



**CLIMATE RISK
ASSESSMENT FOR
HORTICULTURE
REGIONS**

Bowen
Queensland



CLIMATE RISK ASSESSMENT FOR REGIONAL GROWERS

Background

Bowen sits on the coast, with ocean to the north, east, and south. On the western side the Don River's alluvial plain provides fertile soil that supports a horticulture industry, comprising small crops such as tomatoes, rockmelons and capsicums. The Don River drains a flatter inland area immediately south of Bowen township and west of the Bowen River.

Bowen township has a population of around 9,500 and is situated very close to the horticulture producers. Bowen and other nearby tourism-focussed towns such as Airlie Beach are an important resource for the industry as they house many of the backpackers which provide labour for the horticulture industry.

The region has been affected by climate related events such as cyclones, storms and floods in the past, including Cyclone Debbie in 2017. The potential implications of climate change on the region is a concern to many growers, who are interested in knowing more about the issue, and in considering how and when they should respond.

To build capacity in the grower community including supply chains, a workshop was organised by Growcom. This short report provides an overview of the key risks that were discussed and makes recommendations of the next steps that may support the industry to be better adapted to climate change in the area.

Approach

The workshop was attended by a diverse range of stakeholders to discuss the impacts, risks, opportunities and adaptation to climate change in the horticulture industry and associated stakeholders (including local government and a transport organisation (supply chain). There were no mango growers at the workshop and so the mango industry is not covered specifically in this report.

In addressing risks from climate change for the industry, the workshop enabled participants to highlight some of the climate challenges for the region, discuss a range of issues, and to identify some strategic solutions to help ensure a longer term viable industry in the area.

Discussion amongst participants determined that a time frame of 2030 was the most appropriate for the discussion. This aligned with the outer limits of current strategic planning for the growers. A high emission climate change scenario (RCP8.5) was adopted as climate models indicate little difference between high and low emission scenarios over the timeframe of interest.

Catchment to coast

The horticulture industry is distributed on the highly fertile floodplain along the Don River. Accordingly, the way in which climate change can affect growers is highly dependent on the location of the industry, with growers near to the mouth of the river being susceptible to climate change impacts from the coast (storm surge, increased salinity of the estuary, and surrounding groundwater) as well as those from the land (increasing temperatures, changing rainfall and extended periods of drought).

Climate change in the region

Available climate change information for the area was accessed from Queensland Government, CSIRO and NCCARF.

Temperature

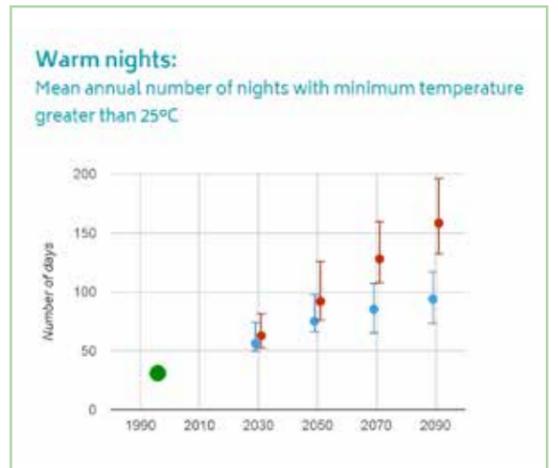
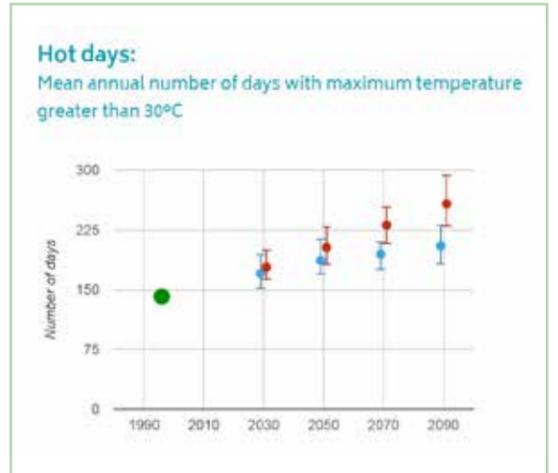
There is likely to be a substantial increase in the temperature reached on the hottest days, and an increase in the frequency of hot days and the duration of warm spells (see figure 1). The number of warm nights with minimum temperatures above 25oC will also increase.

Tropical cyclones

Tropical cyclones are projected to become less frequent, but with increases in the proportion of the most intense storms.

Bushfires

There is likely to be little change to fire frequency. However, when and where fire does occur, its behaviour is likely to be more extreme.



Graphs showing temporal changes of number of hot days with maximum temperature greater than 30oC and number of warm nights with minimum temperature >25°C. (Source CoastAdapt)

REGIONAL CLIMATE RISK ASSESSMENT

Regional climate change adaptation measures and opportunities

Participants discussed issues that have been faced previously and issues that are being faced at present. They then discussed current management of the risks they face and whether the management that is in place is working or if any residual risk remains. Participants were then asked to determine how the different pressures and issues would change by 2030 under a high emission climate change scenario. Finally there was discussion about what strategies or management options could be put into place in the region to adapt to the identified risks and to maintain a viable and sustainable horticulture industry in the future.

Hazards	Present day risk	Current Management Strategies	Residual risk	Future risk	Adaptation options
Farming operations and infrastructure					
Storm surge	Yes Storm surges associated with cyclones	Lower farms have built levees to protect from storm surge No crops growing during the risk season, have good drainage and runoff capture	No	Potential increase if intensity of cyclones increase If growing season and cyclone seasons overlap there is likely to be an issue	Larger/higher levees Plant riparian vegetation such as mangroves to help reduce the effects of storm surge. Ensure good drainage practices are in place so that any water associated with storm surge can run off quickly. Ensure that farm equipment is housed at levels above likely storm surge levels, move susceptible equipment to higher ground before storm surges impact the area.
Salinisation of estuary	Variable depending on rainfall, and tides		No	Potential increase if intensity of cyclones increase If growing season and cyclone seasons overlap there is likely to be an issue Likely to increase as sea level rise increases (minimally in 20 years), and as potential for longer droughts increase (likely in 20 years).	Monitor salinity at high and low tides to get a good understanding whether water extraction is possible, and if so, when its possible.
Salinisation of groundwater	No current issues	N/A	N/A	Increased salinity of estuaries and higher water levels will increase pressure. When combined with pumping of groundwater during dry periods can exacerbate effects.	Using alternate water sources eg from Proserpine Dam (could lead to conflict with other users)
Heat	Heat waves impact tomato growth	Some shading	Yes	Tomatoes can only be grown in certain temperature conditions. If these are exceeded, restricts growth and quality, marketability	Can build shades. However, these are expensive and are then prone to other climate impacts eg winds
Changes to seasons (earlier summers, later and warmer winters)	Have occasionally had periods where season has come early. Has challenged ability to get transport.	Plant and grow crops earlier in response to climate signals	Yes	Temperature changes during growing seasons, and warmer winters could result in increased likelihood of different suites of pests, diseases. Warmer temperatures can enable pests to complete lifecycles faster, leading to additional pressure on crops, and increased expense in addressing the problem. Dry mild winters are perfect breeding conditions for pests.	
Heat	Heat can affect tomato crops Higher temperatures – no pollination Heat also affects the size of tomatoes.	Growing season timing, shading	Yes	Longer periods of hot weather may increase the likelihood of these forms of impacts occurring more regularly which can have longer term impacts on ability to supply the market, and lead to loss of confidence from purchasers about ability to supply quality stock. This has less impact at the start of the season, more impact at the end. Effective shading is expensive and is highly susceptible to cyclonic winds and will be damaged. Also increases costs markedly which then needs to be recovered.	Changing growing seasons may work up to a point. Looking at different processed products?
Heat	Temperatures of storage sheds	Air conditioning	No	Over time, periods requiring air conditioning will increase. Air conditioning costs will increase, energy use and CO2 release will increase.	Use of solar electricity and battery technology
Bushfire	N/A	N/A	N/A	There is potential that if more severe fires occur they could impact growers	



Hazards	Present day risk	Current Management Strategies	Residual risk	Future risk	Adaptation options
Farming operations and infrastructure (continued)					
Droughts	Droughts challenge water access	Town water supply from Proserpine dam. Better water management actions	No	More severe and longer lasting droughts will challenge growers' ability to access water at reasonable prices (or at all)	Explore options to ensure water can be obtained cost effectively
Storms				More intense downpours which coincide with certain farming activities such as after ground cover is removed could lead to increased run-off and loss of top soil. The run-off of sediment and highly turbid waters could affect the quality of receiving waters.	Construct wetlands or other means to trap sediment before it runs off from the property.
Flooding	Cyclone or storm related				
Hail	N/A	N/A			
Cyclones Winds	Cyclones which coincide with growing season can cause severe damage. Cyclone Debbie affected the early growing season resulting in 25% loss		Yes	Late season cyclones can potentially lead to significant losses to crops if they coincide with the full growing season when all crops are planted and mature.	
Cyclones Rainfall	Cyclones which occur when ground cover is removed can result in loss of topsoil and downstream impacts		Yes	If cyclones occur when ground cover has been taken out to begin planting, there is potential for loss of top soils.	Construct wetlands or other means to trap sediment before it runs off from the property.
Supply chain and markets					
Temperature	Growing season. Supermarkets develop contracts with the Bowen growers because they are assured of a reliable supply during winter.			If the season of growth changes or if stock is not reliable or of poor quality, supermarkets will look to other regions for supply. This has direct impact on the growers and indirect impact on the local economy.	
Temperature (changes to the growth window of crops)	When season has started early, there have been challenges for the transport industry to provide the required service	Liaising with transport industry to try and influence logistics	Yes	As the industry only supports the domestic market, the scale of the industry and associated supply chains (transport) is not suited to supporting the current range of growing regions if the seasons overlap.	Work with the transport industry to try and get access to transport. Establish the infrastructure and mechanisms (airport) to enable internationalisation of the market. This would enable the growers to cope with overlapping growing seasons. Look for ways of processing fruits cost effectively.



Hazards	Present day risk	Current Management Strategies	Residual risk	Future risk	Adaptation options
Health of staff					
Temperature changes (condensed growing season)	N/A	N/A	No	<p>Condensed season means more labour for shorter periods, possibly longer working hours. This creates OHS issues, and challenging work practices. Also impacts the costs of employing backpackers and workplace laws mean greater payments are required outside core hours.</p> <p>Changes to backpacker employment has flow on effects to the broader Bowen and Airley Beach economy.</p>	<p>Make recommendations to government, industry associations to push for a change to legislation to allow workers to receive standard rates for working earlier or later in the day to ensure a safer working environment.</p>
Heat	Yes have hot days and associated labour management practices	<p>Drink water</p> <p>Breaks in shade</p>	Yes	<p>Behavioural issues with backpackers increase OHS challenges. Excessive drinking and late nights make backpackers more susceptible to the effects of heat and dehydration.</p> <p>Backpackers often do not wear the correct sun protection gear.</p>	<p>Increase reliance on seasonal workers, who are more likely to be acclimatised and to have management procedures in place.</p> <p>Build on good integration with Regional Council, and ensure there is access to information and guidance for back packers to support their safety.</p>
Cyclone related damage	Long term effects on the mental health of those affected at home or at work	Farmers provide support to staff as much as possible.	No	<p>Mental health of those affected by cyclones can be affected depending on the level of damage and impact that affects them directly.</p> <p>The incidence of this is dependent on the number and severity of cyclones which affect the area.</p>	<p>Improve access to support services.</p> <p>Improve messaging about seeking support.</p>
Cyclone related loss of livestock and pets	Impacts of losing animals leads to issues related to mental health	Livestock is moved where possible, pets remain with owners as much as possible	No	The impacts of these losses will continue, and may be exacerbated if cyclones become more intense	<p>Better information about cyclone tracks, and a management process put in place to transport animals out of the affected areas to safe harbours elsewhere.</p> <p>Improve access to support services.</p> <p>Improve messaging about seeking support.</p>

Operational Risk: How might climate change affect the ability of the growers to operate?

The long-term viability of the industry in the Bowen Region will be challenged by climate change. Margins are already being squeezed and smaller farms are unable to be maintained. Climate change related impacts resulting in growing seasons being squeezed and increasing the potential for poor harvests will create further pressures on the growers in the region.

In the short term, measures can be put into place to reduce risks, but some of these measures can be expensive and can increase exposure to climate related events. An example is building shade rows for tomato crops. These can be damaged or lost completely when cyclones occur. To ensure the industry remains viable in the long-term, there is a need to consider other crops that can be grown in the area, and which is better suited to the long-term climate.

Similarly installing solar electricity and batteries on storage sheds to reduce costs of cooling, can help reduce the effects of heat, but increases losses that can occur following cyclones.

Some of the biggest operational challenges are related to challenges associated with increased heat with direct effects on crops, changing the types of diseases and pests which must be dealt with, and challenging farming activities (OH&S).

Changes to the growing season can impact the market and lead to competition with other growing areas within Australia. There is a need to establish ways of accessing new markets such as overseas, or to identify different crops that can be grown in the Bowen area.

The proximity to and hence the strong connections between the Bowen horticulture industry and the local government was significant, and the need for continual engagement with the grower community and council was highlighted. Town water supply, links to backpackers and accommodation, housing for itinerant workers were all raised as issues. The importance of having a sustainable horticulture industry for the township of Bowen was also discussed.

In the short term, actions include:

- monitoring and maintaining records of temperatures and seasons to help determine how seasons are changing
- Exploring potential for new crops or working with researchers to develop new strains of present crops that are more resilient to heat.
- Constructing wetlands or sediment trapping mechanisms to prevent soil loss.
- Implement procedures to limit heat stress on workers
- Engage with farming associations to seek changes to workplace legislation to enable work to begin earlier and end later without penalties to enable safe working conditions to be put into place.
- Make the market aware of your approach to addressing climate change risk. Having a climate adaptation plan in place will help to increase confidence in your operations.

In the longer-term actions include:

- Developing shade facilities which are resistant to cyclones.
- Develop solar facilities which are resistant to cyclones.
- Work with local and state governments to implement food processing facilities in the region, increasing the returns to growers, and reducing potential for loss of local markets associated with changes to growing seasons. This also requires identification of new crops than can be grown to ensure that food processors can be used all year round.
- Identify and implement plans to develop new products from produce that is currently treated as waste. This can increase profit margins and support the implementation of other actions.

Supply chain risk: How might climate change affect the ability of growers to get the supplies it needs or get its products to market?

Challenges to supply chains and market access key issues identified at the workshop. Many of the crops grown in the region such as beans and tomatoes are not able to be stored and must get to market quickly. This can be a challenge for logistics in the trucking industry, particularly if growing seasons in different regions start to overlap. The transport industry services multiple growing regions and need to coordinate logistics to ensure their own profitability.

Short term actions:

- Begin discussions with the transport companies to understand pinch points, and to develop a long-term plan to ensure access to local markets. Issues to be resolved include lead-up times for logistics planning.
- Engage with markets to understand their needs in terms of timing associated with buying decisions.

Longer term options

- The information obtained through engagement and discussions with transport providers and markets, can be used to develop a longer-term plan for ensuring profitability or viability. Identifying these thresholds/ and the link to when they are likely to be impacted by climate change, will help to determine when new knowledge about suitable crops and other options to ensure viability need to be implemented.
- Work collectively with other growers to engage with local, state and commonwealth governments to establish overseas markets and build facilities and infrastructure to enable access to these markets.

Human Health Risks: How might this affect “business needs/ planning” of growers into the future?

The influence of heat and heatwaves on workers is and will continue to be a major issue related to health. This is exacerbated by behavioural issues related to back packer workers including effects of heat following excessive alcohol consumption, the need for protective clothing, and the lack of acclimatisation reducing adaptive capacity.

The effects of severe climatic events such as droughts and cyclones can have an influence on the mental health of growers and their staff.

Short term options include:

- Developing a heat management plan for your operations. This can include having respite time in a cool environment, ensuring that all staff wear adequate Personal Protective Equipment, and ensuring that drinking water is available.
- Work with local government, employment agencies and chambers of commerce to ensure that backpacker staff are aware of the risks and are properly informed about what it required to ensure their safety. These should be properly enforced by growers.
- Continue good practices to support staff following events such as cyclones. Identify local mental health support services and ensure that information is available to staff and encourage staff to seek help if they are affected.

Longer term options include:

- Engaging with state and commonwealth governments to seek changes to legislation which enable staff to work in cooler hours without penalty to employers.

Conclusions

Climate change is likely to have an impact on the horticultural industry in the Bowen region over the next 20 years. There are several actions which can be implemented which will support growers’ current climate risks such as heat and heatwaves, cyclones and occasional changes to growing seasons. Understanding the longer-term implications, and making associated plans to address them, will help growers to maintain a viable industry in the areas, or develop alternative crops and markets. Many of these will take long time frames to implement which should be considered in determining when to implement them.

It is important that supermarket buyers and customers are aware of climate change adaptation planning that is done. It will help to maintain confidence in the industry.



*Written by Dr David Rissik, Senior Principal
Climate Change Adaptation, BMTGlobal*

Commissioned by Growcom under the Cyclone Debbie Project.

