

Australian Institute for
Disaster Resilience



Australian Disaster Resilience
Conference presents

Knowledge Week

24 - 27 AUGUST 2020

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#ADRC20



Australian Disaster Resilience Conference presents

○
KNOWLEDGE WEEK

— DAY FOUR —

Business fostering resilience



1 - 3.30PM AEST | 27 AUGUST 2020





**Dr Shahbaz
Mushtaq**

University
of Southern
Queensland

**Dr Jarrod
Kath**

University
of Southern
Queensland

**Kerry
Battersby**

Queensland
Farmers'
Federation

**Insuring to ensure a future for agriculture
– producing enhanced agricultural crop
insurance systems**

Drought and climate adaptation program

Insuring to ensure a future for agriculture – producing enhanced agricultural crop insurance systems

Drought and climate adaptation program

Today's Presenters

Professor Shahbaz Mushtaq, Professor (Agricultural Economics and Climate Finance), Centre for Applied Climate Sciences, University of Southern Queensland

Kerry Battersby, Project Manager, Queensland Farmers' Federation

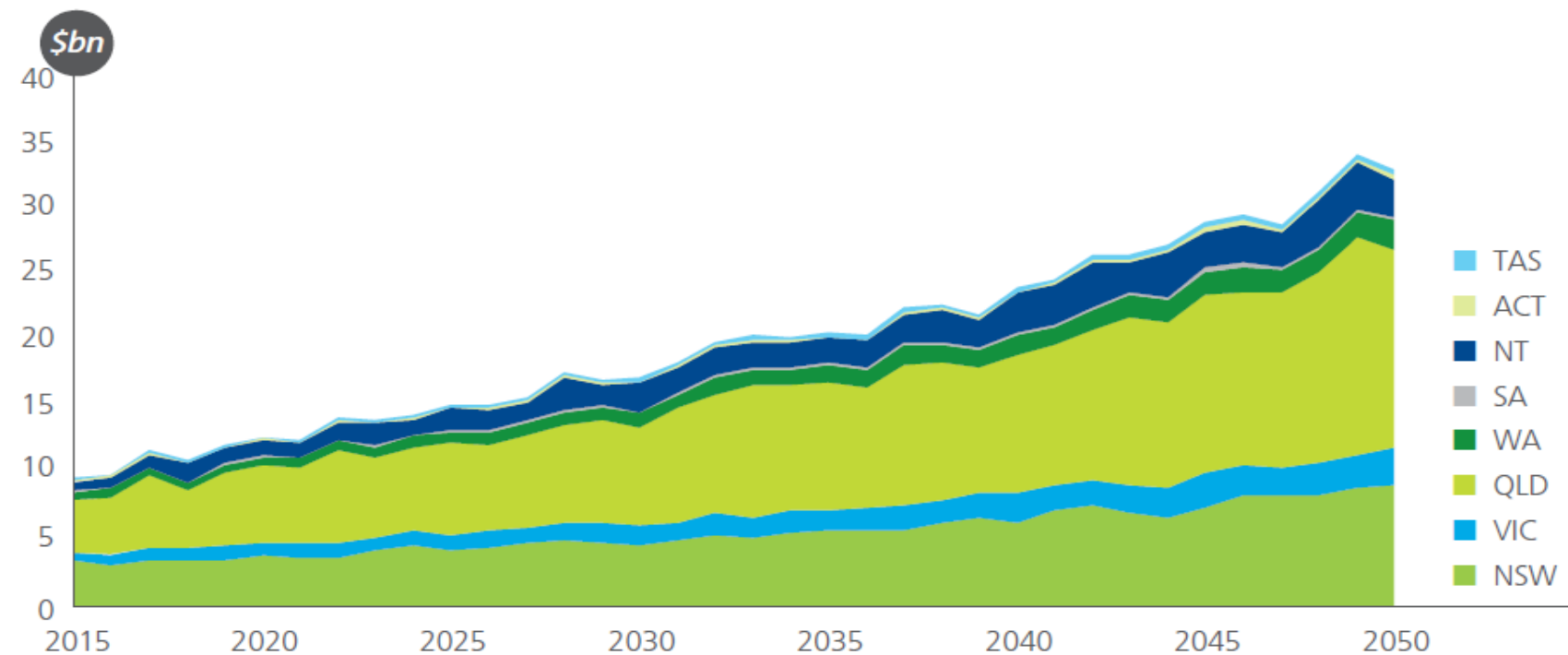
Dr Jarrod Kath, Research Fellow (Agro-Environmental and Climate Finance), Centre for Applied Climate Sciences, University of Southern Queensland

Additional Project Committee members

Russell Mehmet, Director, Property and Casualty, Willis Towers Watson

Ross Henry, Manager, Disaster Recovery, Queensland Rural and Industry Development Authority

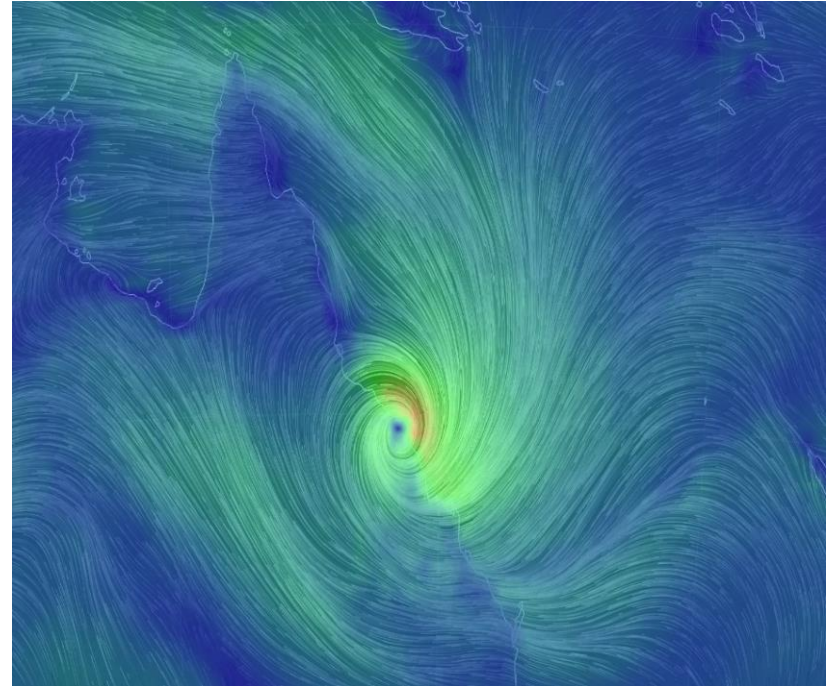
Chart ii: 2015–50 forecast of the total economic cost of natural disasters, identifying costs for each state



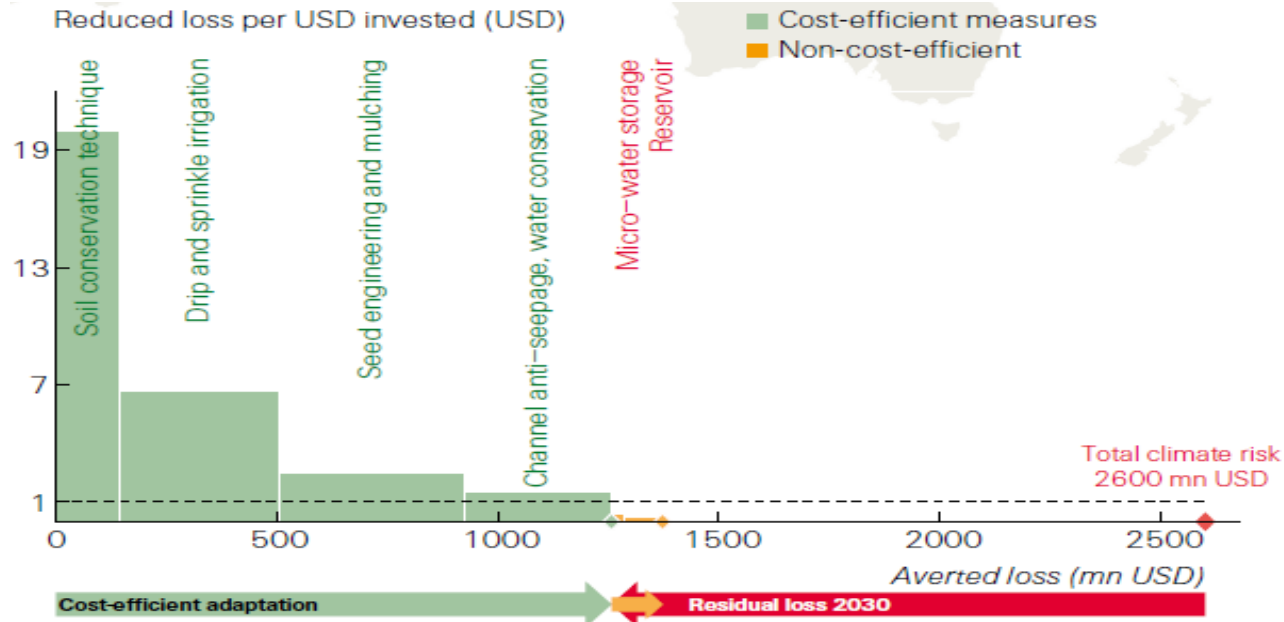
Source: Deloitte Access Economics analysis

How can we respond

- Risk management
- Risk transfer
- Careful integration of risk transfer and risk management options



Risk Management and Risk Transfer

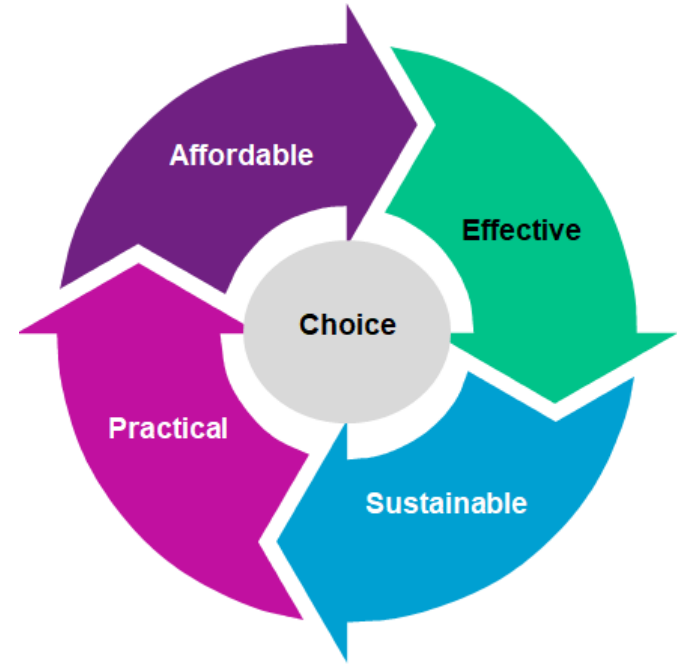


A portfolio of climate adaptation measures is required to address the total climate risk (SwissRe, 2014).

Risks Transfer

A resilient agricultural sector with improved *risk transfer mechanisms* through the development of targeted, cost-effective, affordable and sustainable crop insurance products.

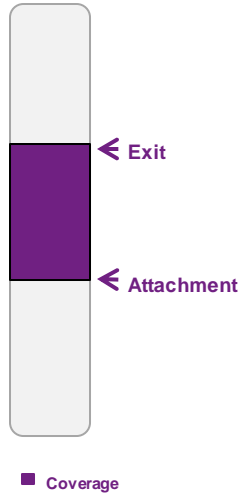
Increased awareness and understanding of the process through which risks could be shared through insurance.



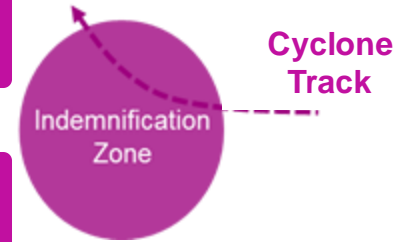
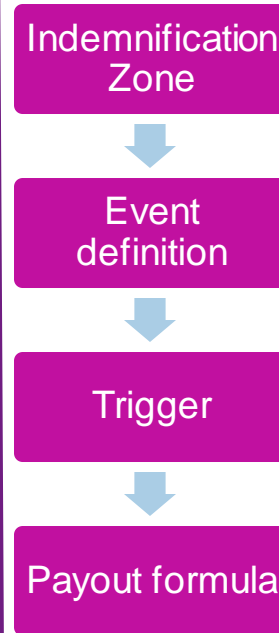
New opportunities in the future that transfer some of the risk from farm & government to the insurance sector

Drought and climate adaptation program

Parametric Solutions



- If a rainfall/temperature index breaches a pre-determined threshold, the policy is triggered
- The claim amount is based on a pre-agreed scale of payment



- If a cyclone passes through this indemnification zone, the policy is triggered
- The claim amount is based on a pre-agreed scale of payment

Drought and climate adaptation program

What perils that can be covered with a parametric programme?

It's all about the data

Weather Indices

- Temperature
- Precipitation
- Wind-speed
- Wave height
- Solar irradiation
- Snow

Natural Perils

- Windstorm
- Earthquake

New Indices

- Crop yields
- Agricultural quality
- Terrorism
- Pandemic
- Burnt area

In Development

- Passenger numbers
- Volcanic ash
- Flood
- Hail

Data

- The data underpinning a parametric programme must be:
 - Independent
 - Reliable
 - Consistent
 - Have sufficient history for underwriting
 - Be continuously recording throughout the contract term for settlement
- Data availability and integrity has improved significantly in recent years
- Weather observations are recorded by ground stations located in many regions of the world
- Offshore data is measured by buoys
- Data sets often go back for more than 50 years
- Data are measured at least daily and sometimes hourly
- Satellite data is also available which provides a higher density of data but a shorter history

Drought and climate adaptation program



"My cane farm was directly in the path of this Cat 4 system. We had winds of up to 265kph followed by over 1,000mm of rain within a 48 hour period.

We had 2 sheds completely written-off; one shed suffered major damage; there was major damage to our main residence. And by major damage, I mean more than 50% of the structure."

2017 season: 40% loss of production | 2018 season: 30% loss | 2019 season: 25% loss

Drought and climate adaptation program



- Queensland farmers are subject to highly variable climatic conditions, including drought and floods, which can undermine production.
- Insurance could play an important role in helping Queensland farmers manage their climate risk.
- Use of insurance to manage climate related production risk is poorly understood and utilised by farmers.

A collaboration of government, university research, insurance and agriculture industries

Photo courtesy of CANEGROWERS members

6 Benefits for Primary Producers

1. Parametric solutions provide an alternative way of transferring the revenue or cost impact of natural catastrophes
2. These solutions differ from traditional insurance policies
3. Loss payments respond to the occurrence of a pre-agreed trigger event index.
4. Flexible policies designed and calibrated to reflect the specific locations, exposures and risk management objectives of the farmer.
5. Flexible structure: single season, annual or multi-year arrangement.
6. Claims are settled very quickly after the occurrence of the policy trigger – usually 14 days.

Drought and climate adaptation program



QUEENSLAND FARMERS' FEDERATION

Drought and climate adaptation program



CANEGROWERS

Drought and climate adaptation program

Case Study 1

Key Facts

Farm / Industry: Sugarcane

Risk: Cyclones

Location: Yalboroo, Central Queensland

Solution: 'cat-in-a-box' Index-based Insurance

Farm Profile

The farm is located approximately 70km North West of Mackay in Central Queensland. The 140-hectare dry land farm yields around 9,000 tonnes of sugarcane per year. High rainfall and mild temperatures typify central Queensland weather, with the farm identifying cyclones and the associated rainfall as the biggest weather risks.

Risk

A major risk for farm businesses in this region are cyclones. The cyclone season officially runs from November to April, and on average 4.7 tropical cyclones affect Queensland per year.

In March 2017, Cyclone Debbie caused widespread damage to the region's sugar industry. The wind caused extensive lodging and in some cases snapped the sugarcane off; this resulted in 25% to 30% losses through the region. The associated rainfall also caused widespread damage.



Action

After consultation with the farm, a 'cat-in-a-box' cover for a category three or above cyclone was priced based on the farm location and the shape of the cyclone (usually circular) as defined by the farm. To best position the farm in the box, the centroid of the circle was set 25 km above the location of the farm.

'Cat-in-a-box'

A 'cat-in-a-box' is a simple weather index trigger mechanism which depends on the physical parameters of the event. In the case of cyclone risk, the location of the farm within a specific geographic zone (box) and its category as it enters the zone. If these are met, the transaction triggers, resulting in a claim payment.

Case Study 2

Key Facts

Farm / Industry: Sugarcane

Risk: Rainfall due to Cyclone

Location: Hampden, Central Queensland

Solution: 'cat-in-a-box' Index-based Insurance with additional Rainfall Trigger

Farm Profile

The farm is situated west of Mackay in central Queensland. This high performing, 210-hectare dry land farm yields around 15,000 tonnes a year. The main farm comprises of 180 hectares with a further 30 hectares leased.

Risk

Flooding due to intense rainfall, often associated with cyclones, has been identified as a major risk for this farm and is common for many sugarcane farms.

In March 2017, Cyclone Debbie caused widespread damage to the region's sugar industry in the. The associated rainfall resulted in widespread damage through the region. Earthworks and laser leveling are used extensively to manage drainage in the high rainfall.



Action

After consultation with the farm, a 'box' cover with an additional rainfall trigger was developed. The rainfall trigger was 400mm within a 48-hour period, and with a radius of 50km was positioned over the farm; the centroid of the circle was above the location of the farm to best fit within the indemnification zone.

Policy Triggers

Cyclone Trigger

A 'cat-in-a-box' is a simple weather trigger mechanism which depends physical parameters of the event. In the cyclone risk, the location of the farm specific geographic zone (box) and its category as it enters the zone. If these are policy triggers, and the payment is made.

Rainfall Trigger

Where a defined level of rainfall is met within a defined period (typically all the covered cyclone activity) the

Drought and climate adaptation program

Case Study 3

Key Facts

Farm / Industry: Sugarcane

Risk: Cyclone and Rainfall

Location: Marian, Central Queensland

Solution: Index-based Insurance with additional Rainfall Trigger and 'cat-in-a-box' only

Farm Profile

The farm is situated outside Marian near the Pioneer River in central Queensland. The farm is 145 hectares and produces around 10,000 tonnes per year. The dry land farm relies on the high rainfall that typifies the Mackay region of Central Queensland.

Risk

Cyclone and flooding have been identified as major risks and tested for this farm.

The flooding is as result of intense rainfall associated with cyclones. Over 300mm of rainfall within a 48-hour period can be very damaging, with extensive damage caused due to the rapid moving water across the farm.

In March 2017, Cyclone Debbie caused widespread damage, lodging and breaking cane, while the intense rainfall caused localised flooding across the farm.



Action

Three options were identified and investigated for this farming enterprise.

Option 1

A 'cat-in-a-box' cover for a category three or above cyclone with a 50km radius; the centroid of the circle was set 25km above the location of the farm.

Option 2

A 'cat-in-a-box' cover (category one or higher, circle with a radius of 50km, centroid set at 25km above the location of the farm), with a rainfall trigger. The rainfall trigger is set at 300mm over a 48 hour period that overlaps the period that the cyclone is within the indemnification zone. Rainfall is measured at Mackay M.O.

Option 3

A 'cat-in-a-box' cover (category one or higher, circle with a radius of 50km, centroid set at 25km above the location of the farm), with a rainfall trigger. The rainfall trigger is set at

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Drought and climate adaptation program



Policy Update

Industry with Burn Ashburner

Economics with Warren Males

Parametric Solutions

Wherever you are in the world, growing crops is something of a gamble. Farmers can never be quite sure what nature might throw at them in any given season.

In coastal Queensland, with its tropical and sub-tropical climates, the risks cane growers face include cyclones, floods, droughts and fires.

Managing these risks is considered both a public and private good. At the state level, ensuring a productive and efficient agricultural sector provides export earnings, food security, and maintains rural employment and populations. For individuals it's about ensuring the stability of family earnings, protecting assets and succession planning.

Multi-peril crop insurance is one way growers can manage the risks involved with agricultural production but in Australia it can be costly.

Parametric solutions offer a more affordable, practical, flexible and sustainable alternative.

A pilot project enabling growers to purchase cover for cyclone damage is currently being funded by the Queensland Government's Drought and Climate Adaptation Programme.

The project, being managed by QFF, the University of Southern Queensland and Willis Towers Watson (brokers), with input from CANEGROWERS, is based on a payout for participating growers that is triggered if a Category 3 or above cyclone passes within 50km of their farm.

This payment is not dependent on any assessment of damage and there are no restrictions how the payout is used. The payout can therefore be made quickly, often within 14 days.

While it sounds great, there is a risk that the damage incurred from the cyclone is much greater than the payout amount so the challenge is to design the parametric solution to minimise this risk.

With this in mind, the pilot is also looking at an option for a Discretionary Mutual Fund (DMF) which is effectively a collective fund whereby participating growers are members with the benefit of sharing the risk.

CANEGROWERS will continue to explore the suitability of parametric solutions for Queensland's sugarcane industry, with a view to reducing the risks faced by our members.

Bearing in mind that there is also a public good to protecting agricultural production, there may be a role for government in funding such a system. ■



CANEGROWERSOUT ADVOCACY MEDIA MAGAZINE INSURANCE MEMBERSHIP CANE TO COAST RESOURCES CONTACT

Cyclone risk cover - closer than you think



IN THIS SECTION

[Latest News](#)

[Media Releases](#)

[Media contacts](#)



Like drought, cyclones are part of the farming landscape in Queensland. Despite this, insuring crops against cyclones has long been viewed as fantasy. Now the Queensland Farmers' Federation has a solution.

Every summer we think there must be a way to give farmers the ability to better respond to severe weather events, but then cyclone season passes and no new system has materialised – until now.

Through the Queensland Government's Drought and Climate Adaptation Program, the Queensland Farmers' Federation, in conjunction with CANEGROWERS and other industry members, has teamed up with the University of Southern Queensland and Willis Towers Watson, to create an insurance model that will offer growers peace of mind this cyclone season.

Together, QFF, QSU and Willis Towers Watson have assessed and modelled alternative risk transfer insurance options for cane growers.

They're 'alternative' because we focussed on parametric solutions. Parametric or index-based products differ from more traditional forms of insurance in that payouts are not determined by actual losses for an individual farm and do not require proof of damage.

Rather, a payout occurs in the event of a pre-agreed trigger event. In this case, the event is a cyclone. Irrelevant to the damage, the cyclone itself is the trigger for the payout, making the process much simpler and easier to manage for growers and

Drought and climate adaptation program

UNIVERSITY OF SOUTHERN QUEENSLAND

QFF QUEENSLAND FARMERS' FEDERATION

WillisTowersWatson

TROPICAL CYCLONE INSURANCE FOR QUEENSLAND AGRICULTURE

www.qff.org.au

ADVOCACY NEWSROOM PROJECTS EVENTS FARMING IN QLD About | Our Members | Our Federation

CYCLONE INSURANCE - CLOSER THAN YOU THINK

- EDUCATION
- DATA COLLECTION
- WEATHER ANALYSIS
- PRODUCT DEVELOPMENT
- REPORT OF SUITABILITY

QFF Queensland Farmers' Federation
September 24 · 🌐 Like Page

The University of Southern Queensland - Australia, in collaboration with Willis Towers Watson and QFF recently presented a seminar and discussion on Advances and Innovations in Crop Insurance Systems. Managing and mitigating the impact of severe adverse weather events provides potential benefits for all those involved in the agricultural sector: farmers, suppliers, buyers and government.

Read more about the project here: ow.ly/fXGO30pAroV.

232 People Reached 21 Engagements [Boost Post](#)

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Drought and climate adaptation program

AGRICULTURE NEWS

Drought and Climate Adaptation Program news

The [Drought and Climate Adaptation Program](#) is the Queensland Government's flagship drought and climate preparedness and resilience program.

October 2019



Advancing weather index insurance for crops

Weather index insurance was discussed as a way to manage and mitigate the impact of severe adverse weather for farmers at a series of workshops in September.

The University of Southern Queensland (USQ), Queensland Farmers Federation (QFF), insurance broker Willis Towers Watson and the Department of Agriculture and Fisheries (DAF) are working together to further the development of parametric or index-based insurance products for cyclone cover for the agriculture sector.

[Read more](#)



Advancing weather index insurance for crops

Weather index insurance was discussed as a way to manage and mitigate the impact of severe adverse weather for farmers at a series of workshops in September. The University of Southern Queensland (USQ), Queensland Farmers Federation (QFF), insurance broker Willis Towers Watson and the Department of Agriculture and Fisheries (DAF) are working together to further the development of parametric or index-based insurance products for cyclone cover for the agriculture sector.

Over the past decade, weather index insurance has emerged as an important and viable alternative to the 'traditional' insurances available for producers. With parametric or index-based insurance, a payout occurs following a pre-agreed trigger event, in this case, a cyclone. Irrelevant to the damage, the cyclone itself is the trigger for the payout, making the process much simpler, faster and easier to manage for growers and the insurance company.

The concept received positive feedback from producers. Industry intends to move forward with a pilot program and establish a Discretionary Mutual Fund for CANEGROWERS industry participants. A Discretionary Mutual Fund (DMF) is a commercially proven and widely-used structure to provide insurance-type protection for common interest groups. Risks are shared on a collective basis for the good of all, with the fund owned by an industry entity and its members.

A pilot program with QFF industry member, CANEGROWERS, is currently being developed for proposed testing during the 2020-21 cyclone season. If you would like to know more about this or participate in the project, please contact Kerry Battersby at kerry@gff.org.au or visit the [QFF website](#).

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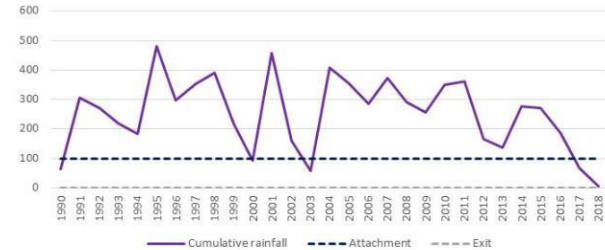
Drought and climate adaptation program

Pilot Projects in Queensland

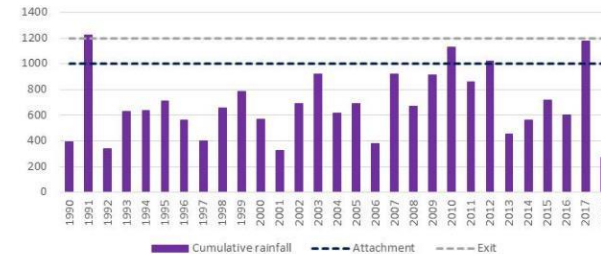
Weather-index programmes

- Pilots have been developed for a number of crops including:
 - Cotton
 - Horticulture
 - Macadamia
 - Mangoes
 - Sugarcane
 - Wheat
- Covered perils:
 - Drought
 - Excess harvest rain
 - Heat days
 - Tropical cyclone

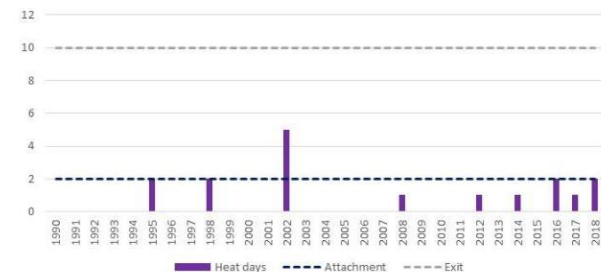
Bundaberg Aero Drought Structure



Bundaberg Aero Excess Harvest Rain Structure



Bundaberg Aero Heat Days Structure



Drought and climate adaptation program

Pilot Project with CANEGROWERS

- 12 Queensland cane growing regions are exposed to cyclone.
- Each grower's policy limit will be **AUD50,000**
- Policy trigger will be a cyclone of **category 3** or above.
- Policy will pay if the eye of a triggering cyclone passes within **50km** of a grower's centroid



Cyclone Debbie Case study

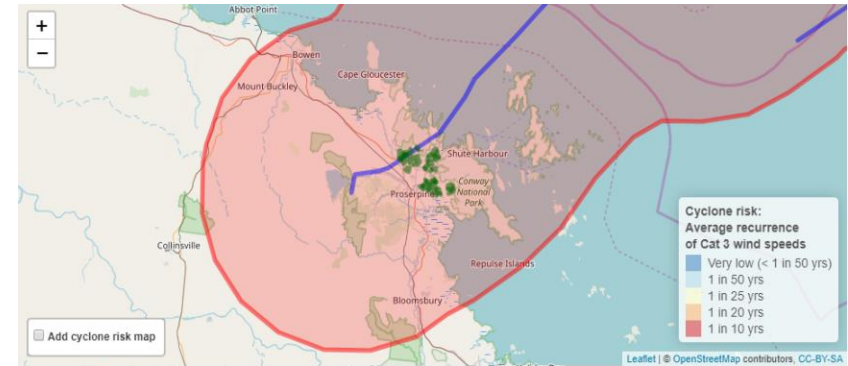
Canegrower losses from cyclone Debbie were around \$150 million, but most of the losses were not recovered.

The assistance from DRFA for producers was ~AUD 16m equating to only ~10% of the financial losses suffered

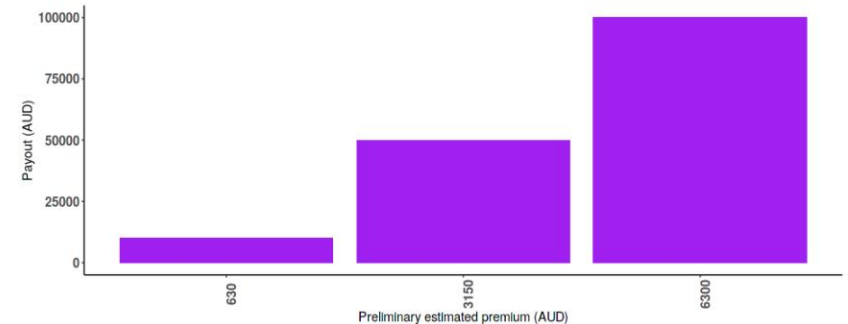
Based on our assumption of 20% initial uptake and AUD 50,000, a payout of AUD 1.48m will be made to DMF members - a substantial complement to disaster relief funding.

However, if the uptake is 50% then this the amount will be ~3m, depending on the policy

Online pricing tool



The estimated premium rate here is 6.3%.



Cyclone premium estimator tool

Cyclone insurance premium estimator for Queensland

This online tool has been developed to provide insights into the risk of tropical cyclone activity in Queensland and the potential cost of parametric cyclone insurance. The tool allows users to view the tracks of cyclones that have occurred historically in Queensland and to see which cyclones have passed within 50km of a chosen location. The premium estimator tool provides users with a premium estimate for an insurance policy which pays if a cyclone of category 3 or above passes within 50km of their location.

NOTE: The cyclone insurance solutions shown here are preliminary and the parameters and pricing will vary according to the location covered and the precise structure of the policy. Estimated premiums are net of local taxes.

Preliminary policy structure. If a cyclone of category 3 or above passes within 50km of the insured location (the indemnification zone) a pre-agreed payout occurs. The premium will increase proportionally to the payout amount and will vary by location according to the risk of cyclone activity in the insured region.

Click on the map to see an estimate of the premium for an area of interest. Premium estimates are similar for locations in the same region.

Select a historic cyclone to see its track and its indemnification zone (a region encompassing all locations within 50km of its track).

Move the slider below to see the tracks of all historic category 3 cyclones occurring during the chosen time range.

[More information cyclone insurance can be found here](#)

Select a cyclone to see its indemnification zone (shown as a shaded red area)

Debbie

[More information insurance research in Queensland can be found here](#)

*Select the time range for which you wish to show the tracks of historic category 3 or above cyclones (shown as solid blue lines).



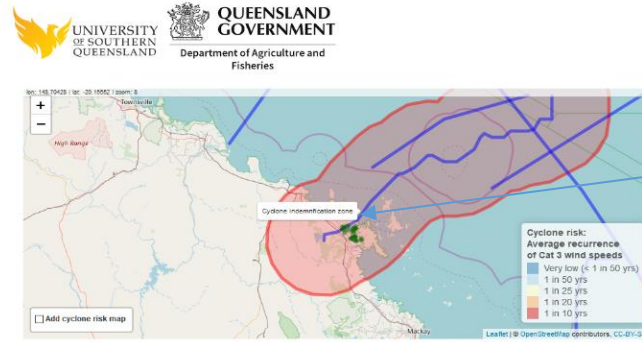
*Cyclone track data prior to 1989 is less reliable because of a lack of satellite data.

[Cyclone track information is from the Australian Bureau of Meteorology](#)

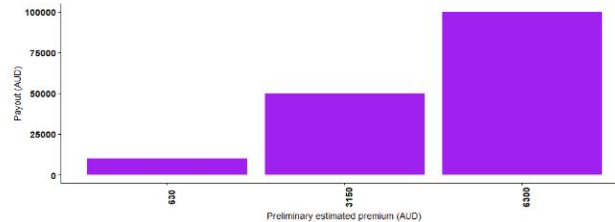
[Cyclone risk information is adapted from the Tropical Cyclone Hazard Assessment \(THCA\) from the Australian Government Geoscience Australia](#)

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The estimated premium rate here is 6.3%.



Shows cyclone tracks, payout zones and premiums for different payout amounts

Cotton production and drought risk

C:/Users/kathj/OneDrive - USQ/Attachments/Projects/DCAP2 Insurance/Cotton app/New folder - Shiny

http://127.0.0.1:5290 Open in Browser Publish

Select the attachment and limit range of the drought index insurance to get a premium estimate.

Limit (mm) **Attachment (mm)**

0 75 1000

Enter tick value (how much is payed out for each mm of rainfall deficit below the attachment)

100

lon: 150.16113 | lat: -27.76133 | zoom: 5

Average annual rainfall (mm)

300
400
500
600
700
800
900

Northern Territory Queensland Brisbane Gold Coast

Leaflet | © OpenStreetMap contributors, CC-BY-SA

Select months for index insurance coverage

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Estimated premium (AUD)

lower estimate upper estimate

Premium estimate range

Estimated line (%)

lower rate on line estimate upper rate on line estimate

Rate on line estimate range

Rainfall (mm)

Year

Year

Payout (AUD)

Year

Gives estimates of likely premiums and history of payouts with that level of insurance

Questions?

Contacts

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www.usq.edu.au/research/institutes-centres/ilse/applied-climate-science

Kerry Battersby, Project Manager, Queensland Farmers' Federation

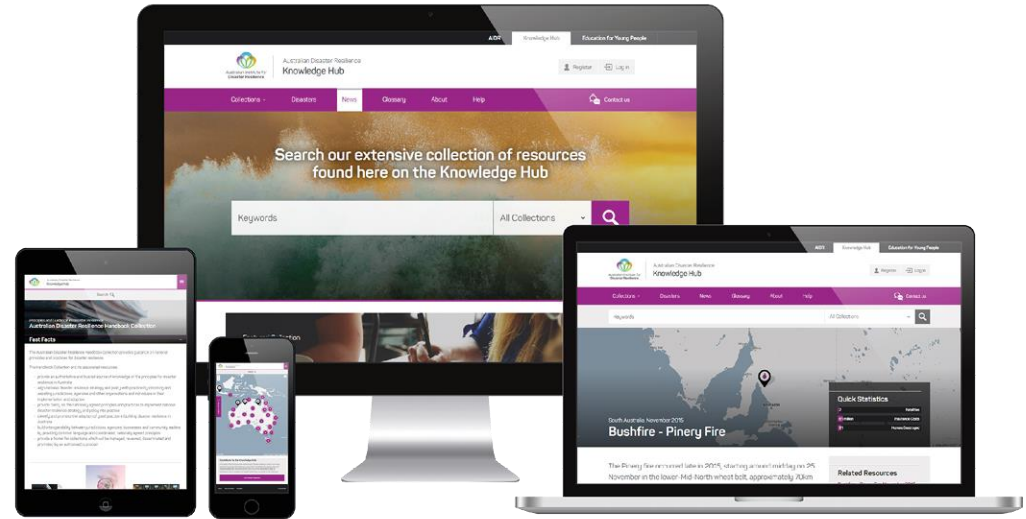
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