Northeast landscapes Local Knowledge and Action Navigating Climate Change

27th August 2021

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Climate Specialist
@climatedogs

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What a wonderful place to be…….

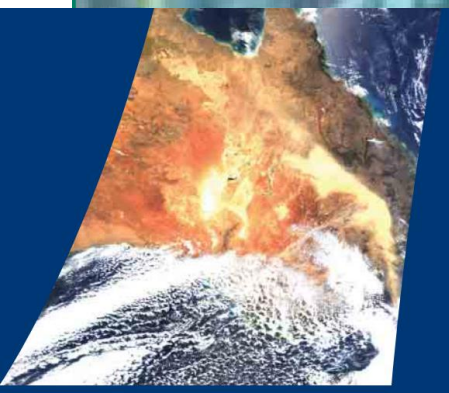
SWAMPS RIVERS & RANGES INC.

NRCL
NATURAL RESOURCES CONSERVATION LEAGUE OF VICTORIA

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

Rural City of Wangaratta

VICTORIA State Government | Environment, Land, Water and Planning



Climate Change:

An Australian Guide to the Science and Potential Impacts

Key climate influencers southeast Aust rainfall:

- **ENSO** – Pacific Ocean moisture source
- **IOD** – Indian Ocean moisture source
- **SAM** – the fronts….
- **STR** – the highs…..

Key drivers of our seasonal variability & impacted by climate change – (BOM, CSIRO, NASA etc)

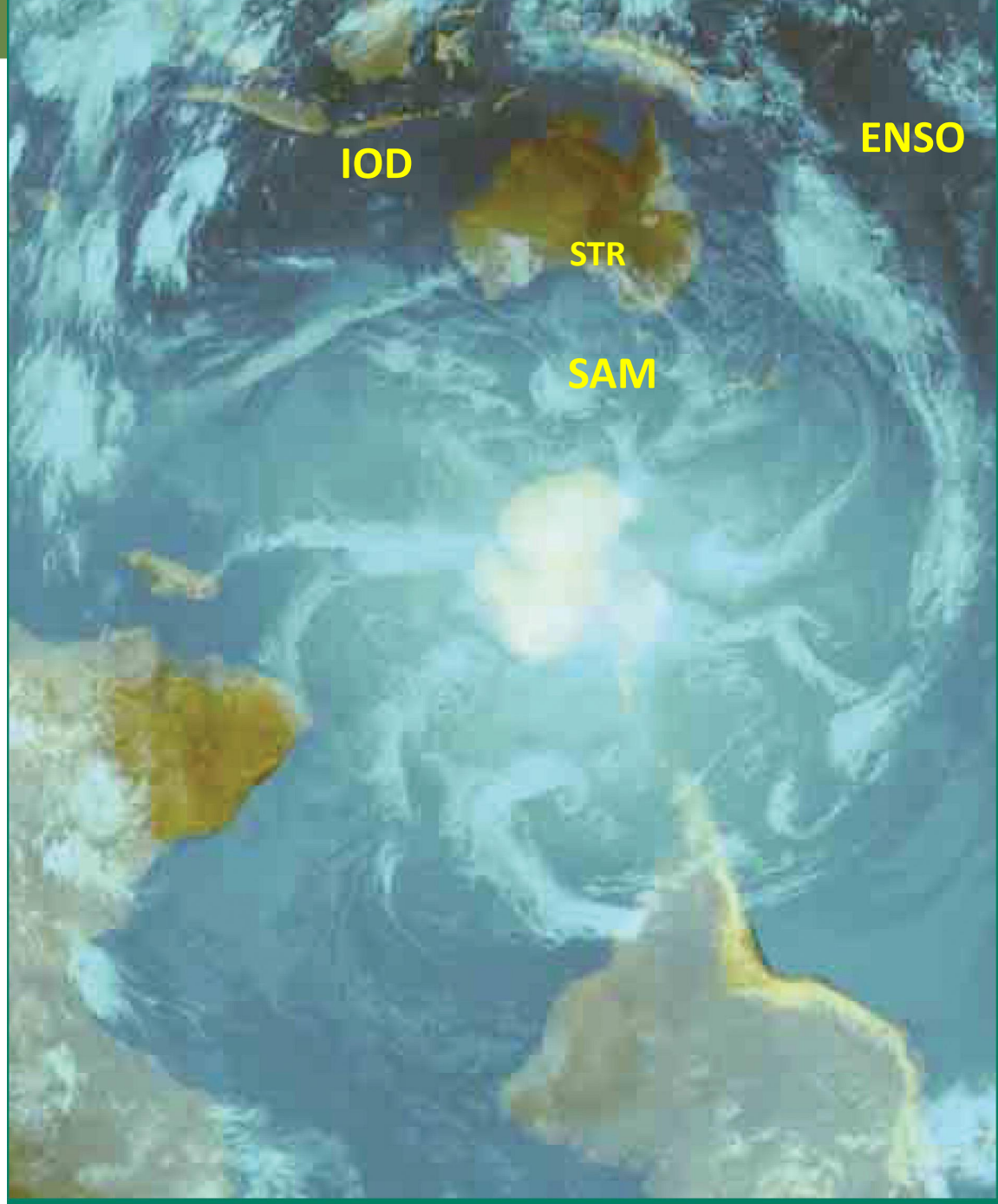
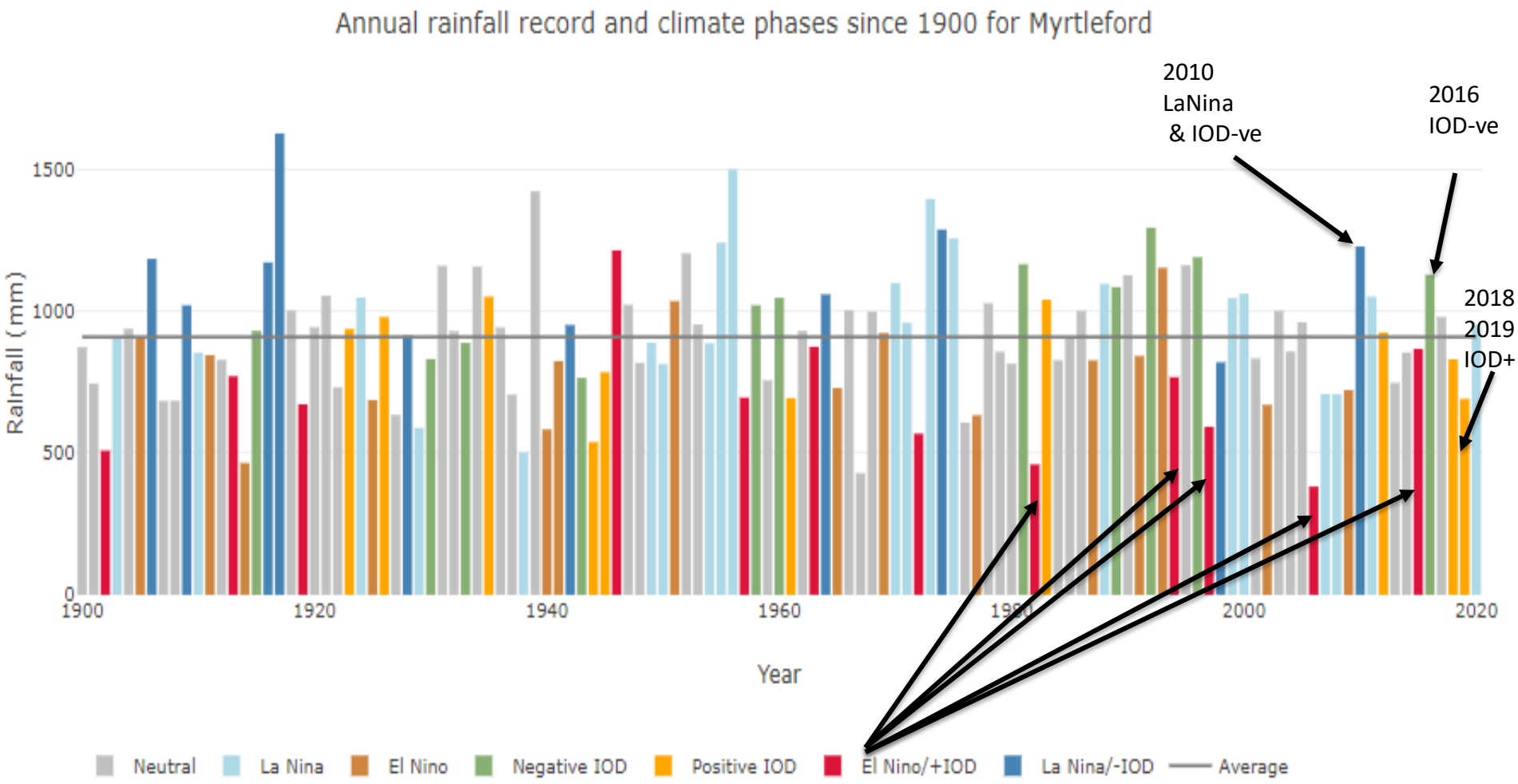


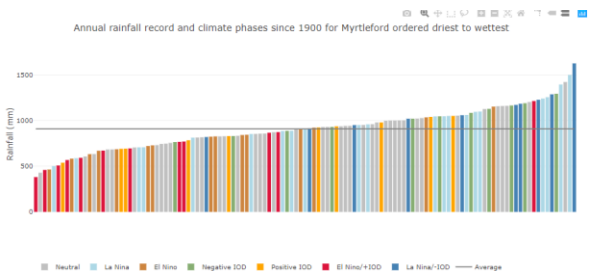
Figure 2.12.

Annual Rainfall 1900-2020 at Myrtleford Victoria - 910mm long term average



Local Climate Tool (AgVic and GRDC)

www.forecasts4profit.com.au/Local-Climate-Tool



Annual rainfall deciles 1910 to 2020

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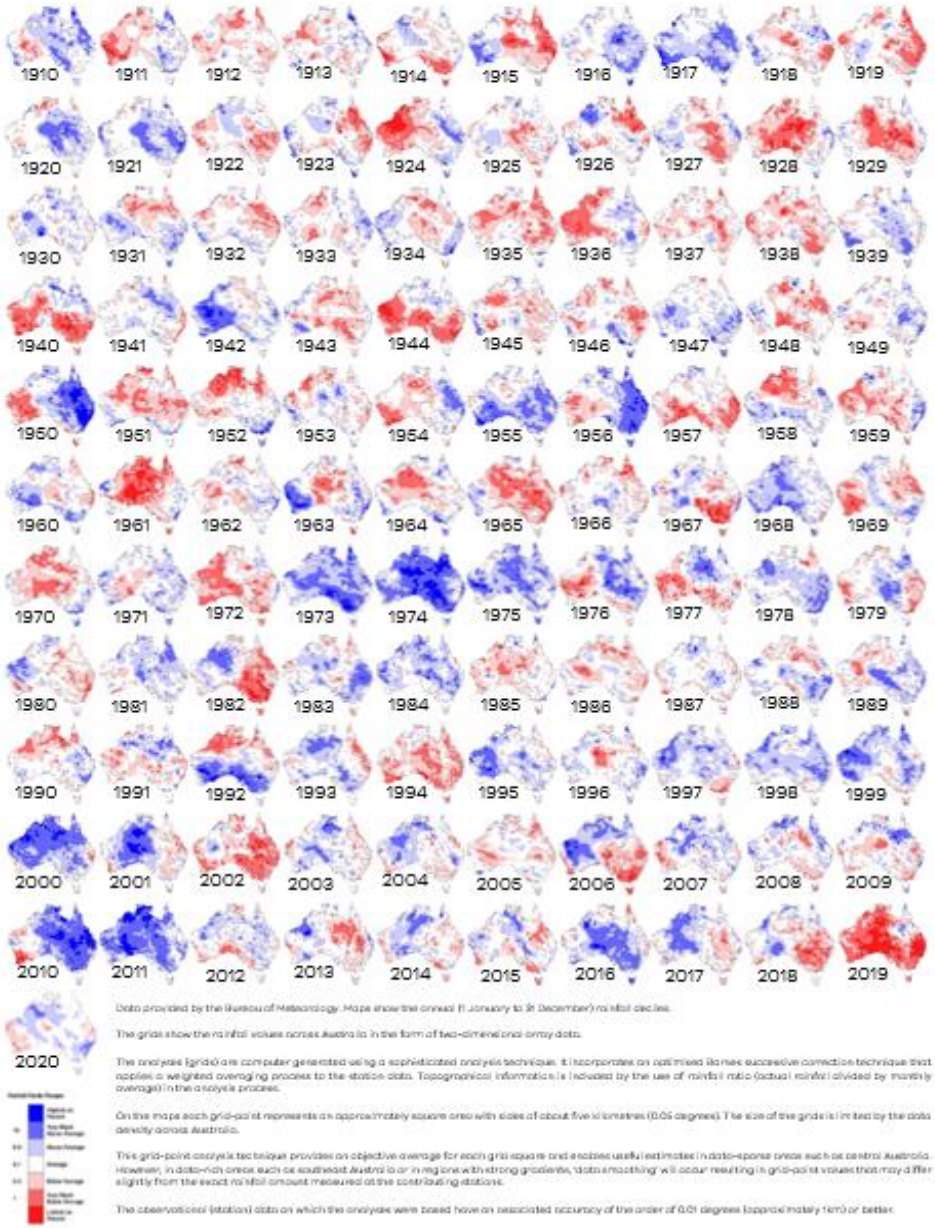

Data provided by the Bureau of Meteorology. Maps show the annual (1 January to 31 December) rainfall deciles.

The grids show the rainfall values across Australia in the form of two-dimensional array data.

The analyses (grids) are computer generated using a sophisticated analysis technique. It incorporates an optimised Barnes successive correction technique that applies a weighted averaging process to the station data. Topographical information is included by the use of rainfall ratio (actual rainfall divided by monthly average) in the analysis process.

On the maps each grid-point represents an approximately square area with sides of about five kilometres (0.05 degrees). The size of the grids is limited by the data density across Australia.

This grid-point analysis technique provides an objective average for each grid square and enables useful estimates in data-sparse areas such as central Australia. However, in data-rich areas such as southeast Australia or in regions with strong gradients, 'data smoothing' will occur resulting in grid-point values that may differ slightly from the exact rainfall amount measured at the contributing stations.

The observational (station) data on which the analyses were based have an associated accuracy of the order of 0.01 degrees (approximately 1km) or better.

Annual maximum temperature deciles 1910 to 2020

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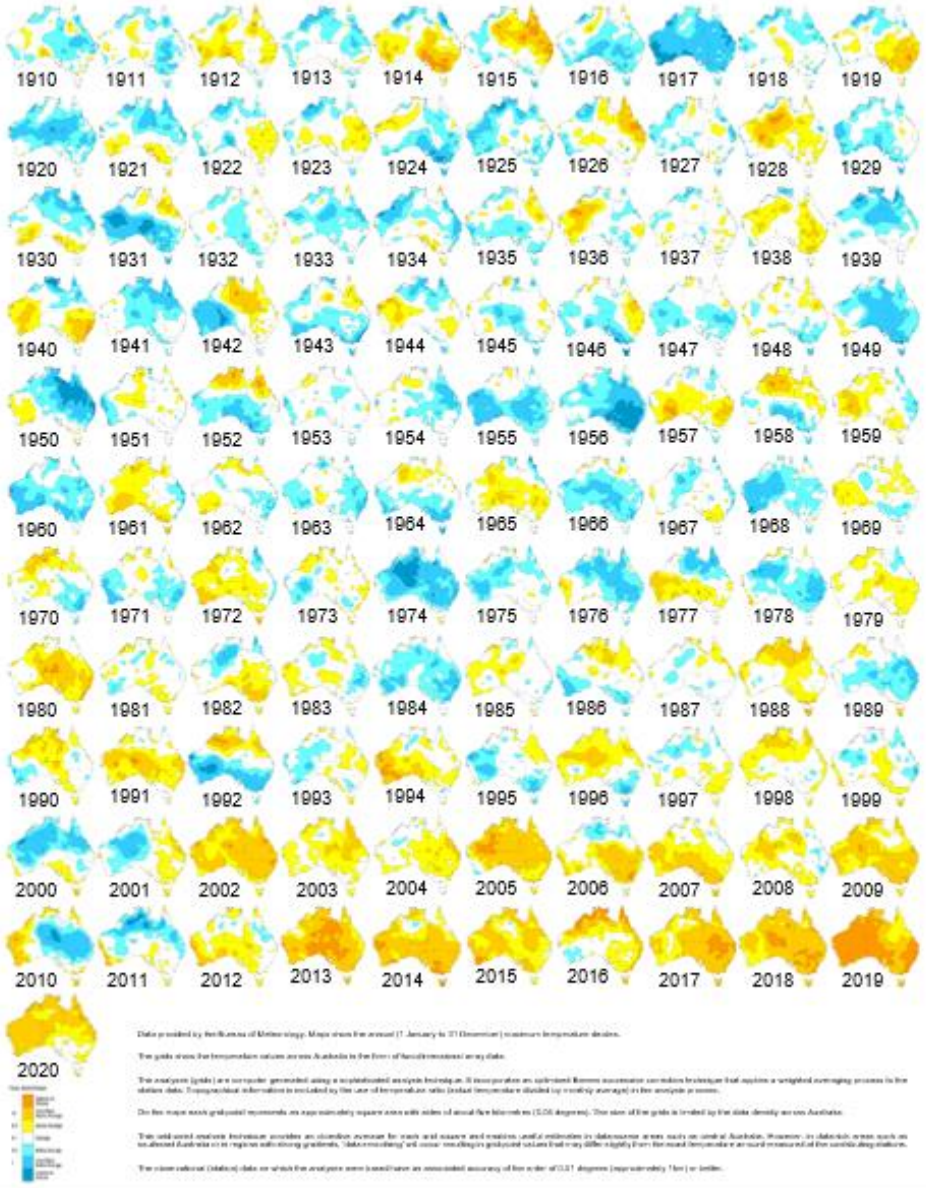

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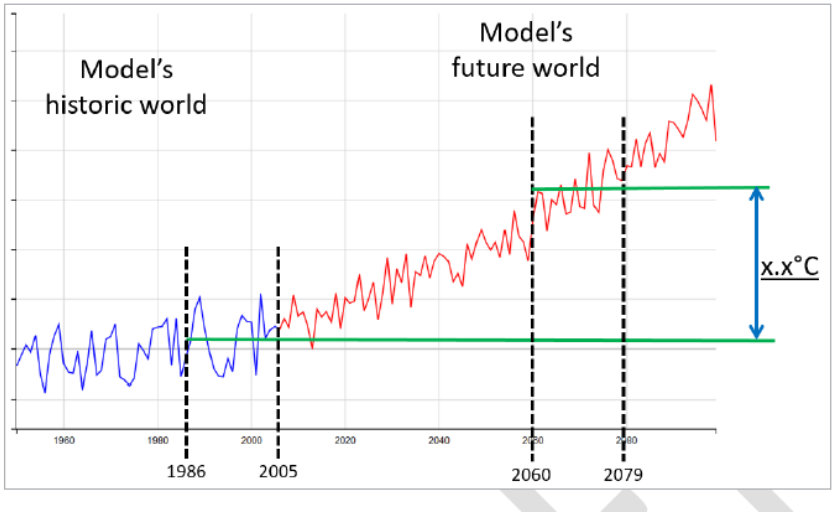
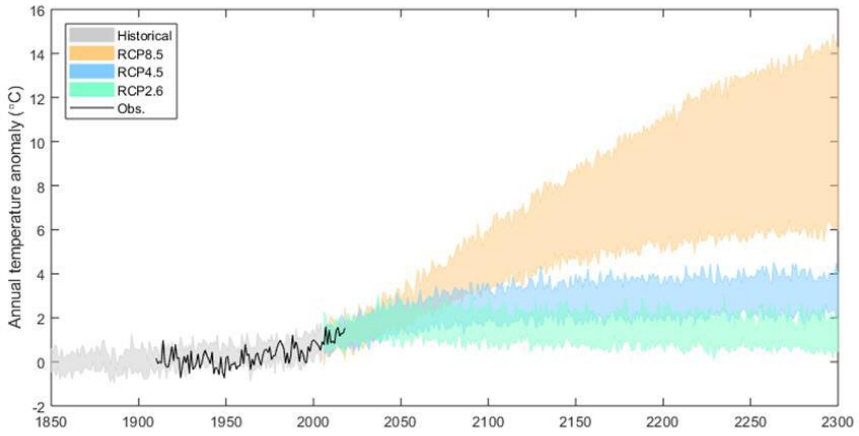
Highest scientific confidence is around temperature increase as GHG emissions rise



The future?

- Warming trend continues
- Uncertainty exists for rate of change (emissions scenarios)

Choices & Consequences….



By 2100 range could be:

- 2 degrees?
- 4-5 degrees?
- (and continues rising post 2100)

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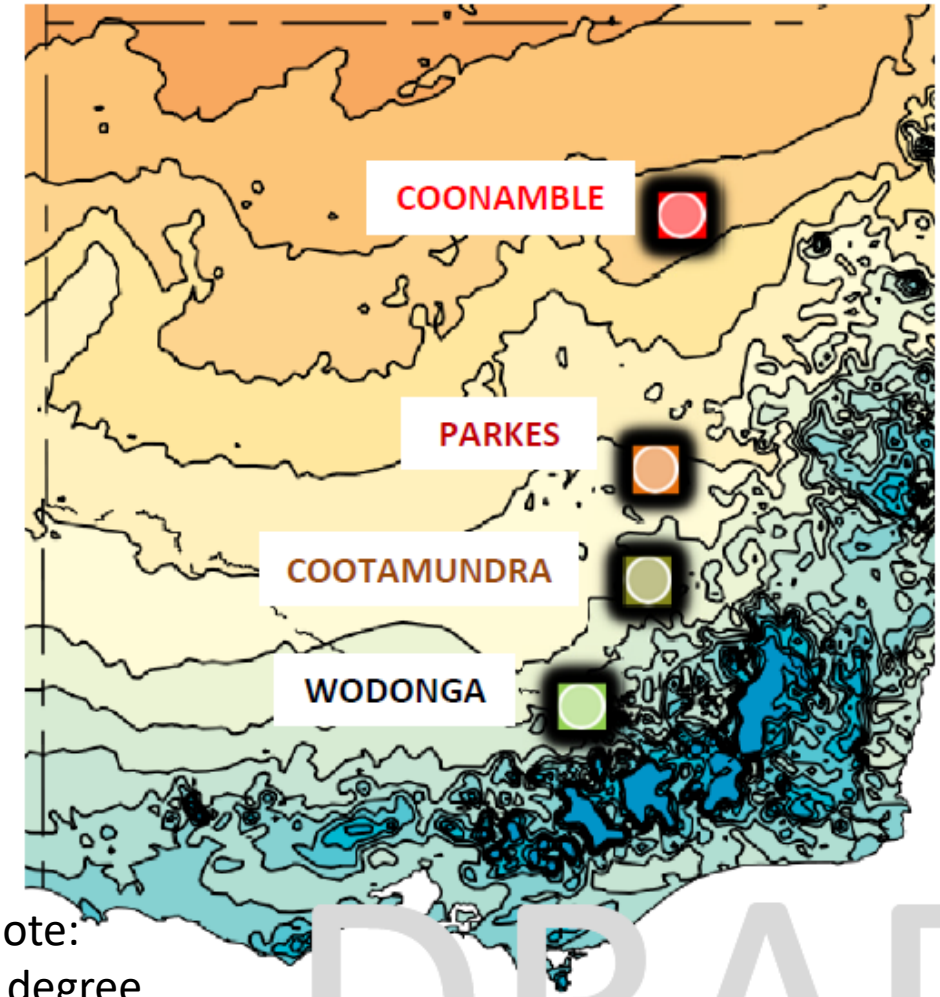
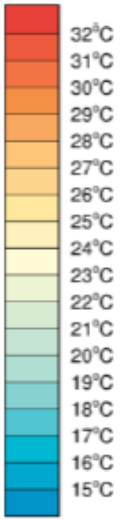
What might Wodonga's climate be like in 2030, 2050 & 2090?



Maximum Average Temp. (1986-2005) (BoM)



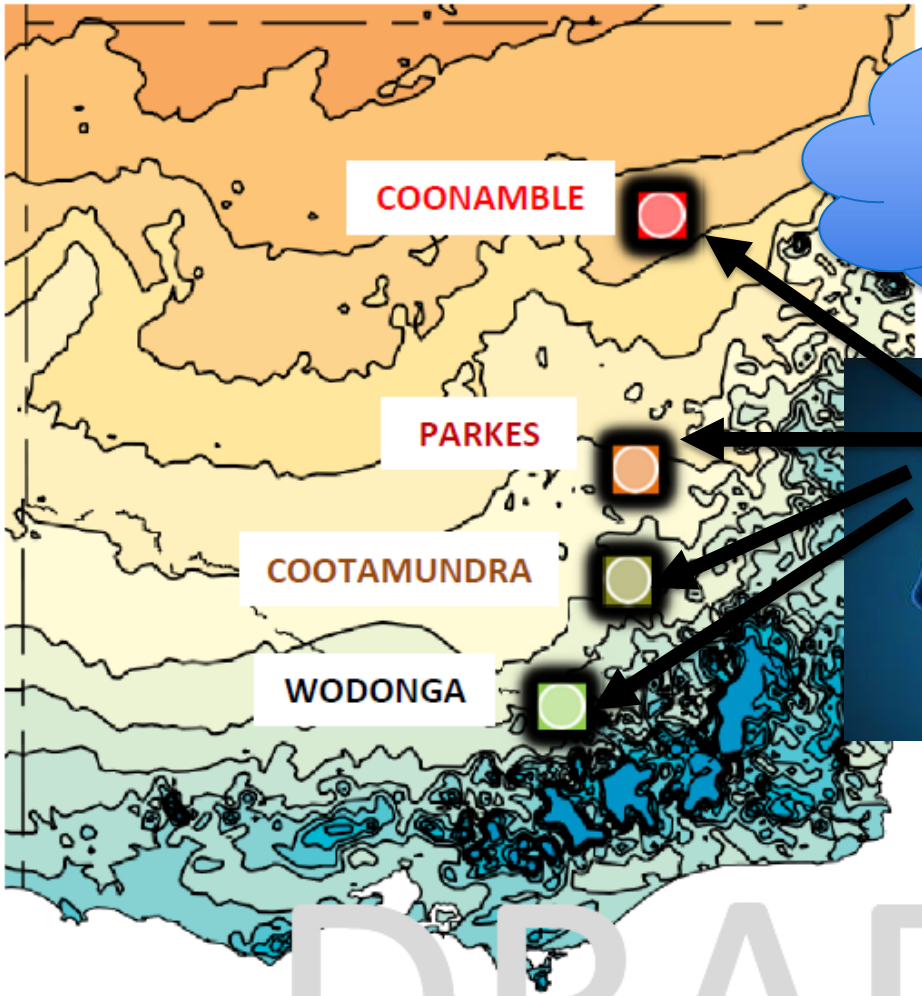
Climate Analogues explore what the future climate could be like for a given location. These analogue localities have been developed using the Analogues Explorer Tool from the CSIRO's Climate Change in Australia. This tool matches the proposed future climate of a region with the current climate experienced in another region using average annual rainfall and average annual maximum temperature (within set tolerances). They were developed using the maximum consensus of models (based on CMIP5) for the high greenhouse gas emissions scenario, (RCP 8.5). NOTE: These analogues have been further refined to align with projected seasonal changes based on Model CESM1-CAM5 which was selected by John Clarke, CSIRO Climate Science Centre, as the most representative model. This

Current Wodonga average temperature and rainfall			2030 Wodonga climate looks like Cootamundra		2050 Wodonga climate looks like Parkes		2090 Wodonga climate looks like Coonamble	
	Season	Wodonga Current	Wodonga Projected 2030	Cootamundra Current	Wodonga Projected 2050	Parkes Current	Wodonga Projected 2090	Coonamble Current
Mean Max. Temp °C	Spring	21	21.8	21.6	23	23.4	26.1	26.6
	Summer	30.2	31.6	30.6	32	31.9	35.2	33.7
	Autumn	22.4	23.5	22.7	24.3	23.9	27	26.2
	Winter	13.5	15	13.7	15.6	15.2	18.3	17.9
	Annual	**21.8**	**23**	**22.1**	**23.8**	**23.6**	**26.6**	**26.1**
Mean. Rain fall (mm)	Spring	187.8	192	168.3	173	150.6	159	127.0
	Summer	130.4	123	146.5	126	151.4	130	156.4
	Autumn	147.2	165	131.3	153	138.7	159	131.6
	Winter	232.5	218	185.3	218	141.9	205	106.1
	Annual	697.8	710	625.4	674	582.7	659	521

Note:
1 degree contours

www.agriculture.vic.gov.au/agriculture/weather-and-climate/climate-analogues

What might Wodonga's climate be like in 2030, 2050 & 2090?



Hmmm…….
So what does this really mean?

…es explore what the
…e like for a given
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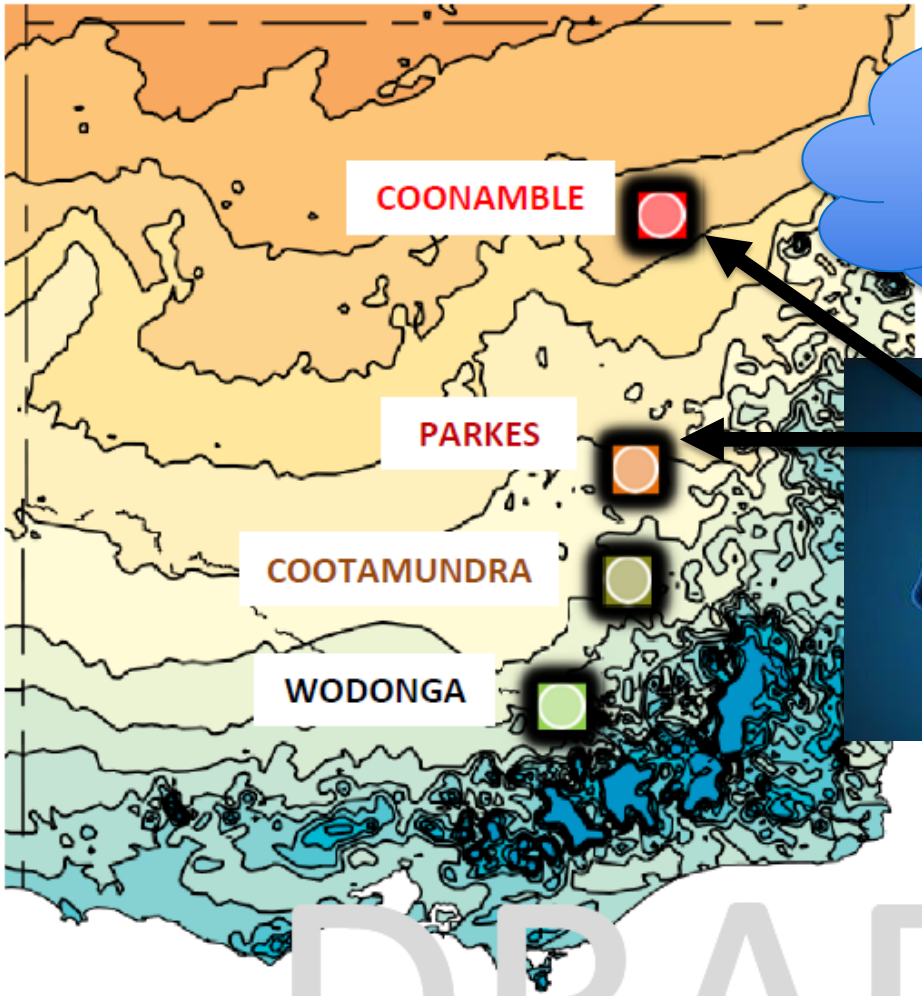

Hang on……
I don't want to be in this situation!!!

…es explore what the …e like for a given …e localities have …he Analogues …SIRO's Climate …. This tool matches …ture climate of a region …the current climate experienced in another region using average annual …infall and average annual maximum …mperature (within set tolerances). They were developed using the …ximum consensus of models (based …CMIP5) for the high greenhouse gas …missions scenario, (RCP 8.5). NOTE: …hese analogues have been further …ned to align with projected seasonal …nges based on Model CESM1-CAM5 …which was selected by John Clarke, CSIRO Climate Science Centre, as the most representative model. This

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www.agriculture.vic.gov.au/agriculture/weather-and-climate/climate-analogues

“Climate is what we expect, Weather is what we’ll get.”

(Andrew Watkins BoM)

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Simulated extreme heat day in 2050's (@high emissions)

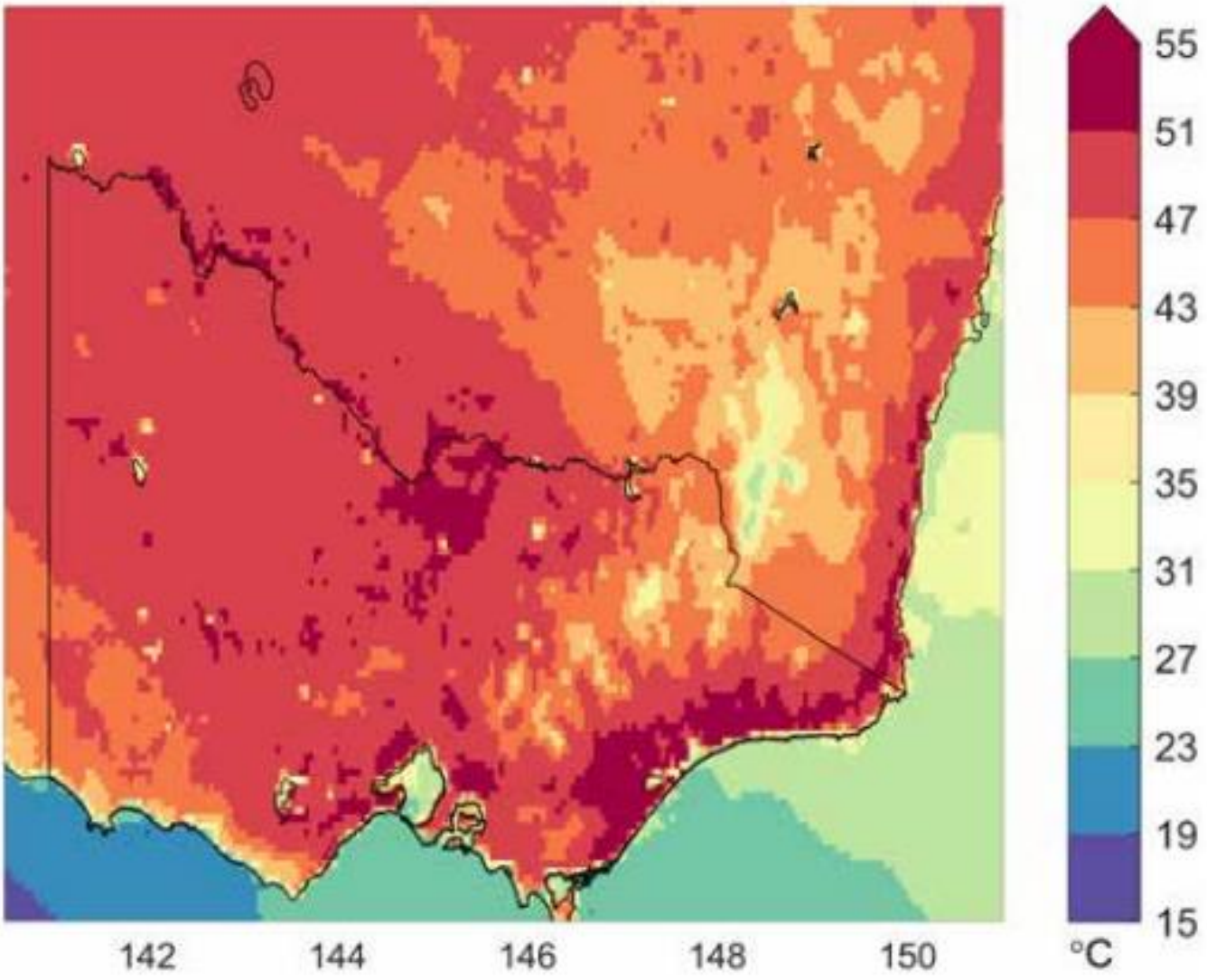


Figure 27. Daily maximum temperature for an example extreme heat day simulated under a very high scenario (RCP8.5, a summer day in the 2050s, HadGEM2-CC model downscaled by CCAM), where Melbourne reaches 50°C, and even higher temperatures inland. There is a warm bias in the simulation associated with the Gippsland region, so the temperature may be artificially elevated near the southeast coast. Note this is not the hottest day in simulations, it is just indicative of a very hot day in the future climate without a historical precedent.

Source: www.climatechange.vic.gov.au/adapting-to-climate-change-impacts/victorian-climate-projections-2019

Some implications……

Fire threat: Corryong water at 'critical level', communications down

Severe heatwave warning for most of Victoria

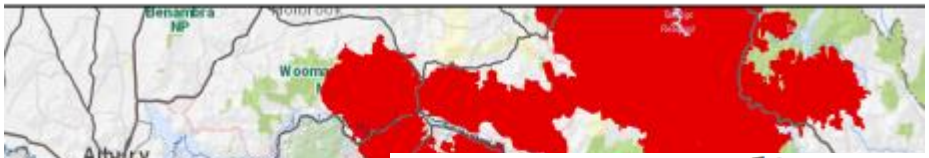
Jonathan Pollock

31 Jan 2020, 8 a.m.

Victoria storms: Euroa, Myrtleford and Wangaratta prepare for major flooding


Rain causes flooding in a burned forest along the Benambra-Corryong Road

Victorian Fires - Fire Extent 2019/2020



Smoke taint ruins vineyard crops

Winemakers and grape growers in bushfire-ravaged regions across south eastern Australia are facing the prospect of smoke taint ruining much of their crop.

Murray-Darling Basin plan will need overhaul in 2026 as droughts increase

News › Victoria

28 people confirmed missing in Vic bushfire crisis, State of Disaster declared

What exactly are we trying to adapt to?

Non-stationary climate

(means it will keep changing)

We will need to keep changing too!

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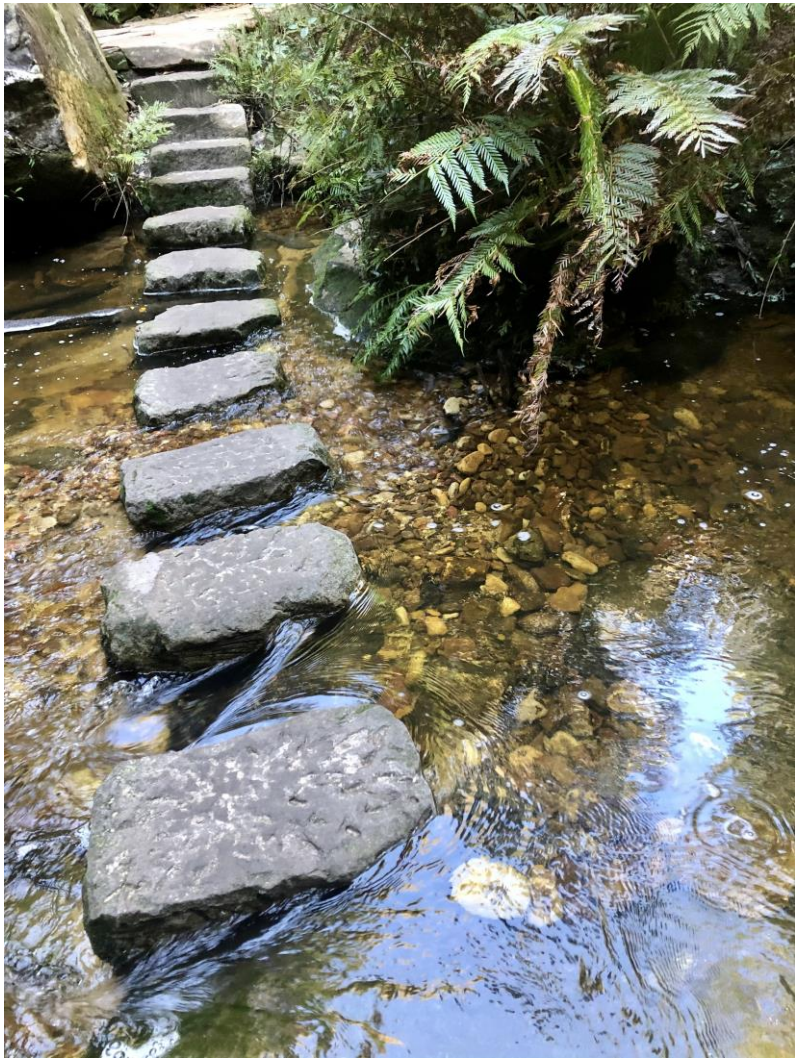
- Learning as we go, especially extremes
- People & our networks
- Passing on our collected knowledge
- Understanding, updating & adapting as we go
- *It's a team sport…*



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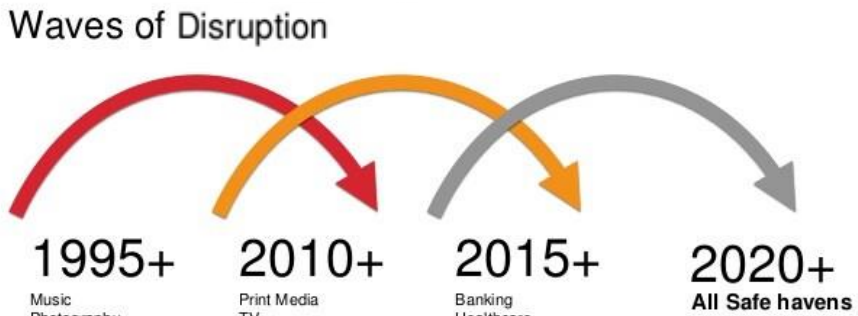
The three "P"'s of climate change <u>impacts</u> (adapting to it <u>and</u> reducing emissions):

- **<u>Physical</u>** – effects of what the climate does (heat waves, droughts, floods, wild weather etc)
- **<u>Policy</u>** – the impacts of changes to policy (reform around issues such as water, carbon trading, energy-renewables, bushfires, planning, drought, transport, coastal etc)
- **<u>People</u>** – how others respond (banks, insurance, consumers, trade-markets & supply chains, investors & shareholders etc)



Various levels or

“LENS” for adaptation & change?

- **Individual/farm/business**
- **Local community, regional**
- **Industry-supply chain or national**

Conflicting aims can occur……

(eg fair & equitable water sharing, fire risk and vegetation etc)

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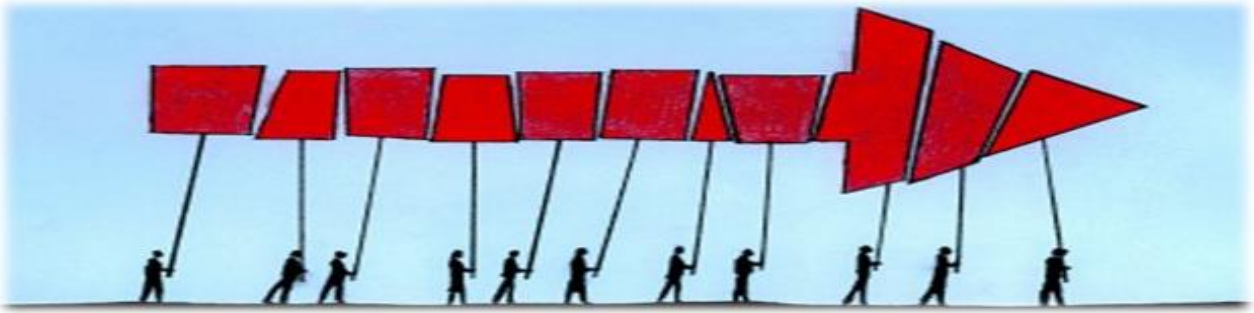
- **Successful agriculture & communities occur across many climate zones**
- **But each has systems in place that make it work (soils, infrastructure, services, farming system etc)**
- **Shifts will require active learning, response & development networks**
- **Rates of adoption, windows for change may open up more often?**



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A functioning and connected Landscape, with refugia known and protected as best we can…..

Changing fire regimes….

Shifting species ranges….

Hotter droughts……

Flash flooding….

Expanded range of pest species….

Occasional water scarcity….

Prepared communities….

Vegetation, waterways, wetlands and corridors rejuvenated & protected

Knowledge and action networks

Water & catchment planning, sharing & action…

Great places to live and work….

Productive, sustainable agriculture and food production & supply chains….

refugium

[rəˈfyo͞ojēəm]

NOUN

refugia *(plural noun)*

an area in which a population of organisms can survive through a period of unfavorable conditions,

Implications for how your community responds?:

- Water resources
- Energy transformation
- Community/health
- Natural Assets, Biodiversity/Conservation
- Industry and adjustment
- Planning/built infrastructure urban/coast/rural)
- Primary Industries (agriculture, fishing, mining)
- Transport
- Emergency management
- Economic development/jobs/livelihoods

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Climate Change & Taking Care ….

(The planet will be fine, but what about us and the things we care for?)

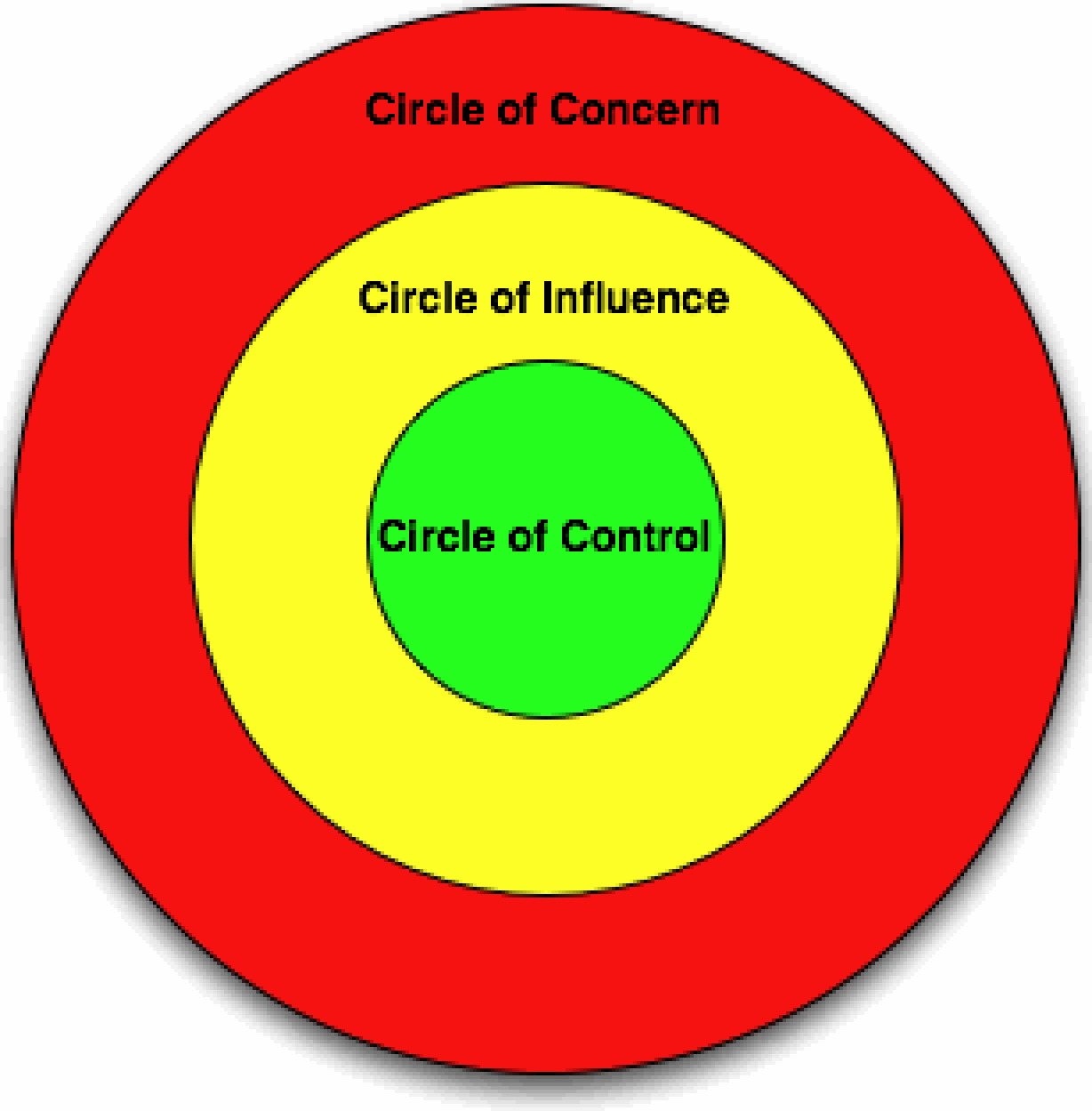
Thinking about our personal journeys…..

www.motherjones.com/environment/2019/07/weight-of-the-world-climate-change-scientist-grief/

"Scientists are talking about an
intense mix of emotions right now.
There's deep grief and anxiety
for what's being lost,
followed by rage at continued political inaction,
and finally hope that we
can indeed solve this challenge."

"I've trained my brain to not torture myself about things that are outside my control."

"My involvement in the public discourse is empowering."



Circles of concern, influence, and control.

Steps to taking your own actions….

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A powerful role for leadership and teamwork….

“Building communities that we want to live and work in”

“Making decisions today that leave us better off in future”

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Practice change - rule of thumb!
We all change practice/behaviour when :

1. **IT WORKS!** (Proven Technology or Practice) The technology/practice is known & proven to work, not a risky experiment *(Evidence base- science, research, tech & innovations)*

2. **I WANT TO!** (Attitude) It makes sense to change for some benefit I value *(Much better than current state)*

3. **I CAN!** (Capacity) I have capacity to do it - eg time, labour, finances, skills, service providers to make it happen & maintain it *(There's nothing holding me back)*

"Getting 2 out of 3 of these isn't enough!"

https://youtu.be/PXk4QHwXtGU

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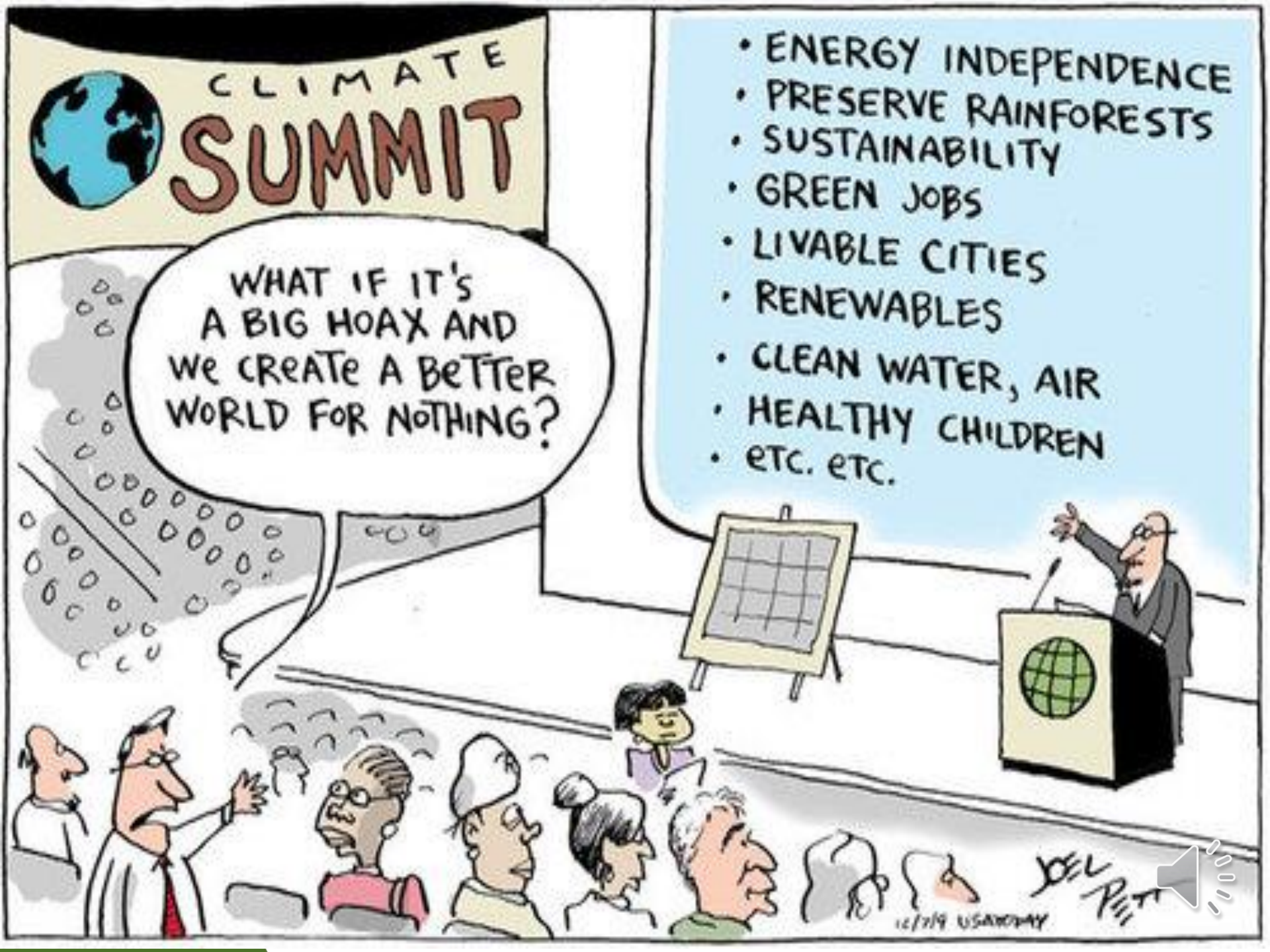
CLIMATE
SUMMIT
WHAT IF IT'S A BIG HOAX AND WE CREATE A BETTER WORLD FOR NOTHING?
• ENERGY INDEPENDENCE
• PRESERVE RAINFORESTS
• SUSTAINABILITY
• GREEN JOBS
• LIVABLE CITIES
• RENEWABLES
• CLEAN WATER, AIR
• HEALTHY CHILDREN
• ETC. ETC.
JOEL PETT

Thank You

www.agriculture.vic.gov.au/agriculture/weather-and-climate

graeme.anderson@agriculture.vic.gov.au
Tweets @climatedogs

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