influence stocking rate decisions and drought risk assessments by area and frequency.

| What factors are important in influencing stocking rates? (first four mentioned) | ALL AREAS (n=70) | LONGREACH (n=25) | BORDER (n=20) | HILLSTON (n=25) | How do you assess the risk of drought or dry conditions in coming seasons? (first three mentioned) | ALL AREAS (n=70) | LONGREACH (n=25) | BORDER (n=20) | HILLSTON (n=25) |
|---|---|---|---|---|---|---|---|---|---|
| quantity and quality of standing feed | 50 | 19 | 16 | 15 | keep track of SOI | 12 | 5 | 3 | 4 |
| time of year | 26 | 11 | 9 | 6 | law of averages (dry and wet periods) | 9 | 1 | 3 | 5 |
| recent climatic/rainfall conditions | 16 | 8 | 4 | 4 | don't have long term strategy | 8 | 2 | 4 | 2 |
| market | 11 | 8 | 1 | 2 | Bureau of Meteorology (www) | 8 | 1 | 3 | 4 |
| water available | 7 | 3 | 3 | 0 | conservative estimates of what it might happen | 7 | 1 | 5 | 1 |
| health of animals/condition of stock | 7 | 3 | 1 | 4 | seasonal outlooks generally | 7 | 2 | 0 | 5 |
| stored fodder on hand | 6 | 0 | 0 | 6 | Roger Stone | 6 | 5 | 1 | 0 |
| SCOs general (BoM/QCCA/others) | 6 | 2 | 2 | 2 | feel for seasons through many generation | 6 | 1 | 0 | 5 |
| stock/crop balance | 6 | 0 | 0 | 6 | feed in hand at certain times | 4 | 4 | 0 | 0 |
| ground cover/ soil protection | 5 | 0 | 2 | 3 | gut instinct | 4 | 3 | 0 | 1 |

A relatively high number of respondents said that they do not have a long term strategy for assessing climate risk. Some went on to talk about the variety of information that they do take some heed of in anticipatory decision making. Others made it clear that they would not be influenced by climate outlooks, but at other stages of the interview mentioned El Niño or climate forecasters in describing how and when they made decisions to lighten off. Such discrepancies were not uncommon in relation to assessment of climate risk and raise questions about assessing 'uptake' of climate risk information.

The notion of uptake is also problematic in the context of understanding and use of scientific climate information. General ideas may be comprehended; principles or concepts understood, yet practices may remain unswayed by these gleanings because they are deemed to lack *saliency*, *credibility* or *legitimacy* (Cash 2001) either in themselves or their sources. In cases where individuals have engaged

with the science though not necessarily employed it to inform decision-making (and particularly where they have engaged with the scientist), a reflexive relationship is established:

There's a lot of people in the community that cling to straws. Doesn't matter what part of the community they come from. And the moment someone like Roger Stone comes out and says "The outlook for the next three months is looking pretty promising", a lot of people get their hopes up a lot and then he comes out and says "Oh, you know, the Pacific Ocean temperatures are warming up too much and the SOI is falling." But you know, I've had a few discussions with Roger Stone, and its only now that he's starting to address what I've been asking him now for about four years, five years, and that is the SOI and El Niño effect, it really only affects eastern Australia. How far west does it come from the seaboard? And Roger himself will acknowledge that by the time you get to about us, it's a hit and miss as to whether it has an effect or doesn't have an effect. That's why some people out here do quite well in an El Niño. Most of the weather here comes from the Indian Ocean.... right up until recently, Dr Roger Stone's group has not been trying to really assess the correlation between the Indian Ocean atmospherics and the Pacific. I think the Indian Ocean means more to most of us than the Pacific (male grazier, Longreach area, QLD).

Such reflexive relationships with scientists and their information products change local narratives by, for instance, challenging the simplifying generalisations of the media or other local graziers. Hence, relationships between individual graziers and experts were often reflected not only in individual interviews but in small locales or networks where climate narratives were more "scientised". This "scientisation" often appeared to have been seeded by one or more individuals; through Local Best Practice Groups, Landcare Groups or social functions. Such individuals had usually attended climate workshops which were reported upon favourably, if predominantly in that the manager's conception of the factors that influence the local climate and weather were challenged or broadened.

Conversely, in other locales, climate researchers were often conflated with weather forecasters in the third person plural – "they". Probabilistic statements about seasonal climatic risk were translated as definitive. For example, carefully caged statements such as "four of the eleven sampled Global Circulation Models surveyed indicate that the Pacific Sea-Surface Temperatures may return to El Niño-like conditions in the Autumn of 2005" became: "they reckon we're going back into drought after Autumn". While some probabilistic climate communication issues have been described psychologically (Nicholls 1999; White 2000), they also present an interesting case of the socio-cultural translation of science into a contestable form. Because probabilistic climate risk models can never be wrong, *per se*, they are difficult to validate through personal experience, and naïve uptake would require that trust in a model's reliability be absolute. When several models (or their proponents) appear to contradict one another, such trust becomes increasingly problematic.

Most inter-annual and inter-decadal models operational in Australia are historical and statistical (see McKeon *et al.* these proceedings). Their output, however, still frequently exists as 'forecasts' rather than as historical and spatial correlations. That said, a relatively high level of public engagement with SOI values and with analogue years (years in which similar SOI or SST conditions prevailed) points to the salience of *visibility* and *recurrence* of both patterns and signals. This can be highlighted by examining climate variability at various time scales along with a consideration of how climate is discussed locally. On a shorter timescale, the ascendance of consideration of the MJO (Madden-Julian Oscillation, or Forty-day wave) in decision making in western QLD, illustrates a rapid adoption of knowledge in response to a highly visible and frequently recurrent pattern:

There was hardly a person that you'd talk to that didn't, in February, or January [2003], that wasn't working on the 40-day oscillation. Of all the climate things that we listen to up here I reckon the 40 day oscillation or the MJO as they call it, what is it? The Madden Julian Oscillation? [laughs]. Probably carries more weight than anything. It's had a good run. I don't think it will always have a

good run. I think they would have picked it up already just in rainfall charts, you know you would have just picked up this coming through all the time.... and also it's very pointed, just at the moment, because it is very dry and everybody's hanging out for rain, the prices [of stock] are very dear, so people are setting targets a bit (male grazier, Longreach).

The relative visibility and distinct frequency of the MJO and its rapid assimilation into certain local climate narratives, contrasts markedly with inter-annual and inter-decadal climate variability and even more so with timescales usually associated with global climate change. Participants often contested anthropogenic climate change on the grounds that climate has always changed, and illustrated this with reference to the geological history of the "country" in which they lived, its rocks and fossils. Climate change was often seen as an inevitable pattern of global and local history, remembered through the landscape itself, and recurring at indeterminate frequency.

Two decades ago, and for the two centuries before that, anticipatory climate risk assessment in Australian agriculture was entirely based on local knowledge of patterns and signals at local, regional and international scales. Numerous local hypotheses have stemmed from this, and though they are generally treated with scepticism within grazing communities they are often referred to. Old hands bear much of the accumulated understanding, particularly those with good memories and sharp observational skills. Many managers reported that they listened to credible old hands who frequently cage any predictions in terms of climatic and ecological patterns and histories; similarities between years inform how a given year is 'shaping up' and what *might* be expected. In this, the recurrence and visibility of patterns is again related through the landscape itself.

Climate and weather conversations are often about interactions between atmospheric conditions, plants and animals. They are both ecologically informative and place-specific. Their pre-eminence among local narratives gives them multiple roles: they are not just ice-breakers or chit-chat, but through their pervasiveness convey a deeper understanding of (situational) ecological factors affecting the broader locale or region. From such conversations over days, months and years, any given conditions are put in the context of the history and geography of that region and thus inform a relative understanding of the ecological and climatic situation together for any given place, as well as the anticipatory climatic risk faced. I have called this experiential and inter-subjective construction of the local climate 'climatic place'. It constitutes the local climate in terms of the way weather accumulates in the individual and social memory and so becomes a feature of the place. It is far removed from existing definitions of climate as either "the statistical assemblage of the weather in a region or at a place", or "the thermodynamic/hydrodynamic status of the global boundary conditions that determine the concurrent array of weather patterns" (Bryson 1997, pg. 451). Climatic place is closer to the climate to which McIntosh *et al.* (2000, pg. 24) refer in asserting that "we are all collectively paleoclimatologists".

## CONCLUDING COMMENTS

Within the grazing communities that are the focus of this research, scientific climate risk information was seen to be variably but increasingly prevalent in the local narratives of weather and climate. I have briefly described these narratives here in terms of climatic place and provided some examples of how the interactions between climatic risk science (and scientists) and local grazing communities, is altering the narratives and thereby local decision-making. Within these narratives the saliency and legitimacy of patterns and signals in a local, regional, and scientific sense, are influenced by their *visibility* and *recurrence*.

Climate researchers are aware that "institutional and human capacity building" are "as much contextualised by deep social, cultural and historical factors as they are by complex atmospheric, landscape, economic and policy considerations" (Kiri-ganai Research Pty Ltd 2004). However, in

much climate risk research the uptake of information is equated with changing decisions for the better. Such conceptualisations of how climate information exists in the decision-making frames of graziers in the semi-arid rangelands simplify the contingencies upon which climate risk decisions, such as altering stocking rates, are made. Scientific climate information may be most influential through the way it is translated and inevitably contested in local narratives. It appears to be within these everyday conversations and interactions that situational and anticipatory climatic risk is negotiated.

The ways in which scientists and government extension agents have interacted with graziers on an individual or community level has influenced narratives of climatic place, often within quite narrow locales or networks. Such nexus could be fruitfully extended to develop and maintain links between science and society through *interactive* formats and media, particularly internet, radio and workshops, which allow the contextual and contingent nature of climate risk assessment to be communicated *between* land managers and the scientists or extension agents.

Assessment of climatic risk is highly context dependent, and statistical or numeric modeling of climate variability only informs a relatively minor part of most climate risk related decisions. Despite this, the grazing communities that were the subject of this research are increasingly including climate science information in their climate and weather conversations. These conversations are informed by a complex interaction between science, various media, personal interactions and politics. I have briefly illustrated some conspicuous features of the complex, local and socio-cultural contexts in which risk assessments are made by graziers. These raise questions regarding two of the normative assumptions pertaining to the development and dissemination of climate risk information; firstly, that 'uptake' of climate information can be evaluated; and secondly; that seasonal outlooks are only of value if they change a decision. Just as the factors which lead to the development of an El Niño event are contingent rather than simple and causal, the nature of situational and anticipatory local risk assessment make it difficult to attribute risk decisions to any individual factor. Also, evaluating how graziers understand and use climate information is complicated by their reflexive engagement with climate science and scientists. Qualitative research can, through examining relations and interactions, provide a more nuanced analysis of the impact of scientific information on local decision making.

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