



Territory Climate Futures: *Towards Adaptation and Resilience*

A workshop convened at the Northern Territory NRM conference
Darwin 12th November 2019



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Background

The Workshop on 'Territory Climate Futures' was convened in November 2019 in recognition of growing public and institutional concern about the potential impacts of climatic extremes and long term changes in climate. During the 18 months preceding the workshop, the lives of many in the Northern Territory had been directly touched by extreme climatic events, and the weather and climate had consequently been elevated high on the popular agenda.

- Cyclone Marcus
- Record high temperatures across some regions of the Territory
- A failed wet season across some regions
- Drought and near drought conditions on the Barkly Tablelands
- Depleted ground and surface water resources in some regions
- Disastrous wildfires in both the Top End and Central Australia

With more people talking about climate and climatic extremes, Government has reflected these growing concerns through policy initiatives of their own. At local government level, the City of Darwin has declared a 'Climate Emergency', while the Territory Government has been progressing its own 'Climate Change Response' paper through a public consultation. The convergence of these concerns and initiatives made it both timely and topical to convene the workshop.

As Territory Natural Resource Management (TNRM) has a particular focus upon nature-based industries and support for sustainable production, these were identified as key foci for the workshop. Specifically, the workshop was structured to explore how individual industries might be impacted by future climate scenarios, and the strategies or approaches that might enable the industry to adapt and build resilience to changing conditions.

The overall goal of the workshop was to exchange knowledge about leading practices for climate change adaptation between industries and sectors, and so raise awareness among all Territory stakeholders about how best to manage climate risks.

Workshop structure

The workshop was structured into a series of individual presentations, beginning with a summary overview of future Territory climate outlooks from the Bureau of Meteorology.

This was followed by four presentations outlining the climate change perspectives of specific industry groups, before refocusing on the climate issue from a broader perspective.

The workshop wrapped up with a higher level policy response focus. This led into discussion of key climate adaptation challenges, opportunities and lessons that could be learned, building upon the previous presentation.



Climate Outlook and Future Scenarios

Shane Kennedy (Bureau of Meteorology)

There is a growing awareness globally among scientists and policy makers regarding the risks associated with climatic change. Records clearly show the Australian climate has warmed about 1°C since 1910. Change scenarios impacting the Northern Territory will likely include:

- Increased frequency of extreme heat
- Worsening fire seasons
- Overall increased northern rainfall -but with increased variability and intensity
- Tropical cyclones and associated risks
- Marine heatwaves and acidification
- Rising sea level -currently at about 3.2cm per decade
- Coastal inundation and storm surge

The effects of climatic changes are already being experienced, and Territorians can expect an increase in the frequency and severity of climatic events.

Key discussion points:

- The future extent and impact of extreme temperatures
- Possible changes in future cyclone intensity
- Extent of climate change in the Territory as compared to other jurisdictions
- Effects of ocean temperatures and acidification



Climate Considerations and Adaptation in the Pastoral Industry

Dionne Walsh (Livestock Industries Branch DPIR)

The pastoral industry constitutes a primary productive user of Territory land resources supporting a beef cattle herd of approximately 2.1 million, with the average herd of about 11,000 head per property. Beef production systems are differentiated by production conditions across the Territory, with higher rainfall zones in the north and semi-arid to arid rangelands in the south supporting native and naturalised pastures.

Territory cattle producers operate within a highly variable environment and already need to adapt to annual and seasonal changes in temperature, rainfall and forage availability. Consequently they are highly adaptive and have important lived experience. But annual and seasonal variability can have the effect of masking long term climatic trends. Climate change will impact the industry in a number of ways:

- Saltwater intrusion to impact freshwater floodplain pastures
- Potentially changing the distribution of pest species, diseases and weeds
- Changing rainfall will regionally affect forage availability
- Increased temperatures will increase heat loads for cattle
- Pastoral workforce will operate in higher temperatures

In order to best prepare for a climate variability, producers are encouraged to:

- Understand the climatic conditions in their region and identify key decision dates
- Get an independent and evidence-based livestock carrying capacity assessment undertaken
- Run stocking rates consistent with this advice, adjusting for seasonal variation
- Rest pastures within grazing systems
- Identify and remove unproductive animals to improve herd efficiency
- Attend Business, Grazing Land Management and Nutrition training workshops

Key discussion points

- Mixed farming systems
- Diversification to build resilience
- Agistment options in the industry



Climate Change and Farming

Greg Owens (NT Farmers Association)

Farming in the Territory is currently valued at \$280 million, and can be structured into five climatic zones, encompassing irrigated horticulture and broad acre fodder production. Agricultural development is restricted by groundwater resources, but a large variety of crops are presently be grown with potential to introduce some additional cash crops subject to resource availability.

The Territory industry depends on the predictability of weather: Other success factors include having unique market windows due to seasons and climatic zones and high quality products. But start up and operational costs are very high compared with elsewhere. Key threats to crops associated with Climate change will be

- Pest and disease changes
- Irrigation demands and water stress
- Timing and development of fruit triggers
- Rain damage
- Sunburn of fruit
- Changing planting and harvest windows
- Cooling products during transport

The industry will need to respond to these challenges in a number of ways:

- Improved Integrated pest management
- Soil health and tillage practices
- Improved water use efficiency
- Best practice extension and engagement
- Improved use of weather data for decision making
- Cool chain and logistical improvements
- Decarbonising power requirements
- Recycling and waste reduction

In addition, changing climate conditions will have WHS implications for farm workers, including the number of hours to be worked, tighter harvest windows (need for additional/overseas labour) potential need for night harvest and protection of worker conditions. The industry will become more technology reliant to maximise productivity and resilience.

Key discussion points

- The impact of smoke on crops
- The benefits/ costs of production for local consumption
- Potential crop alternatives
- Global commodity markets and demand



The Indigenous Carbon Industry and Climate Change

Anna Boustead (Indigenous Carbon Industry Network)

The Indigenous Carbon Industry Network (ICIN) represents a rapidly emerging industry across northern Australia, based upon savanna burning carbon abatement. Traditional Owners and Indigenous land managers create carbon credits through early season burning which are sold on to the government or corporate buyers. The industry abates 1.2 million tonnes of CO² emissions annually, and in the Territory alone was valued at \$11 million during 2017-2018.

As well as directly reducing greenhouse gas emissions, the industry has a number of co-benefits including social cultural and economic benefits for indigenous peoples and improved biodiversity outcomes. ICIN was established to build capacity, set standards and guide policy development across governments. Changing climate conditions may impact the indigenous carbon industry in a number of ways:

- Higher temperatures will increase fire intensity and frequency
- Support the spread of weeds such as gamba grass which can intensify fires
- More time and resources will need to be allocated to late season fire suppression
- Fewer carbon credits and less income to support the following seasons fire management
- Fire behaviour less predictable owing to weeds in the landscape
- Hotter, harder conditions for land managers
- Lower morale, increased staff turnover

However, despite these challenges, the Indigenous carbon industry should be recognised as on the frontline of Australia's response to climate change. At present it accounts for about 10% of all Australian carbon abatement credits. This figure is likely to increase if the new sequestration methodology can be implemented. A number of measures would enable the industry to become more effective in its abatement of emissions:

- Clear government policy on emissions reduction and carbon markets
- Seed funding to enable new carbon projects to be established
- Ongoing support for indigenous ranger groups
- Recognition of native title and interests in carbon
- Clear policy, management and control of weeds
- Support for NAFI and R&D for new methodologies

Key discussion points

- Trends and directions in carbon prices
- The economic viability of the industry
- Decisions about responding to late season wildfires



Climate Change Adaptation in the Tourism Industry

Valerie Smith (Destination Development, Tourism NT)

The tourism appeal of the Northern Territory is inextricably linked to its natural assets and values. The Territory tourism industry focuses heavily on landscapes and environment in its marketing. This makes it highly exposed to the impacts of climate change.

Favourable climatic conditions at tourism destinations are a key motivator for NT visitors, and drives demand. Consequently, climate change will have an impact on both the length and quality of the tourism season. Territory climate change impacts will likely include:

- Acute impacts such as cyclones, floods or fires that disrupt tourism
- Chronic impacts such as sea level rise and increasing ambient temperatures

Extreme weather events such as cyclones and storm surges can significantly impact infrastructure which can affect tourism access. Cyclone Monica (2006) and Tropical Low George (2007) resulted in flooding across the Kakadu region. In 2007 the Arnhem Highway cut for an entire month.

More hot days and higher temperatures will shorten the tourist season and increase risks to visitors. Already some central Australian walks have strict access policies related to forecast temperatures. Saltwater intrusion will similarly threaten visitor experiences at Kakadu and other Top End wetlands.

Another climate challenge for the industry is *Flygskam* (flight shaming) which relates to the perceived environmental impact of commercial aviation (which accounts for 2% of global emissions). This will likely prompt a reduction in both interstate and international air travel.

Resilience is being built through adaptation, mitigation and active transition to low carbon practices. The Territory identifies a key adaptation opportunity as offering responsible and 'green' tourism options.

- Showcasing best practice nature-based tourism with a focus on conservation and stewardship
- Supporting Aboriginal cultural tourism experiences and 'caring for country'
- Planned responses to climatic factors- changing tour schedules and seasons, new and better shade structures, developing air-conditioned indoor visitor experiences
- Introducing renewable energy (e.g. Darwin airports solar energy projects)
- Supporting the introduction of biofuels in commercial aviation
- Offsetting carbon credits
- Achieving climate action certifications and sustainability plans
- Climate friendly events, such as the 'World Solar Challenge'

Key discussion points

- The scale and impact of biofuels
- Opportunities for offsetting within the tourism industry
- The scale and development of the Darwin airport solar farm



Climate Emergency Declaration

Shenagh Gamble (City of Darwin)

The City of Darwin has joined 28 other Australian councils in declaring a 'climate emergency'. It has committed to drastically reduce greenhouse emissions and actively prepare respond and adapt to climate change. Climate change response is identified as a local government priority and the declaration of an emergency is the latest in a series of steps taken towards climate change mitigation progressively undertaken over the last decade.

DCC believe climate response needs to be immediate and recognises the imminent threats created by climate change, including:

- Rising temperatures
- Extreme weather events (e.g. cyclones)
- Catastrophic bushfires
- Coastal erosion

DCC believe the emergency requires a whole of government approach, involving concerted action by both Federal and Territory governments. But only Territory government is empowered to declare a 'state of emergency'. The key elements of the DCC strategy include:

- Community engagement and awareness
- Rapid decarbonisation-reducing emissions, (zero net emissions by 2030)
- Adaptation -risk assessment, disaster resilience
- Innovation –sequestration, changes to planning, tropical living

The Climate emergency project plan has been endorsed by Council, and a climate emergency specialist is being recruited. DCC notes that for 10 minutes last week Australia ran on more 50% renewable energy, and that climate adaptation is coming far quicker than many predicted.

Key discussion points

- The definition of climate 'emergency'
- The role of local government in shaping climate change response
- Council responses to bushfires in southern states
- DCC renewable energy agenda



Climate change adaptation and resilience: Workshop discussions

Workshop presenters and participants reviewed the main themes emerging from workshop presentations and subsequent questions/discussions to highlight some key risks, opportunities and issues relevant to climate change adaptation in the Territory.

Discussion theme 1: Climate opportunities and benefits

In some respects the Territory is well positioned to adapt and benefit from climate futures. It has huge potential for the development of renewable power (e.g. solar), relatively intact natural resources that can improve resilience of primary industries and nature-based tourism, and new emerging climate-related industries such as carbon farming and the conservation economy. A relatively small and still developing economy means that it remains agile, and the opportunity cost of changing development trajectory will be comparatively low.

The Territory requires strong commitment and bold leadership to move in this new direction.

Discussion theme 2: NT Government Climate change response priorities

The workshop was reminded of the Territory government's current climate response priorities as set out in its 'Climate Change Response' consultation paper. These priorities are:

- Grow the renewable energy industry to diversify and strengthen the NT economy
- Continue initiatives to reduce emissions across the Territory towards the goal of zero net emissions by 2050
- Respond to climate change risks through adaptive risk response across government.

The Northern Territory Government's approach to climate change highlights the opportunities and growth potential of engaging with climate change realities, and forecasts the creation of new jobs and industries in implementing the climate response. At the same time it cautions that the process of transition needs to be carefully managed to ensure ongoing economic investment in the Territory

Discussion theme 3: The role of governments in climate change adaptation and resilience

Government has a key role to play in supporting and directing climate change adaptation and resilience in the Territory. However, this role will differ across different industries and activities and across different levels of government. Innovation and the emergence of new industries (such as renewables) favours the private sector and non-governmental organisations, albeit within a supportive environment enabled by government policy. By contrast, government may have an important role to play in setting targets, regulation and compliance in emissions reductions and planning climate impact responses. It was suggested that the role of government was to provide leadership by creating certainty and stability, and ensuring protection of the most vulnerable.

Discussion theme 4: Ensuring equitable distribution of benefits from climate transitions

It was suggested that the future economy will be based upon solar and hydrogen energy sources and the management of this transition would be extremely important. Innovation in the Territory has been frequently led by investors and corporations coming from interstate or overseas who take profits and leave infrastructure



behind. Ownership of climate transition and the benefits of this should be in the hands of the most vulnerable Territorians, who are also on the frontline of climate change impacts. The government and other leaders must also provide information to help protect industries and communities from 'snake oil salesmen' who are proliferating around climate change adaptation and the carbon economy.

Discussion theme 5: Localisation and problems of scale

A proposed climate response strategy, increased 'localisation' in production and consumption was discussed. It was pointed out that there is growing impetus globally towards shortening supply chains (and their transport emissions) to consume products locally. Discussion suggested that while this principle could in part be applied to the Territory context, the greatest efficiencies of production (and lowest emissions *per capita*) were achieved through economies of scale and local Territory markets were not big enough to support these. Furthermore, a primary comparative advantage of Territory production comes from producing 'out of season' for consumers in more temperate parts of Australia or overseas. So Territory production depends largely upon supply to distant markets, and climate change adaptation will probably need to work with this reality.

Discussion theme 6: Building resilience through valuing natural resources

Rural and nature-based industries that depend upon natural resources will become more resilient to climate impacts with improved management of these resources. It was suggested that current economic frameworks fail to 'price' natural assets and ecosystems effectively, while fossil fuels and extractive industries are always ascribed monetary values. This led to discussion about the need for traditional industries to more effectively offset conservation of the natural environment and improved land management that can help build climate resilience. Partnership between Conoco Phillips and indigenous land managers in savanna fire management was cited as a clear success and model for future partnerships, albeit with significant government support in its early stages.

Discussion theme 7: Recognising success

A key themes emerging from the discussion was recognition of the proactive position being taken by many actors in recognising and preparing for climate change impacts. Examples of successes include progress towards the establishment of large scale solar farms, and world leadership in carbon emissions abatement through savanna burning. Industry presentations indicated a growing awareness of the challenges from climate change and variability and pointed the innate adaptability, and versatility of Territory Industries. The proactive positions taken by both local and Territory Governments suggest a potential for strong climate leadership.



| | | <i>Role</i> | <i>Organisation</i> |
|----------|------------|---|------------------------------------|
| Liz | Bird | President | Centralian Land Management Assoc |
| Roxane | Blackley | Senior GIS Officer | Desert Channels Qld |
| Anna | Boustead | Coordinator | Indigenous Carbon Industry Network |
| Tristan | Cook | Climate Change & Environment Support Officer | City Of Darwin |
| Troyston | Corbett | | Muru-warinyi Ankkul Rangers |
| Laura | Cunningham | Industry Development Officer | NT Farmers Association |
| Lou | Fava | Marine Parks Officer | Park Australia |
| Simon | Ferguson | Manager Visitor Experience | Territory Wildlife Park |
| Nick | Fewster | Environment And Sustainability Manager | NT Airports |
| Shenagh | Gamble | | City of Darwin |
| Jon | Hodgetts | Angus Downs IPA Coordinator | Central Land Council |
| Louise | Kean | A/Chief District Ranger | Parks And Wildlife Commission |
| Shane | Kennedy | Meteorologist | Bureau of Meteorology |
| Anthea | Lawrence | | Mimal Land Management |
| Lydia | Lawrence | Board Member | Mimal Land Management |
| Jade | Leask | Senior Climate Change & Environmental Officer | City Of Darwin |
| Ellin | Lede | Policy Advisor | Office of the Chief Minister |
| Amie | Leggett | Environmental Scientist | Supervising Scientist |
| David | Liddle | | Environment Centre NT |
| Everlyn | Mardi | Women Ranger | Mimal Land Management |
| Delma | McCartney | Board Member | Mimal Land Management |
| Debbie | McGregor | | Amangal Aboriginal Corporation |
| Jennifer | McGregor | | Amangal Aboriginal Corporation |
| Gabby | Millar | Ranger | Larrakia Nation |
| Shar | Molloy | Director | Environment Centre NT |
| Shantae | Mundul | | Mimal Land Management |
| Vernon | Patullo | | Kungarakan Aboriginal Corporation |



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| Jessica | Puntoriero | Team Leader | Larrakia Nation |
| Chris | Roach | Project Manager | Gaia Resources |
| Alan | Roe | Program Manager | Territory NRM |
| Julia | Salt | Women's Ranger Coordinator | Mimal Land Management |
| Valerie | Smith | General Manager Destination Development | Department of Sport Tourism and Culture |
| Jeremy | Simmonds | Research Fellow | University of Queensland |
| Peter | Spence | Field Supervisor | Desert Channels Group |
| Scott | van Barneveld | Program Advisor | Ilsc |
| Frances | Verrier | Assistant Director | Parks Australia |
| Anne-Marie | Waistcoat | | Muru-warinyi Ankkul Rangers |
| Dionne | Walsh | Rangeland Program Manager, Livestock Industries Development | Department of Primary Industries and Resources |
| Ben | Williams | | Larrakia Nation |

Registered Workshop Participants
