UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

Centre for Water Resources Research

Research Selections

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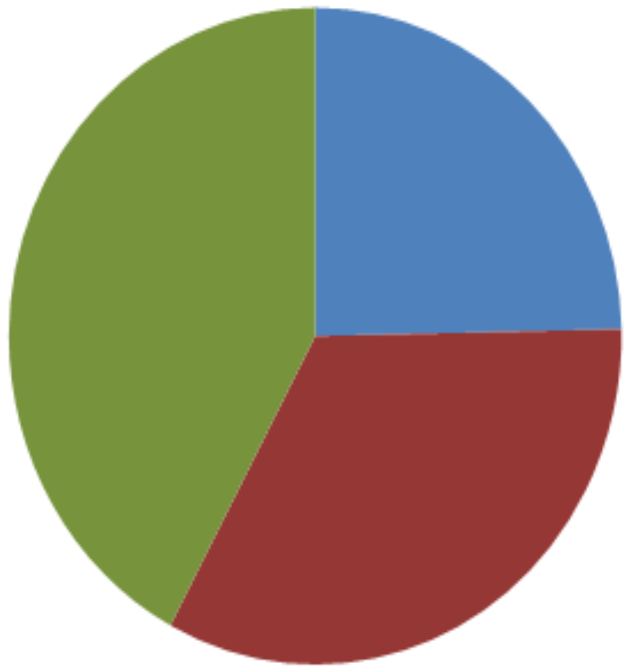
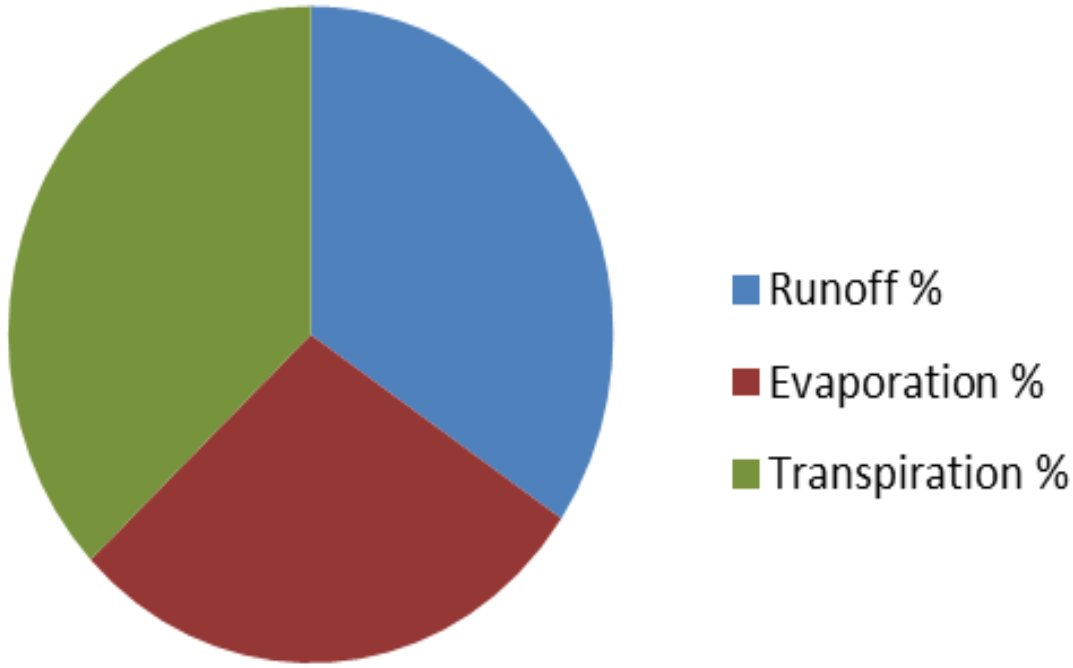
Working mainly on projects for Prof RE Schulze

Linkages between selected Hydrological Ecosystem Services and Land Use Changes, as Indicated by Hydrological Responses

Modelling impacts of increased impervious urban areas on rainfall conversion to annual runoff, transpiration and evaporation



Low urbanisation, few impervious areas



Proposed high urbanisation, many impervious areas

=> Shift from evapotranspiration towards runoff (stormflows + baseflows) because of impervious areas in this semi-humid area

Linking Land Use Change to Changes in Ecosystem Services based on Hydrological Flow Responses

Key results for proposed large scale urbanisation

* Reduced high flow regulation, increased low flow regulation
* Potentially increased downstream water provisioning during dry times, but the water is likely to be of reduced quality
* The marked flow alterations in the relative dry study area is likely to reduce bio- and genetic diversity related to fresh water stream habitat significantly

Key Recommendations to Reduce Impacts from Urban Areas on Hydrological Ecosystem Services

* Impervious areas should be kept to a minimum
* The water from rainfall and increased runoff should be harvested at source or directed onto pervious areas
* The harvested water from urban areas should supply part of the demand
* The potable water demand (especially if sourced outside the catchment) should be reduced as much as possible

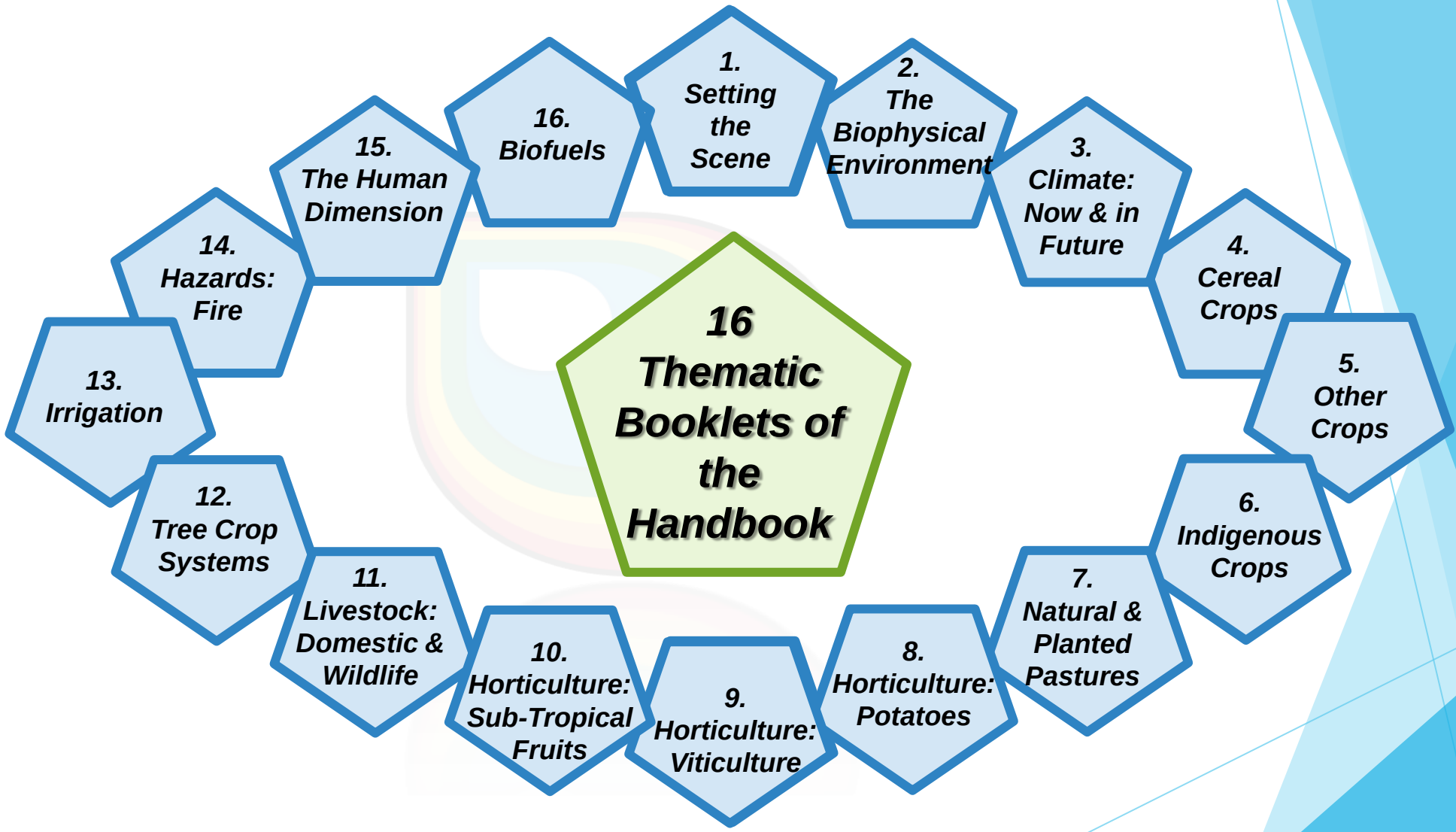
Key Recommendations: Urbanisation (continued)

- Mitigating measures are needed to ensure that post-development stormflows remain similar to pre-development stormflows
- Artificial (focussed) groundwater recharge from urban areas to increase downstream baseflows could be considered, as long as the water quality is good
- Green urban areas, including planted roofs, indigenous gardens, urban food gardens and green corridors should be promoted to support ecosystem services

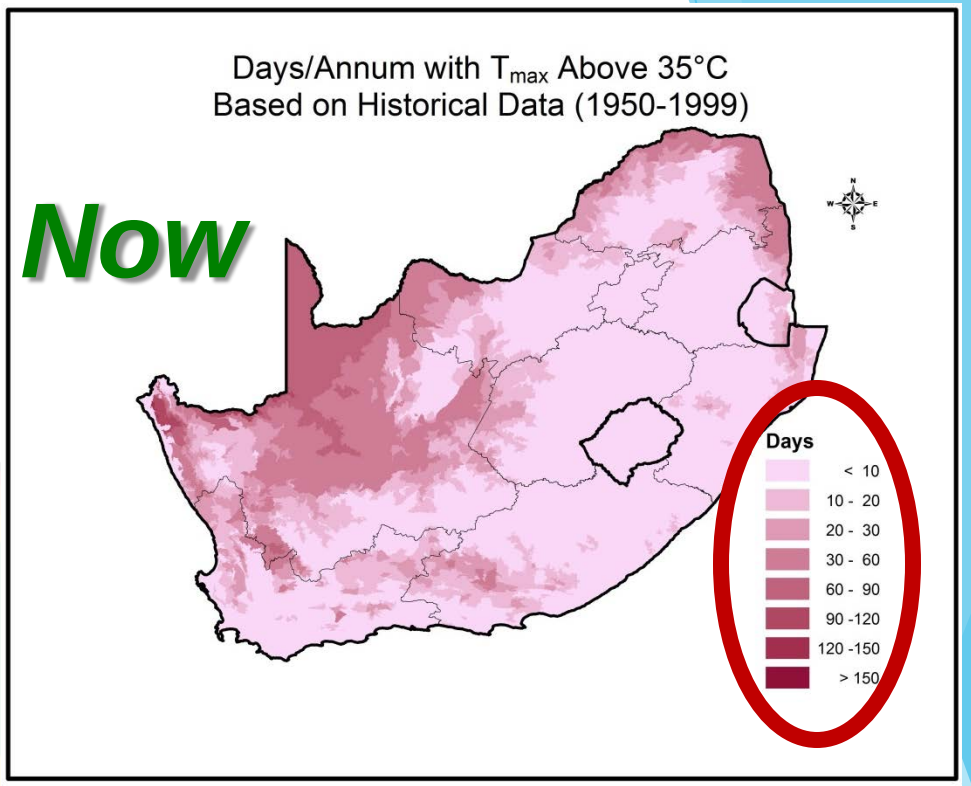
Handbook on Adaptation to Climate Change for Farmers, Officials & Others in the Agriculture Sector within South Africa (Schulze (ed.) pp 672; 46 Chapters)

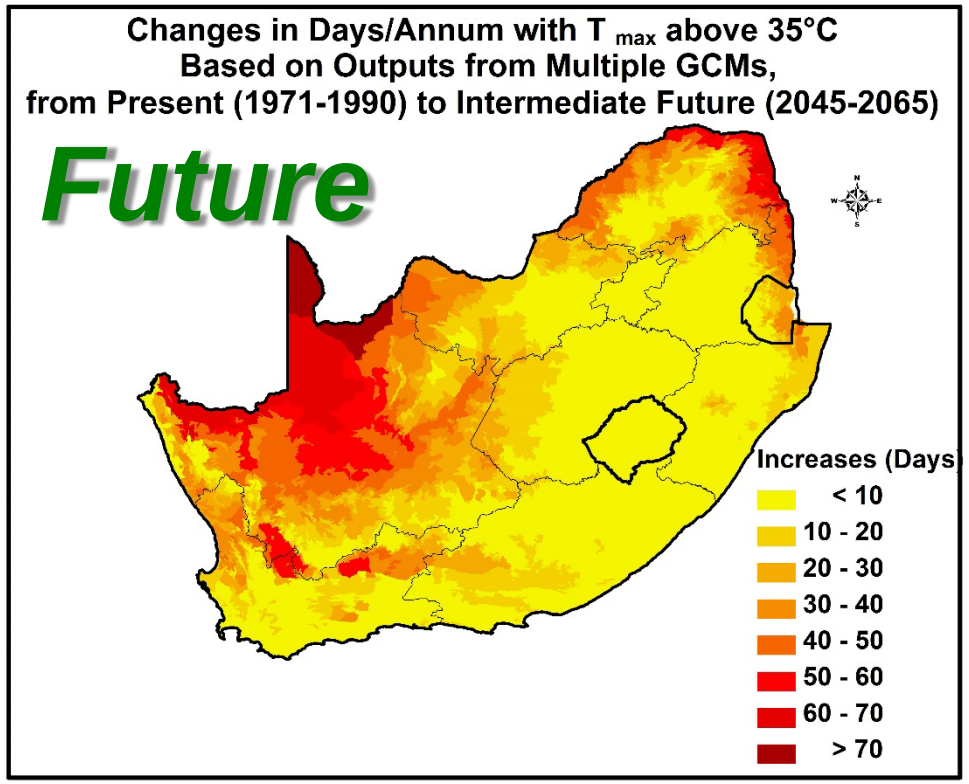
For the Department of Agriculture, Forestry and Fisheries (DAFF)

Handbook on Adaptation to Climate Change for Farmers, Officials & Others in the Agriculture Sector within SA



Critical Daily Maximum Temperatures (> 35 °C)

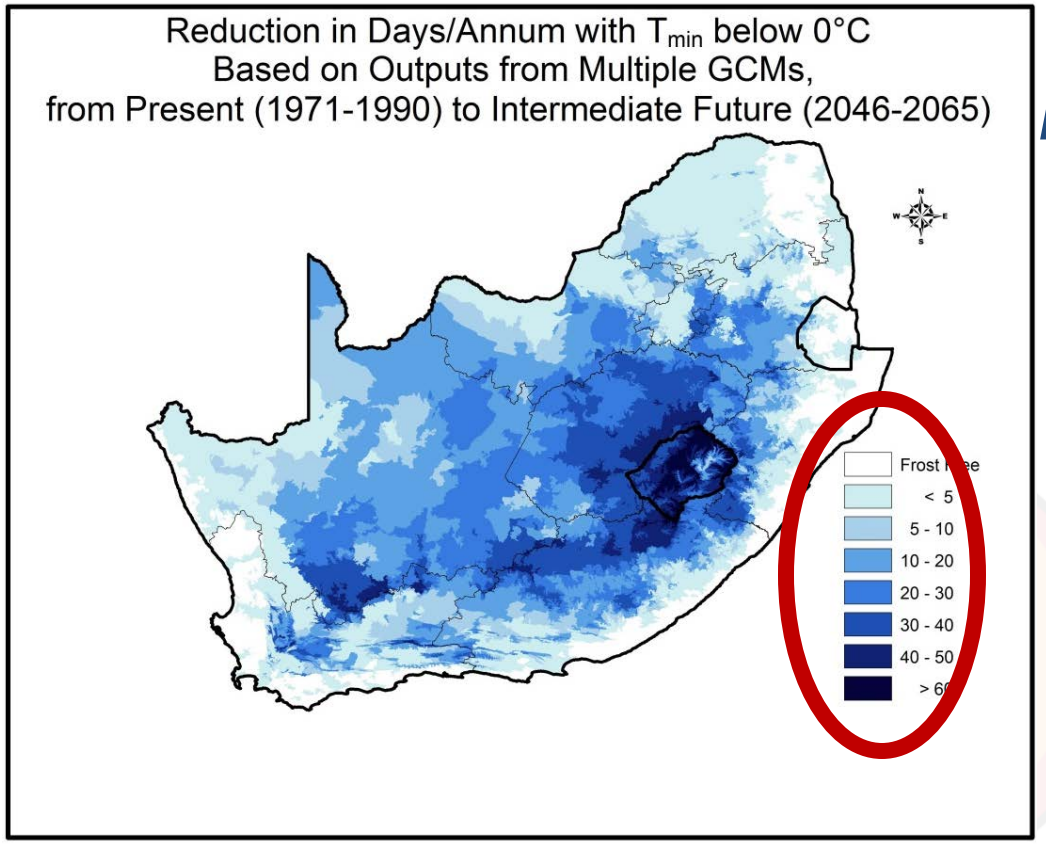




Additional Hot Days 40 Years from Now

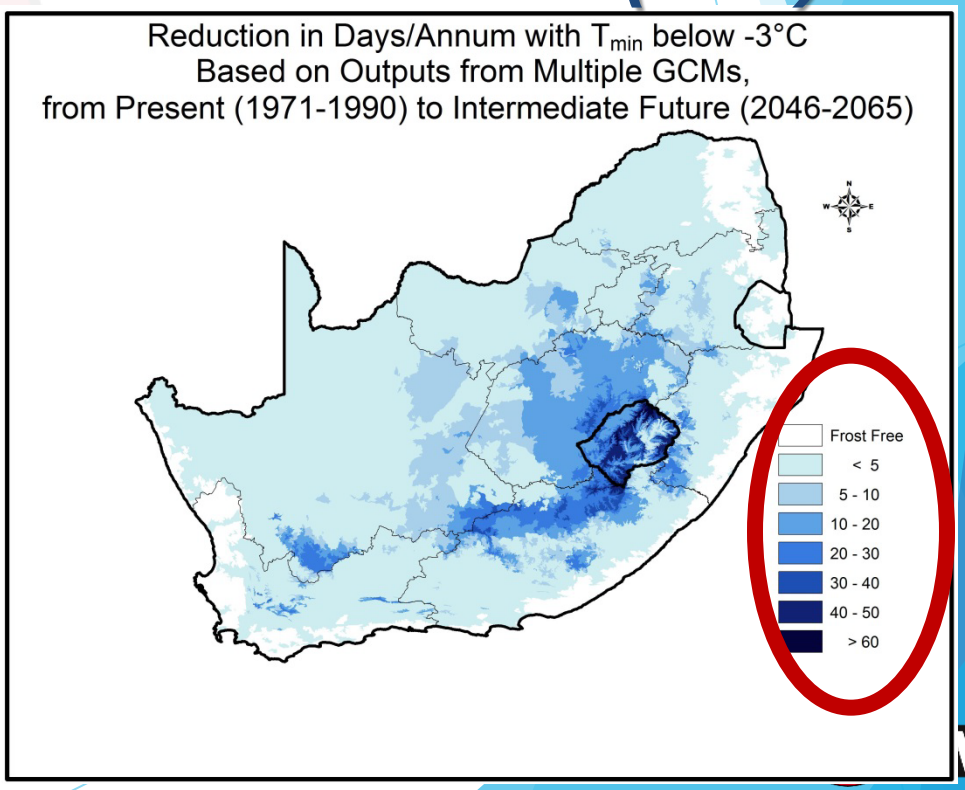
Implications:

Heat Stress for humans, animals and plants, electricity use



Reductions in Days with Frost (0°C)

Reductions in Days with Severe Frost (-3°C)

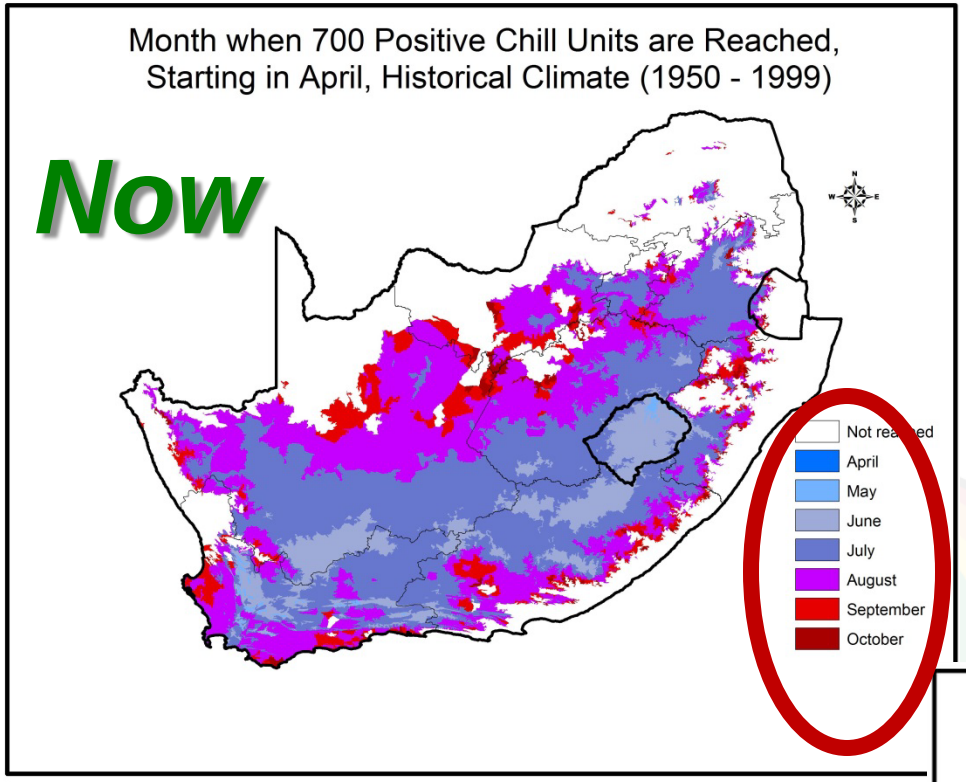


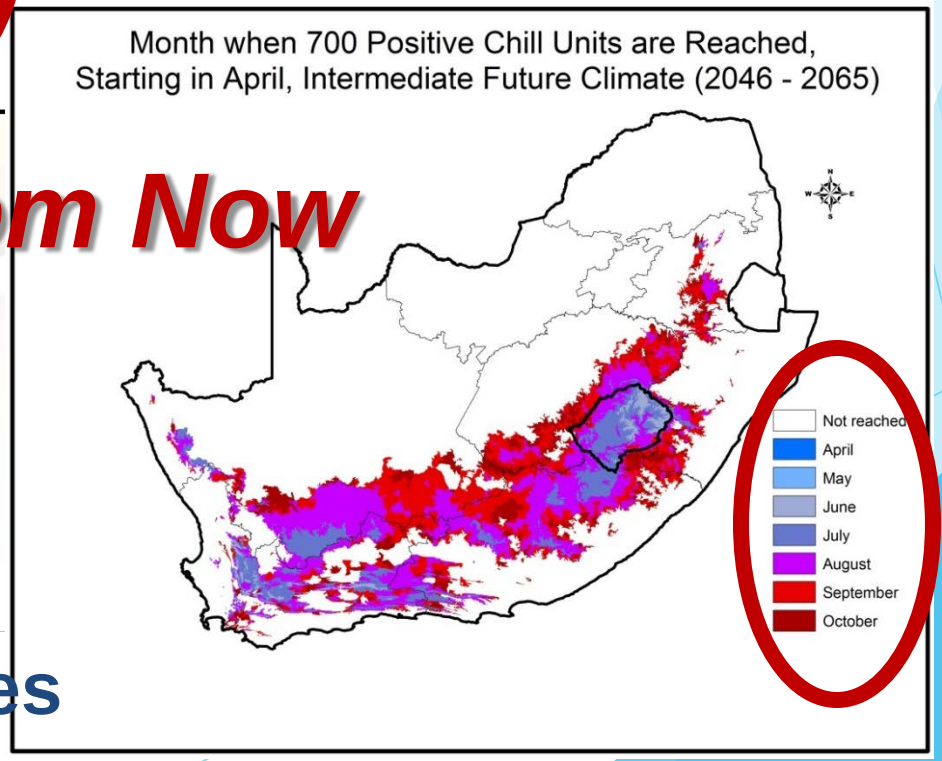
Implications

- Pest & Diseases
- Planting Dates
- Crop Damage
- Shifts in Growing Areas
- Changes in Crops

WRR

Chill Units: Target Date when a Critical Number of Chill Units (700) is Reached





40 Years from Now

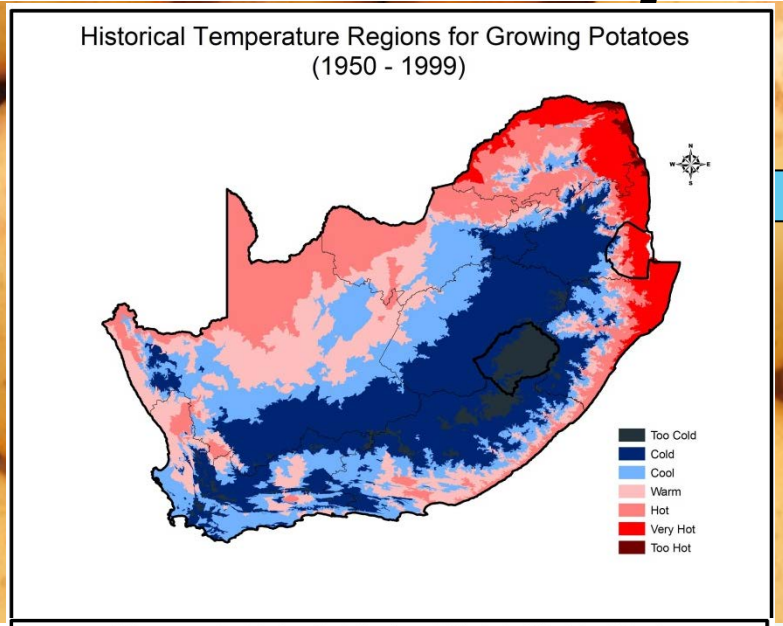
Implications especially for Deciduous Fruit Industry

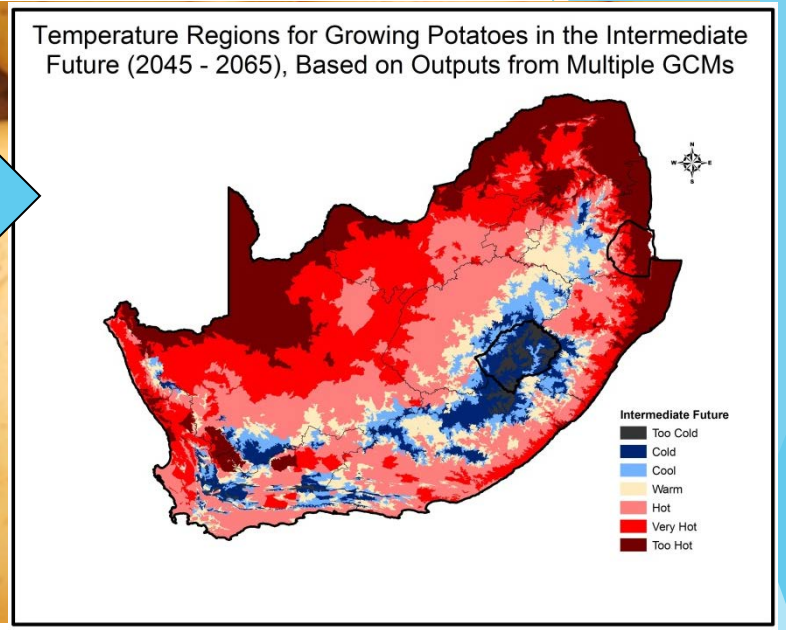
Areas out of Production

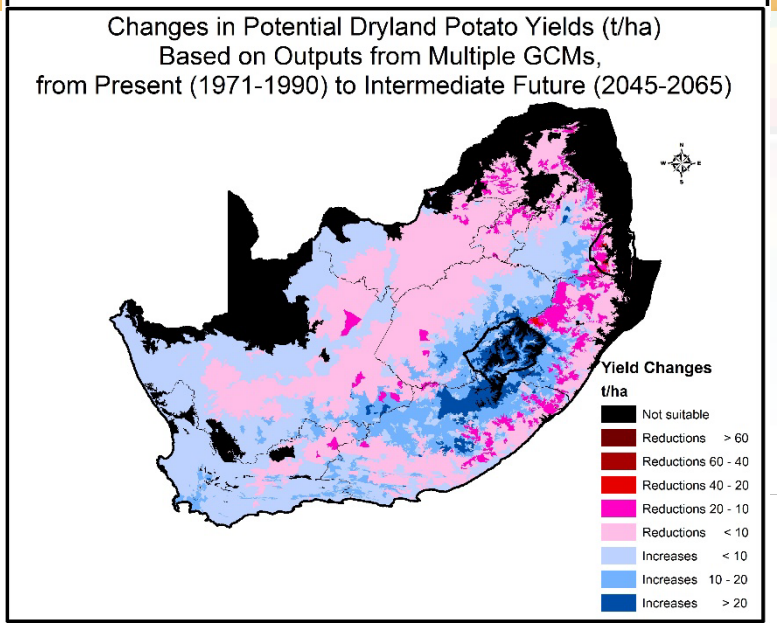
New Varieties

Change in Deciduous Fruit Species

Example: POTATOES







Projected % Change Dryland Yield

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Thank you for listening

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