Drought, the Pastoral Industry and the Australian Environment: Must History Repeat?

Dr Ted Christie, *29 September 2018*

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Mitchell grasslands in Central-Western Queensland, Australia and Resilience:
(i) Response to Disturbance - prolonged drought/grazing pressure, 1965 -1970; &
(ii) Recovery from Disturbance - end of drought following summer rainfall 1973-74.

TAGS: Drought management; decision-making; impacts; strategies; living area; economics; viability; risk management; preparedness; self-reliance; sustainability; land degradation

> ***"Successive generations of drought policy*** **[in Australia]** ***have been tried, reviewed, found wanting and replaced, in a process that's depressingly circular".***
>
> ***Anna Vidot, Lucy Barbour (2014)***

Droughts have long been an integral feature of the Australian environment. The cause: "*An extended period of severe water shortage*".

Rainfall records commenced in 1861. The ***first recorded major drought period*** was 1864-66 (and 1868).

The drought situation in New South Wales, at the start of September 2018, as summarised by the NSW State Government agency the ***Department of Primary Industries*** was: ***Intense Drought*** **~ 16.1%;** ***Drought*** **~ 54.4%;** ***Drought*** **Affected ~ 29.2%;** ***Recovery*** **~ 0.2%;** ***No Drought ~ 0.0%.***

The latest situation report. by the ***Queensland Government review*** is that drought declarations represent 57.4% of the land area of Queensland. There are an additional 85 *"Individually Droughted Properties"*.

Drought and the Australian Environment

In terms of severity and area of extent, the Federation drought of 1895-1903 is generally considered to be the worst drought in Australia's early history, as it had impacts on *"practically the whole of Australia."* Australia's sheep population – originally 100 million – was halved; cattle numbers (12 million) were reduced by 12 per cent[1].

Up to the time of the Federation drought,
drought was generally regarded as abnormal.
This contributed to errors
in estimating the true grazing capacity
of Australia's pastoral lands following European settlement.

Fast forward to the 21st century: Longer historical rainfall records are now available. A key issue is whether ***drought*** in Australia follows a ***predictable pattern***. Can decision-making by pastoralists directly impacted by drought be based on drought being seen as a foreseeable or predictable risk?

The following study concluded that this may not be the case!

The Millennium Drought" (2001–09) has been described ***"as the worst drought on record for southeast Australia"***. In considering adaptation to future severe droughts, the authors of this study analysed the drivers of past droughts in Australia, and its impacts, and concluded:

> *"With each successive severe drought* [in Australia] *having unique features, with the presence of naturally unstable climate drivers and the spectre of global climate change* **[to recognize drought as a recurrent feature of the Australian climate and a predictable risk]** *may prove to be an unrealistic expectation".*

Drought Impacts and the Pastoral Industry

What needs to be recognized, as drought lengthens, is that the sequential environmental impacts of drought intensify over time - at a number of levels. Each level adds to the layers of complexity for Government policy to address.

Decision-Making During Drought[2]

A key goal of drought management for a pastoral holding is to provide sufficient food and water to maintain animals; and to preserve a number of breeding animals to rebuild flocks and herds after the drought ends.

Decision-making during drought is made at the ***property level***. It commences with a ***short-term tactic***: To decide whether to dispose of some animals and the extent of the reduction; this usually applies to animals likely to experience high mortality during drought e.g. very young or old animals.

Most initial stocking decisions are based on the hope that the drought will only be short-term; that the drought will end during the next period of most reliable rainfall.

But, if the drought continues, decision-making at the *property level* extends to consider the need for other possible ***longer-term management strategies*** – in addition to the disposal of some animals.

Some of these strategies include: *Hand-feeding of animals, the cutting down of edible trees and shrubs, agistment, further reductions in animal numbers – and in the extreme case, destocking*[3].

Drought often brings a high debt burden for pastoralists, caused by reduced cash flow or high drought feeding costs, or both. If the pastoralist has significant financial problems, decision-making on longer-term management strategies may be clouded by the risk of economic survival.

Drought management decisions
made at the property level,
are the triggers for flow-on environmental impacts
occurring at the regional, State and national levels.

Drought and Environmental Impacts

As drought lengthens throughout ***the region***, economic impacts at the property level intensify as livestock numbers continue to decline and drought feeding costs continue to increase. Flow-on economic effects from the property level lead to a ***decline in the economy of the region, the State and ultimately the nation.***

With fewer job opportunities and an increase in ***unemployment*** in rural communities, the population of the region falls as people seek jobs elsewhere; population drift to the coast occurs. The ***financial viability*** of local businesses and banks - as well as professional (*e.g. medical, dental)* and trades services - are threatened; Government services may not attract the same level of support as in the past with the result that hospitals, education and postal services could be wound down, or even close.

It is at this time that ***ecological impacts*** of drought may become evident to add a further dimension for concern at the ***paddock ➔ property levels***: The problem of ***land degradation.***

Land degradation
in pastoral lands
is not a continuous process, year in, year out.

It is restricted mainly to periods of prolonged drought as the grazing pressure by livestock and marsupial[4] numbers on the much lower forage production that is available, increases. The ***condition of grazing lands*** *("ecological health") declines.*

Drought Management: *A Framework for the Pastoral Industry?*

An old bush adage
is that if pressure is put on people,
such as climatic or economic pressure,
they put pressure on land.
The challenge for government is
to adapt to problems and situations created by drought
and to offer creative policy solutions
that resonate with resilience for rural Australia.

Drought policies by Government focus on financial assistance to help farmers prepare for and manage the effects of drought, relying on measures such as concessional loans, taxation measures and enhanced social support.

But, more than financial aid is needed!

A major focus of the current public debate for managing future droughts is to pursue opportunities for new or enhanced surface water storages. *e.g. major water infrastructure proposals across northern Australia.*

An assessment of ***reviews of past drought policies*** identifies other options: An increased focus on people, preparedness for drought and risk management; and support of community, health and mental health programs in drought-affected area.

Drought Policy: *Preparedness and the Pastoral Industry*

The principles of drought management decision-making by the pastoral industry have been an accepted body of agricultural extension knowledge[5] for over half a century.

Decision-making by pastoralists
can be divided into
decisions made ***between droughts i.e. preparedness*** *-*
and decisions made ***during drought.***
Both are equally important.

Between droughts, pastoralists need to create liquid assets that could be applied to manage future hazards caused by drought; assets that can be readily converted into cash to meet debts or additional demands during drought.

This is not always possible; or pastoralists may fail to establish adequate reserves. As a result, they experience great difficulty in obtaining finance during a drought – a period when income received for livestock and livestock products (meat and wool), is also greatly reduced.

Drought Policy: *Risk Management and the Pastoral Industry*

Decisions about whether to reduce livestock numbers, and the extent of the reduction, are influenced by socio-economics, risk and uncertainty.

If the market value of stock is low during drought, a pastoralist may decide to not dispose of stock by sale and retain them - and hope for the probability of rain in the near future. A similar outcome may emerge where the prices are anticipated to be very high when the period of drought has ended.

In deciding what appropriate longer-term strategy to adopt, decision-making by pastoralists can be based on ***risk management*** *e.g. the probability of rainfall, the length and severity of drought, anticipated and projected livestock sale prices, hand feeding costs…*

Risk management represents a conservative approach to drought management decision-making as it requires judgements of ***risks*** against ***benefits*** as well as judgements of ***risks*** against ***costs***. The aim, finding a balance which represents an ***acceptable level of risk*** for the pastoralist.

Drought Policy: *Self-Reliance and the Pastoral Industry*

If the area of the pastoral holding is "too small or uneconomic", drought management decision-making - *based on balancing reductions in livestock numbers, drought feeding costs, managing land sustainably and maintaining cash flow* - all interact to make reaching the goal of ***self-reliance*** problematic.

In these circumstances, decisions made during a prolonged drought to reduce stock numbers to a *"safe level"* may lead to a situation where stock numbers become so low to cause cash flow problems through income earned.

Reduced cash flow during a prolonged drought makes the task of further borrowing of money more difficult should credit worthiness becomes an issue.

An existing debt, plus concern for economic survival, may misdirect reasoning to "*try to beat the seasons*" & making decisions that are not prudent.

Resolving this problem is essential to facilitate self-reliance!

A pathway to achieve this goal is for policy to promote the ***diffusion*** *of a more conservative approach for risk management during drought*: The likelihood for its ***adoption*** will be greater for pastoral holdings that support a "**living area"** compared to "smaller" or "uneconomic" holdings.

The ***value of the living area concept***
is that acts as a guide
as to what constitutes
an economically viable agricultural enterprise
for build-up purposes and
for land administration purposes e.g. aggregation control.

Living Area the Driver for Linking the Cornerstones: *Preparedness ~Risk Management ~ Self-Reliance*

The concept of *living area* has been a ***foundation for land administration*** since *Queensland's Land Act* came into force in 1927. As applied in the past, *living area* had a major influence on dealings in leasehold land, at a time when the policy focus of Government was on "*closer settlement*".

In 1994, Queensland's *Land Act* was revised. The *living area* concept was retained; its application for ***land administration*** had changed e.g. to lease renewal, conversion, aggregation control and build-up schemes.

The original statutory definition for *living area* was extended to include ***sustainable land use*** as an element of the concept; *living area* now incorporates ***ecological and socio-economic considerations***[6].

The solution on how to determine what is an economically viable pastoral holding is derived from ***living area standards*** and its methodology.

Living Area Standards: *Pastoral Holdings*[7]

Living area standards for pastoral holdings are defined as the number of sheep or cattle required for a viable economic flock or herd.

An estimate of the area of land needed to sustainably support the flock or herd size, required for each specific land type, can be calculated by multiplying the *required number of sheep or cattle x carrying capacity*.

Carrying capacity refers to the average number of animals that an area of land can support, on a sustainable basis, over the long-term. Carrying capacity is usually expressed as area per cattle or sheep units grazing pastoral lands i.e. *hectares per cattle unit or hectares per dry sheep equivalent*.

Key factors influencing livestock carrying capacity in the pastoral zone of Australia are: climate/rainfall, soil fertility, the mix of land types and their annual variability in forage production, the condition of land *("ecological health")* and the resilience of each land type *(response to and recovery from disturbance caused by drought, fire, grazing pressure…)*.

Examples of Living Area Standards – Pastoral Holdings

- The ***viable economic flock size*** required for the Mulga Lands Bioregion of south-west Queensland was based on a ***Living Area Standard*** of 12,500-15,000 sheep as determined by QDNMR in July 1998.
- The ***viable herd size*** required for the Mitchell Grass Downs Bioregion of central-west Queensland was based on a ***Living Area Standard*** of 2,000-2,300 cattle as determined by QDNMR in July 1998.

Queensland's *living area standards* need to be revised and updated by QDNRM. The past trend in Queensland is for the values to increase over time.

Conclusions

Grazing is an industry of varying fortunes. It's success or failure is largely dominated by seasons and prices, neither of which can be controlled by the grazier... The area of a holding must be of such a size so that it can be used wisely and preserved, and able to withstand an economic siege... the need is to give the grazier an adequate living area.

Sir William Payne (1959)[8]

Drought management policy needs to recognize the inter-dependence and mutual support between ***sustainable land use***, ***financial viability*** and adequate resources in the form of a ***living area*** for a pastoral holding. This linkage should guide decision-making during drought based on the condition of the soil and vegetation resource and long-term investment.

Adequate resources need to be combined with the pastoralist's skills and experience to successfully cope with the next climatic or economic crisis.

1. ***Risk management*** represents a conservative approach to drought management decision-making as it requires judgements of ***risks*** against ***benefits*** as well as judgements of ***risks*** against ***costs***. The aim is to reach a decision which represents an ***acceptable level of risk*** for the pastoralist.
2. For ***living area standards*** to have a significant role to play in any risk management approach, Government policy should effectively address the need for pastoralists to have – as Sir William Payne observed over 50 years ago - *"an adequate living area"*.
3. *An "adequate living area"* has positive applications for ***decision-making*** at the property level to address ***economic*** *(drought feeding costs; disposal of stock)* and ***ecological*** *(sustainable land use-land degradation)* ***risks.***

4. ***Ecological impacts*** at the property level are equally as important as ***socio-economic impacts*** as drought risks, as pastoral land types vary in their ***resilience*** to disturbance. Living area standards can facilitate sustainable land use by reducing grazing pressure and potential land degradation.
5. Having adequate resources – ***a living area*** with an economically viable flock or herd size at the onset of drought - means that cash flow can be maintained for longer as drought extends and the need to dispose of some animals occurs over time i.e. compared to "smaller" or "uneconomic" pastoral holdings. This is a significant advantage for managing the risk of economic survival given droughts in Australia do not follow a predictable pattern.
6. As a drought lengthens, having adequate resources – ***a living area*** - would act as a "buffer" and delay the immediate need for financial support for affected pastoralists; as well as delaying adverse socio-economic impacts at the regional level. Ultimately, need for aid would be inevitable should a prolonged, severe drought like the *Millennial Drought* recur; astute preparedness between droughts and decisions during drought may not be sufficient to effectively offset an extreme and unforeseeable drought.
7. In 2013, a Parliamentary Committee Inquiry into ***"The Future and Continued Relevance of Government Land Tenure Across Queensland"*** included a review of the ***living area*** policy. However, this review did not consider living area of pastoral lands in the context of ***drought***, ***sustainable land use***, ***financial viability*** and ***risk management.***
8. The central need, now, is for ***Government to share its power*** with the collective wisdom of the pastoral industry and their scientific experts ***to*** review the potential role of the ***living area*** concept as a sustainable pathway for pastoralists to manage drought risks. The limitation, at present, is the absence of a database of living area standards for pastoral holdings for Australia, generally; and Queensland's living area standards that are out of date.
9. Living area standards need to be reviewed to ensure they are based on an ***accepted scientific methodology;*** as well as to ensure that a ***relevant and reliable scientific database*** is available to evaluate and balance the multiple and competing objectives *Ecological/Economic/Social/Cultural* of *sustainable land use.*

END NOTES

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[1] **Australian Department of Science and Technology (1982). 'Australia - The Dry Continent'. *Habitat,* 10, pp 6-8.**

[2] **Decisions between drought are equally as important as decision-making during drought. Decisions between drought are discussed under *"Preparedness"* at page 5 of this article.**

[3] **Longer-term management strategies include:**

(i) The cutting down of edible trees and shrubs. Some 100 or so native species have been used for drought feeding in Australia. Mulga (Acacia aneura) is probably Australia's most important fodder tree; its leaves provide the dietary forage source to maintain livestock during drought;

(ii) Hand-feeding of animals: Using hay or grain purchased from cropping areas grown outside the pastoral zone. Nutrient rich supplements that enable livestock to digest the poorer quality, coarse forage available during drought are also used;

(iii) Agistment: Moving animals off the drought-affected property to another property less affected by drought. The pastoralist has to pay a fee to the landowner for the right to graze on the property where the animals have been agisted.

(iv) Selling all animals: All animals are sold immediately the drought has commenced and before livestock prices slump as the drought becomes more severe. Funds are invested and used to restock after the drought ends.

[4] **The use of artesian water enabled the pastoral industry to expand into and graze larger areas of inland Australia. The red kangaroo, the most widespread of the inland kangaroos, benefited from the use of artesian water by the pastoral industry; their range and abundance expanded as they were no longer restricted to permanent watercourses and watering holes.**

[5] **Moule, GR (1970). 'Aids to decision-making in managing pastoral enterprises during drought'. *Australian Veterinary Journal*, 46, 436-445.**

Dr George Moule was a pioneer and a distinguished Australian researcher of international reknown in the area of animal production. Dr Moule made a long and significant contribution in evaluating and prioritizing R&D needs for Australia's wool industry.

[6] **Definition for *"Living Area"*: *Queensland's Land Act 1994 (Schedule 6, Section 3, Dictionary)*:**

***"Living area"* means the area of grazing or agricultural land that will be adequate to enable a competent person to derive from the working of the land, according to the use for which the land is suited, an income adequate to ensure a reasonable standard of living for the person, the person's spouse and dependant children, as well as provide a reserve to meet adverse seasons and the cost of developing and maintaining the land at a sustainable rate of production throughout average seasons, having regard to—**

(a) the locality of the land; and

(b) the nature of the land; and

(c) the potential of the land for sustainable development; and

(d) the distance of the land from transport facilities and markets."

[7] ***For Living Area Standards for the number of sheep and/or cattle required to form a viable economic unit, Queensland (QDNRM, 1999)***

[8] ***Report on Progressive Land Settlement in Queensland. Land Settlement Advisory Commission (1959). Sir William Payne enjoyed a nation-wide reputation as a fair-minded, non-partisan, skilled land administrator with a practical turn of mind.***