Setting the climate context for farming systems change

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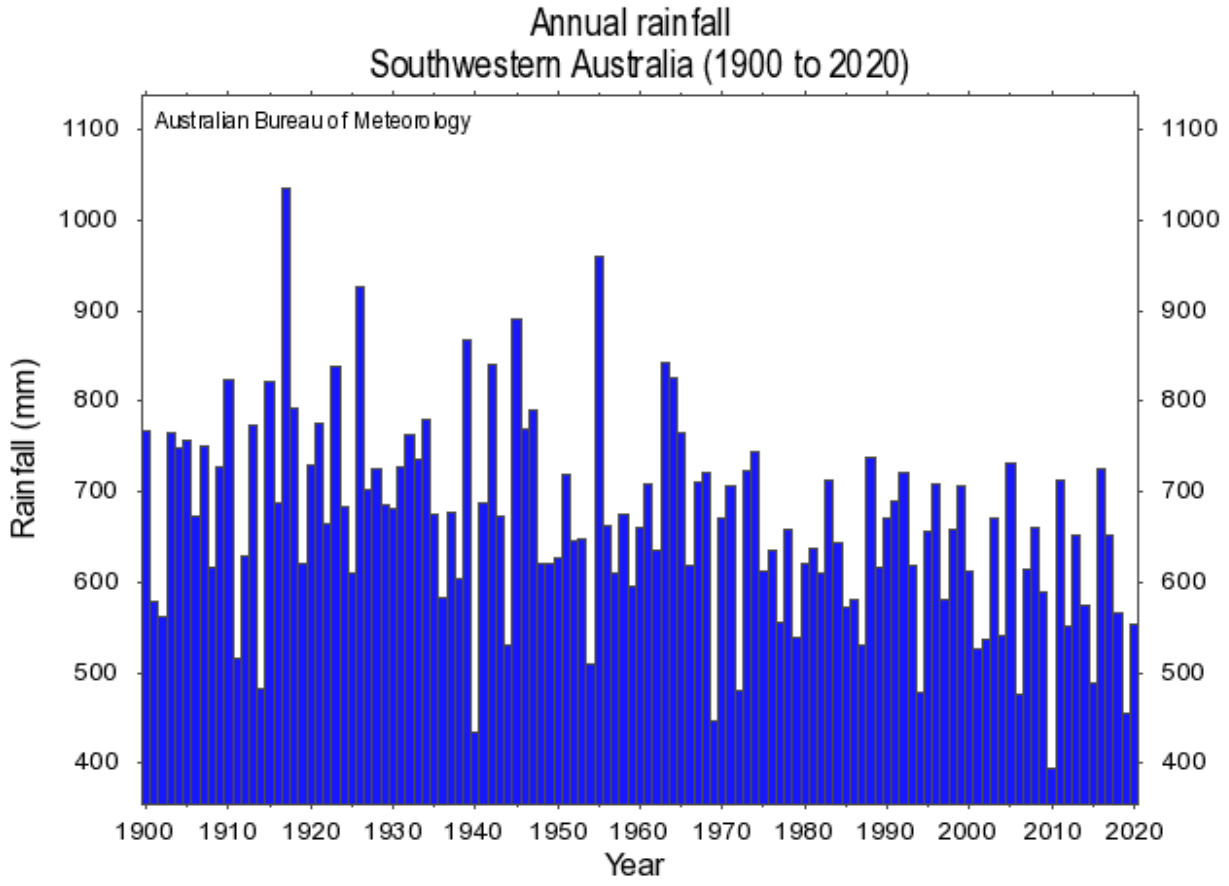
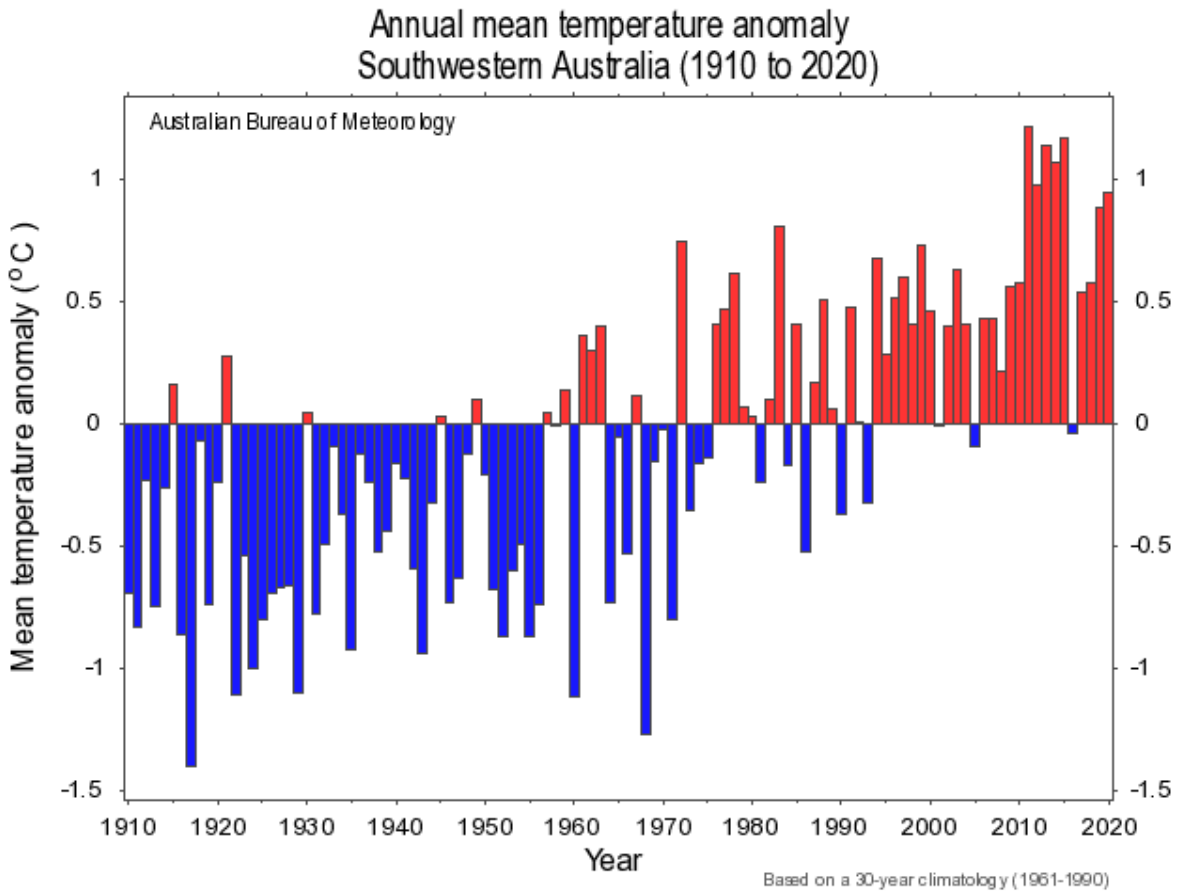
My messages

1. Climate change is here and future changes are locked in
2. Climate change raises the stakes to manage climate variability
3. Familiar patterns of climate are breaking down
4. Farmers have adapted but there will be limits to effectiveness
5. The challenge will be increasing drought & extreme temperatures
6. We can imagine how agriculture might look under climate change
7. However, how we transition to the new future is the key challenge

Climate change has been happening since the mid 1970's





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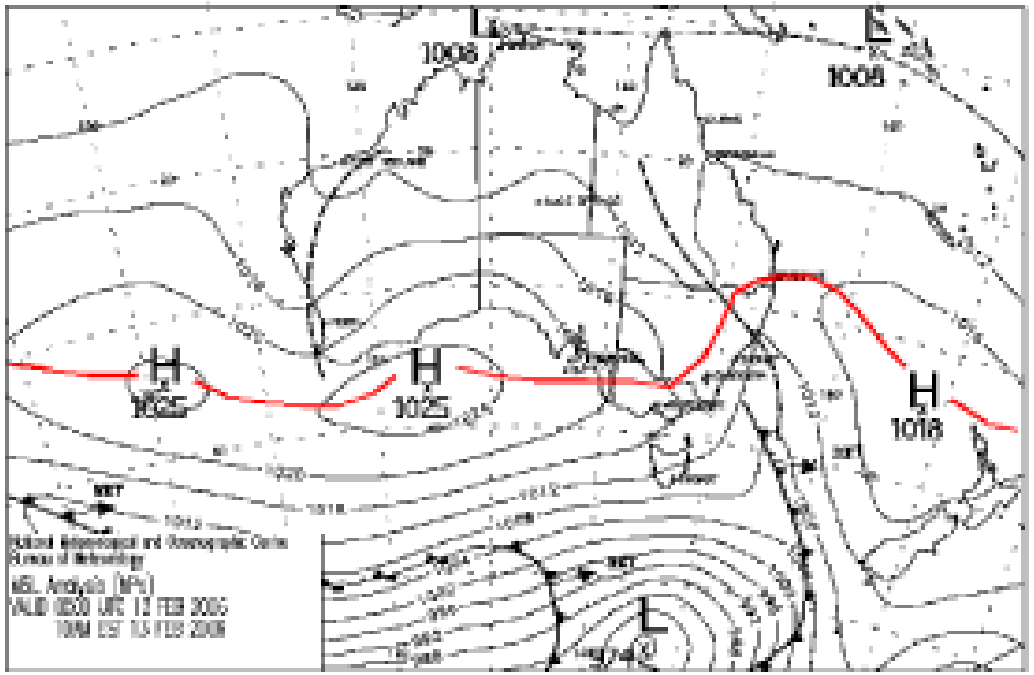
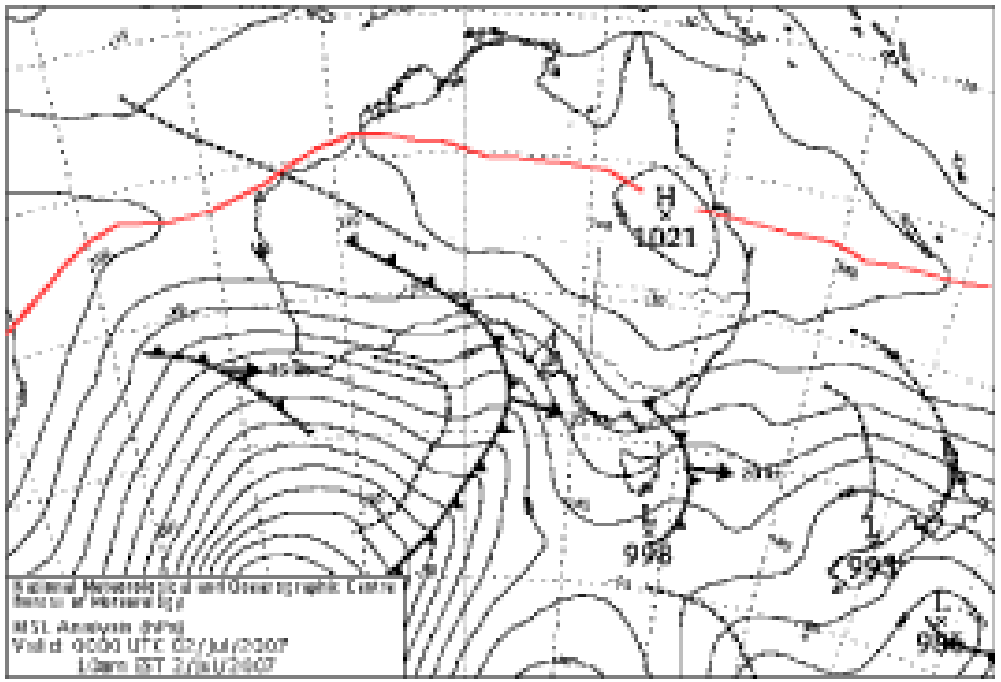
Climate change interferes with the position of the sub-tropical ridge in the winter

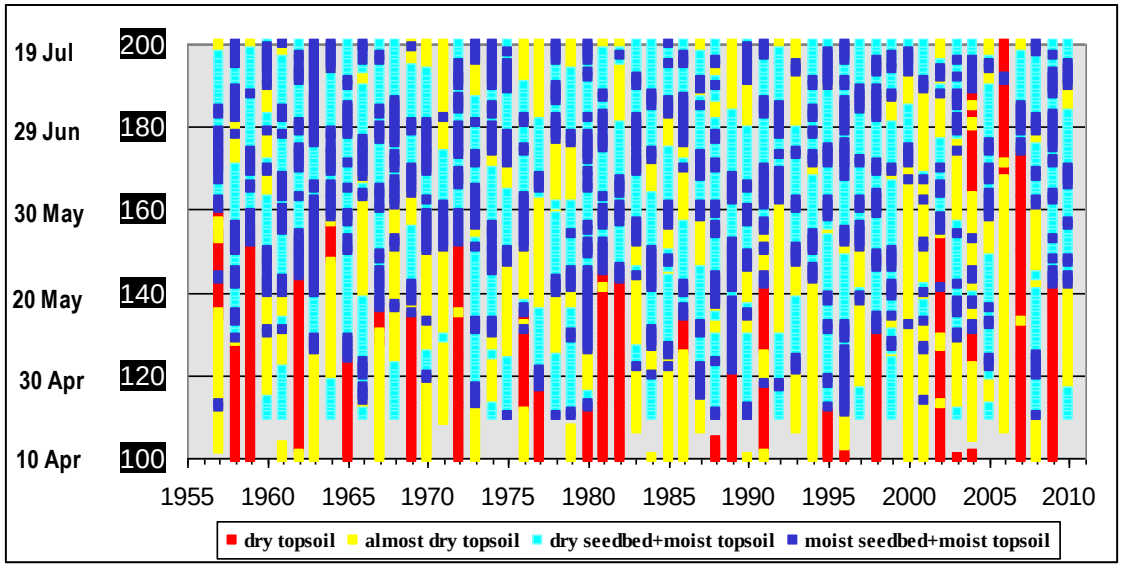
Summer



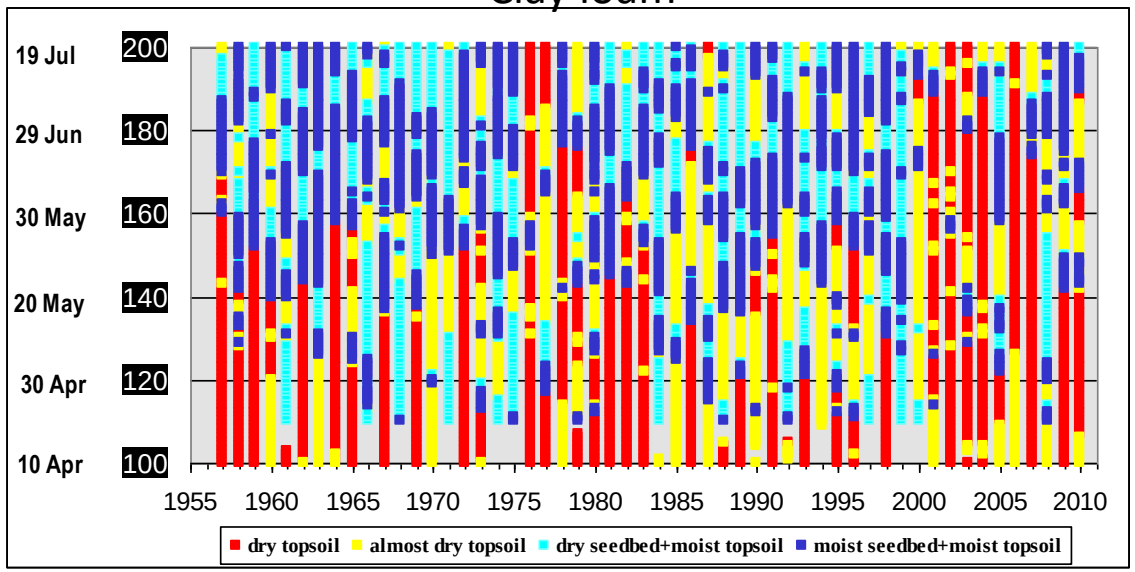
Winter



Sand



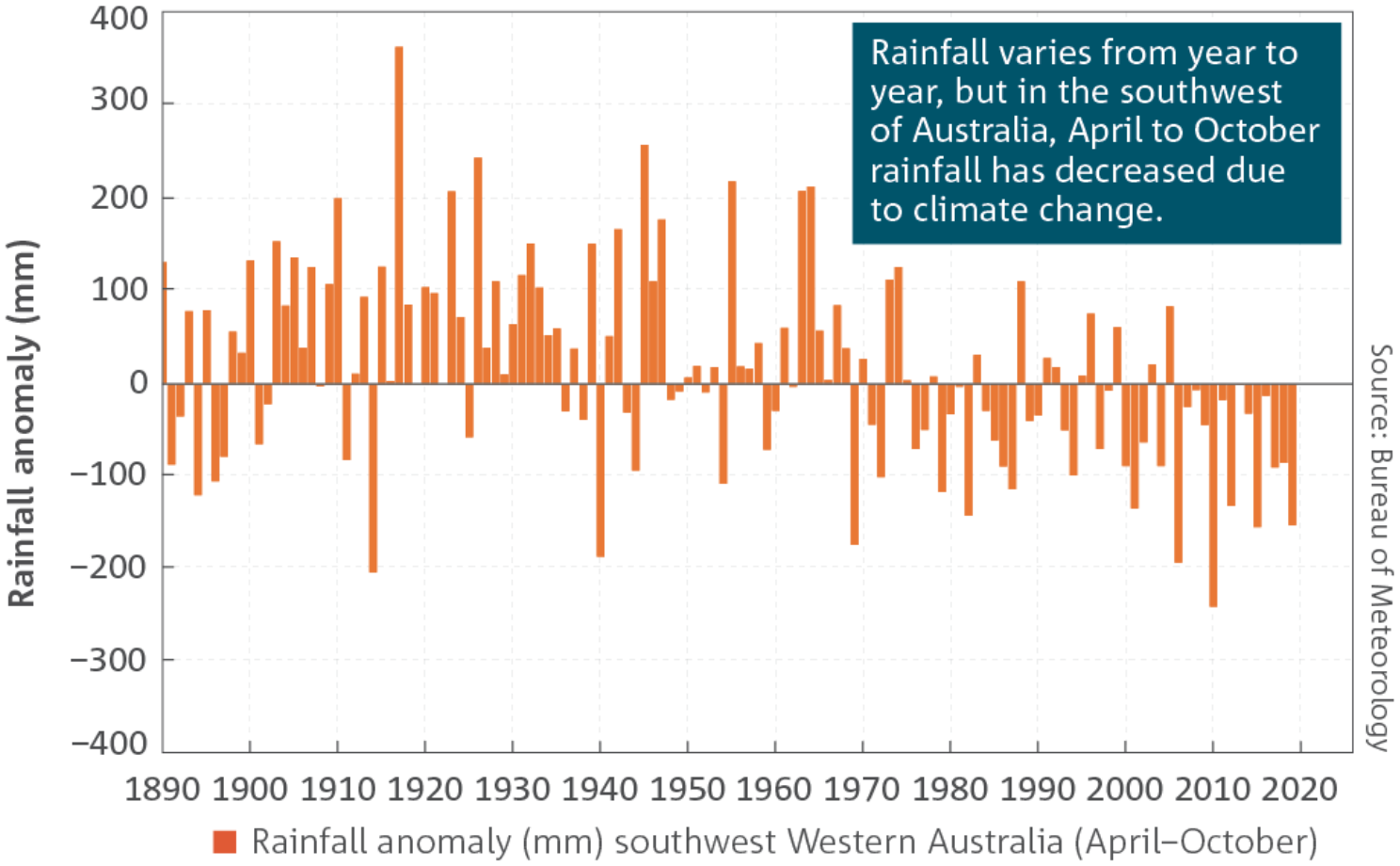
Clay loam



Historical sowing opportunities at Mullewa

We are seeing changes in rainfall patterns at critical times of the season

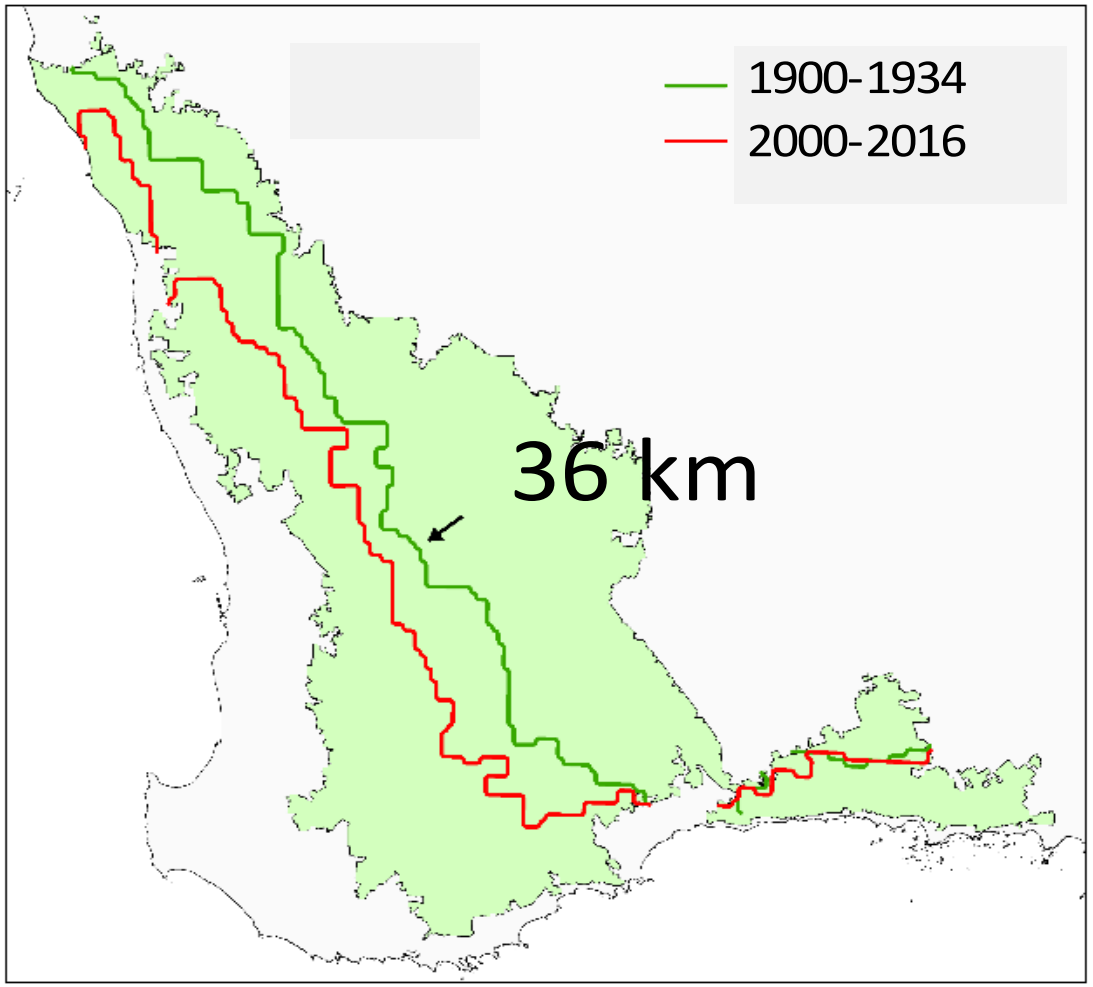
Robertson & Abrecht (unpub.)



Decline in winter rainfall has not impacted production until recently

- www.bom.gov.au

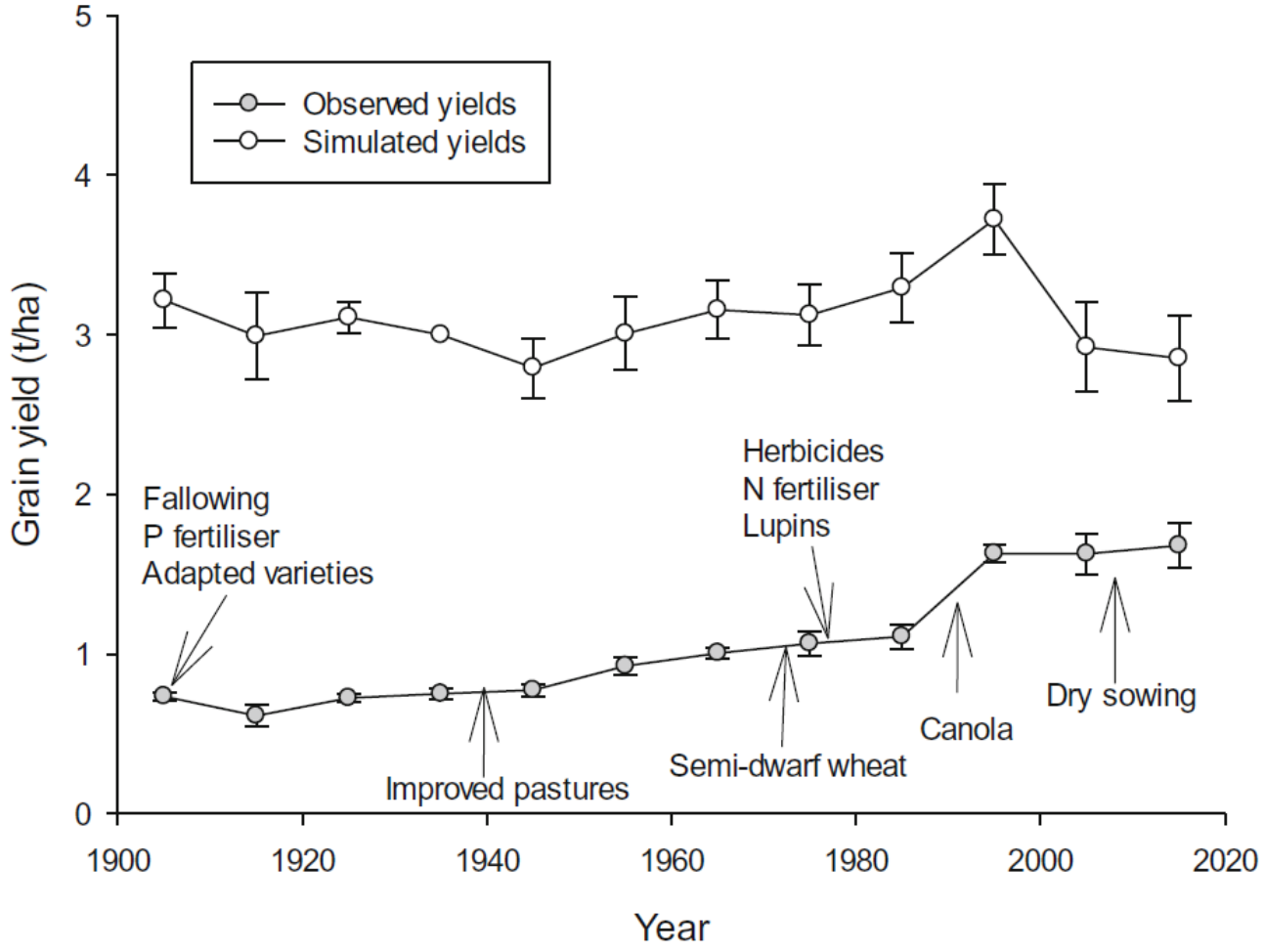
The 3t/ha water-limited potential wheat yield "isoline" has moved 36 km west between 1900 and 2016



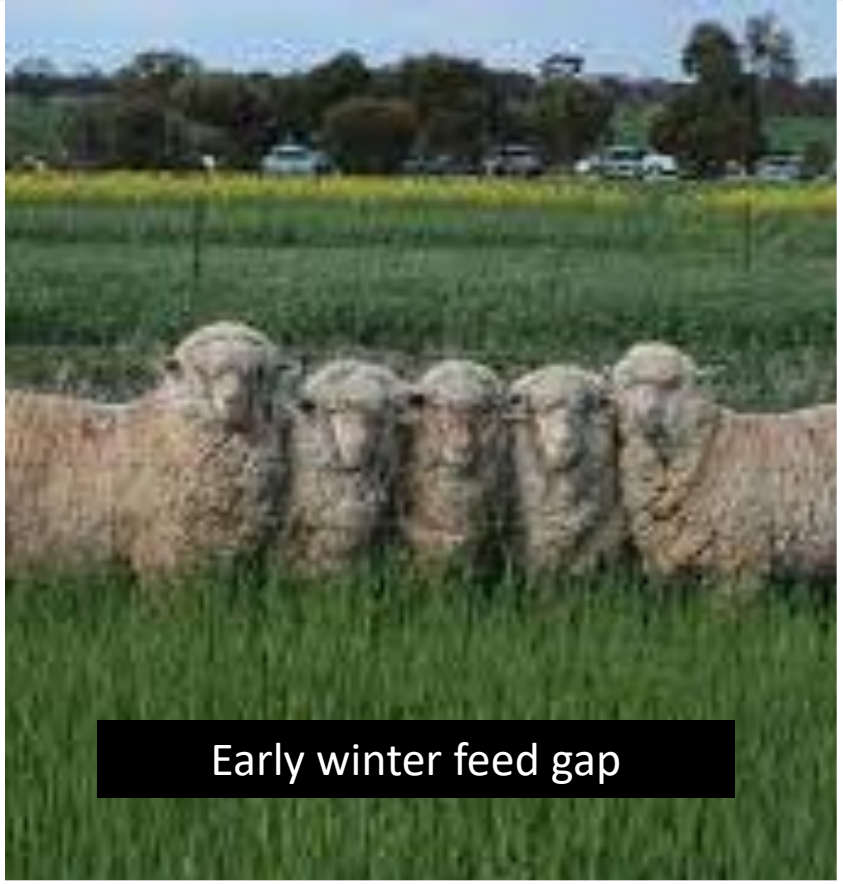
Chen et al (2020)

Most of the change has occurred since 2000

Use of technology is slowing closing the yield gap

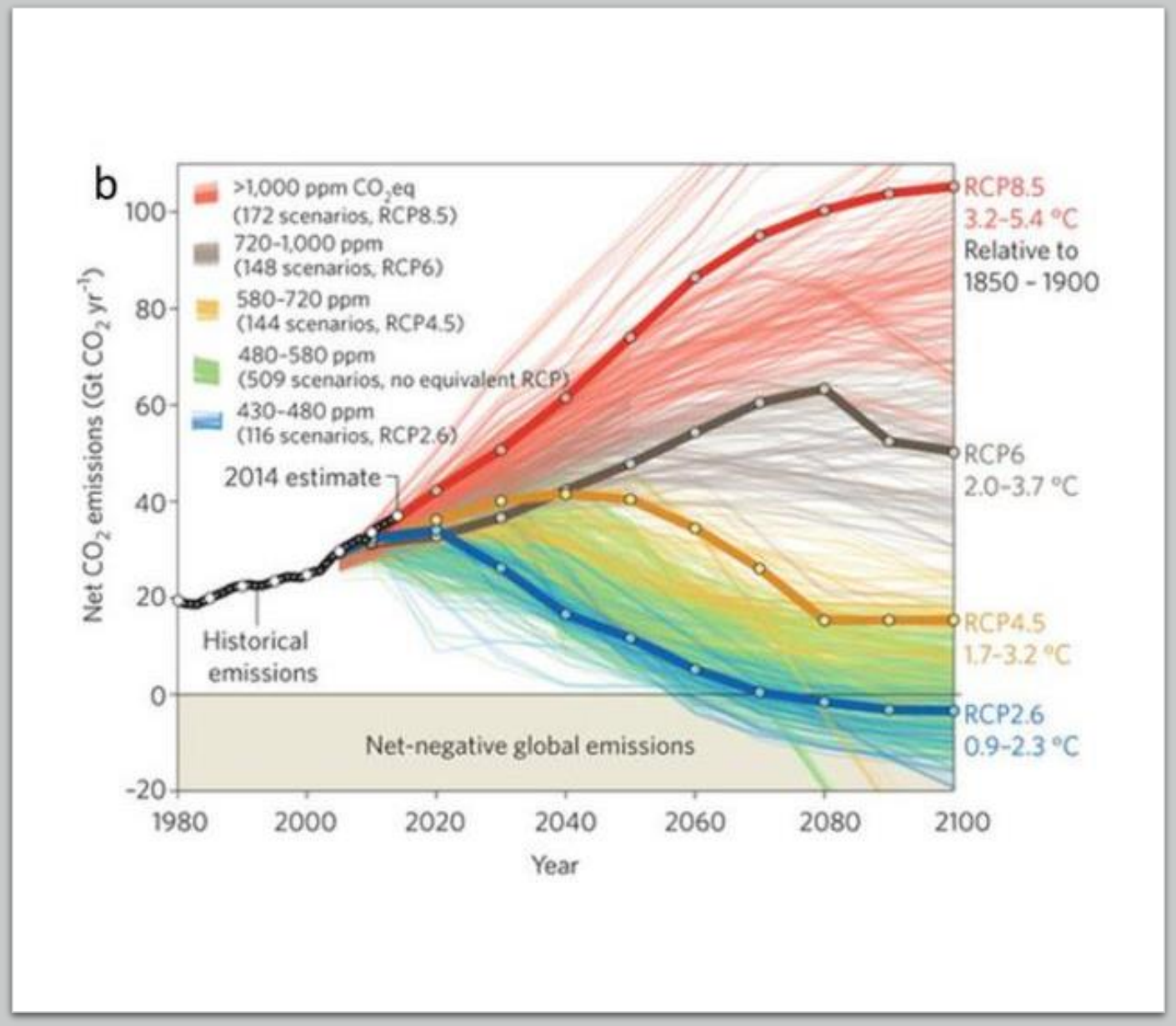


Chen et al (2020)



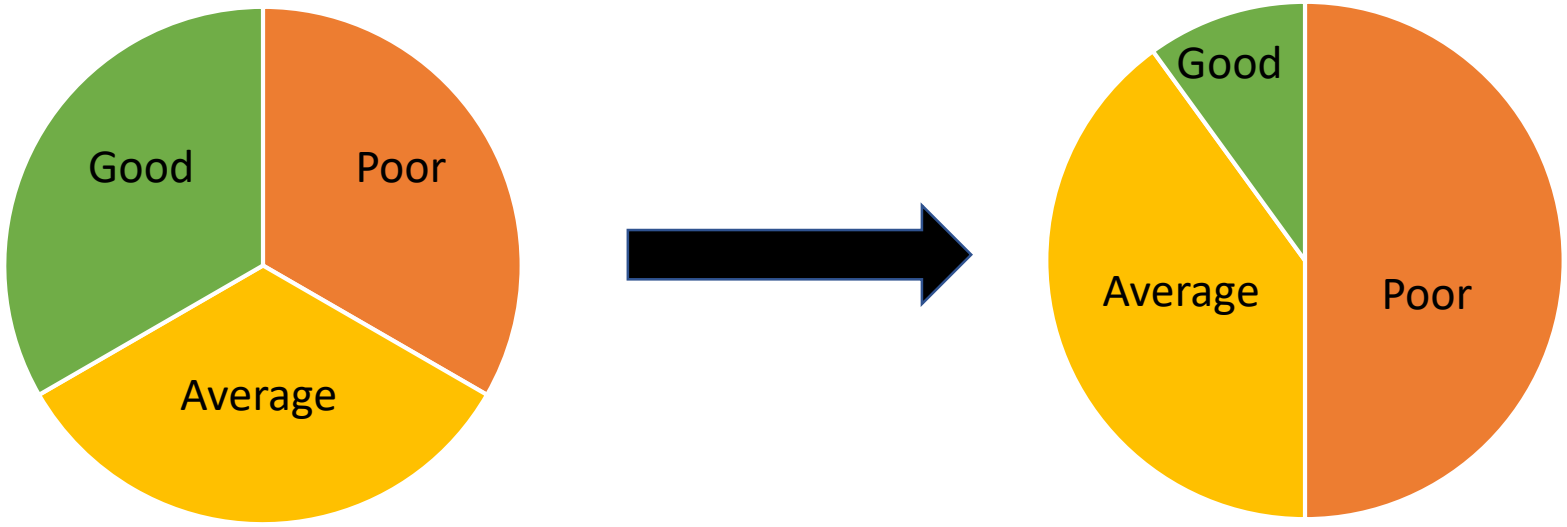
WA farmers have shown they can adapt - business drivers are often the main reason

Climate change is here and future changes are locked in



From: IPCC Scenarios 1992 (IS92), *Special report on emissions scenarios* (SRES) and representative concentration pathways (RCPs)

Our familiar pattern of climate in the SW will begin to break down



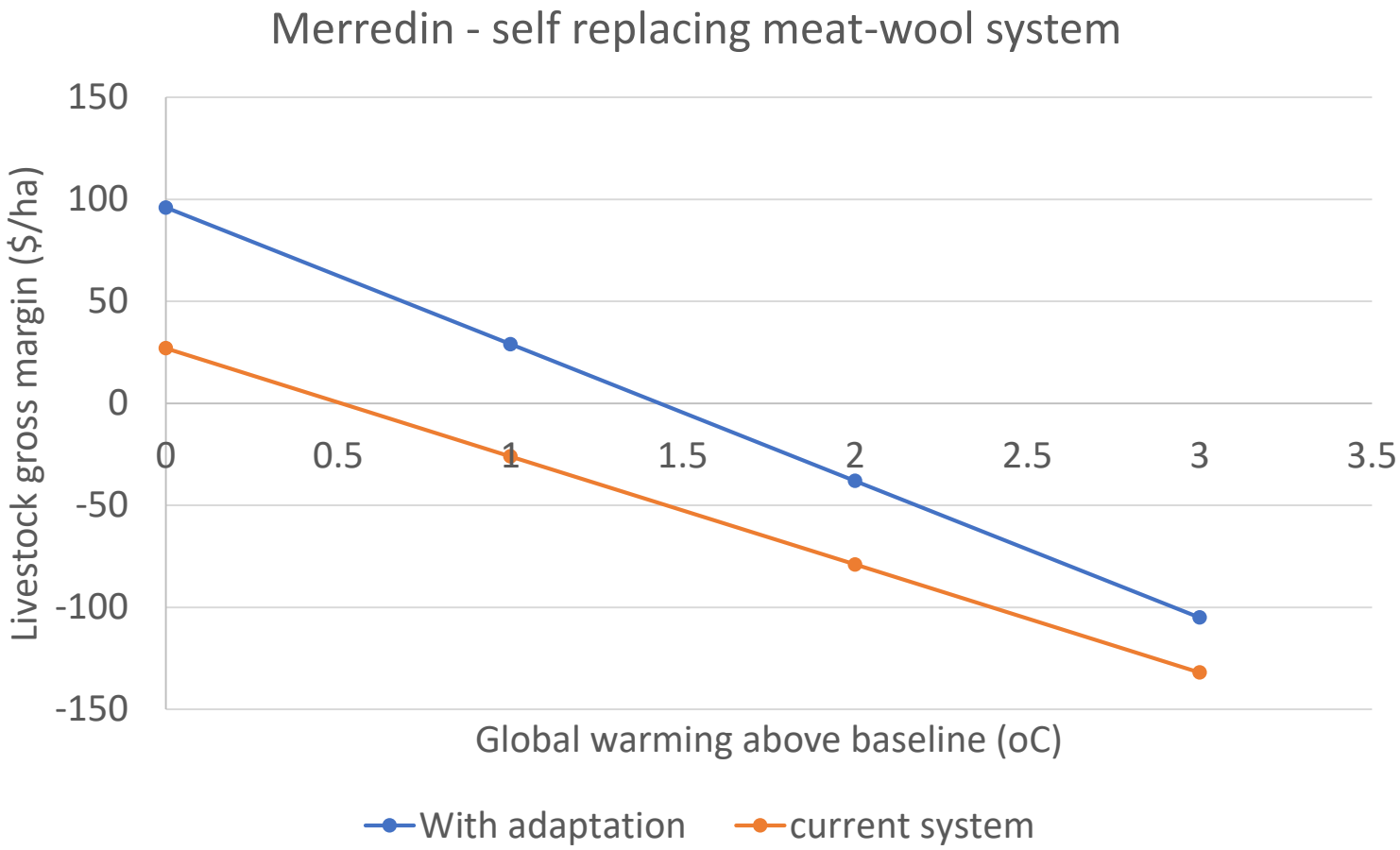
Historical distribution of good, average and poor seasons

Future distribution of good, average and poor seasons

Climate change raises the stakes to manage climate variability

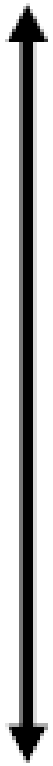
https://www.pinterest.com.au/pin/4714774584714826/

There will be limits to how much adaptation can offset the effects of climate change



Dean Thomas et al.

The challenge – farming under increasingly long and frequent cycles of drought



Geographical diversification

Abandon enterprises (e.g. 100% crop)

Change enterprises (e.g. wool vs. meat)

Change business overheads (e.g. leasing)

Buy more land

Change rotations (e.g. fallow)

Change crop species

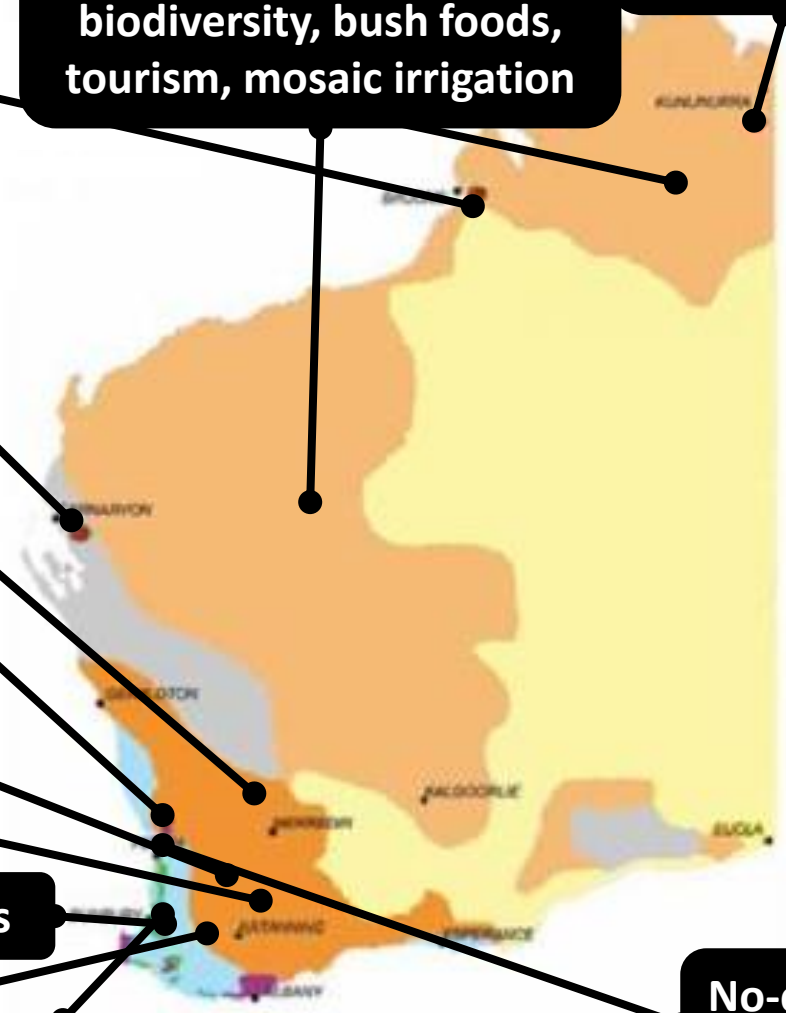
Change use of inputs

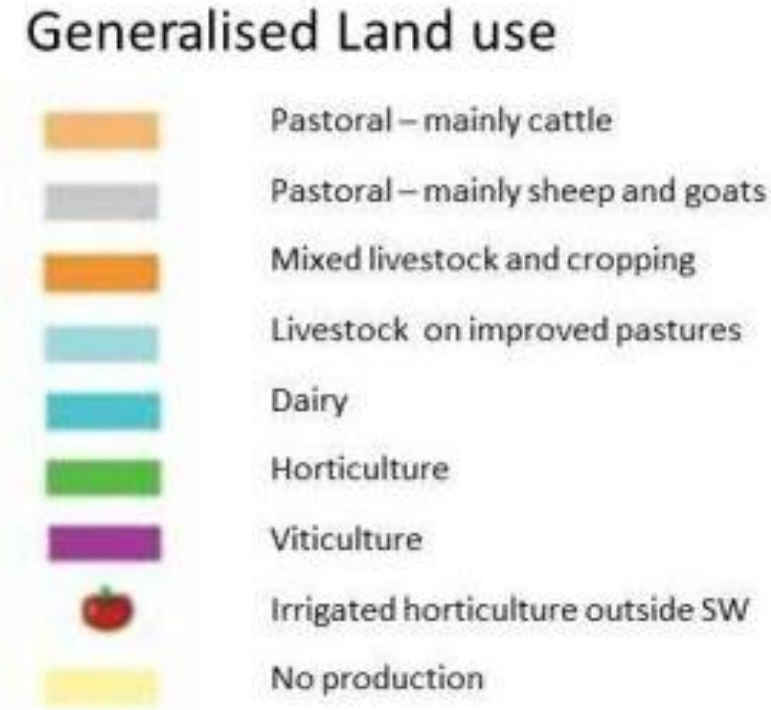
Change varieties

Adopt water-use efficient practices

WA Agriculture in 2050?

Summarised from Sudmeyer et al. 2016 Climate change: impacts and adaptation for agriculture in Western Australia





Dry season heat tolerant crops

Extensive grazing, biodiversity, bush foods, tourism, mosaic irrigation

Bananas and tropical fruits

Less (opportunistic) grains, new livestock systems

Protected vege & fruit cropping

More grains, new mixed farming systems

More lot-fed livestock

Warm zone grapes

New vege species and varieties

Indoor dairy

No-chill & heat tolerant fruit

Transitioning to new systems will need new……

- Business models
- Enterprises for multiple benefits
- Flexible and responsive management options
- Digital technology
- Plants, animals, water options, soil management

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