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

=> Shift from evapotranspiration towards runoff (stormflows + baseflows) because of impervious areas in this semi-humid area
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)
Critical Daily Maximum Temperatures (> 35 °C)

Implications:
- Heat Stress for humans, animals, and plants,
- Electricity use

Future

Additional Hot Days 40 Years from Now

Days/Annum with $T_{\text{max}}$ Above 35°C
Based on Historical Data (1950-1999)

Changes in Days/Annum with $T_{\text{max}}$ above 35°C
Based on Outputs from Multiple GCMs, from Present (1971-1990) to Intermediate Future (2045-2065)
Implications

- Pest & Diseases
- Planting Dates
- Crop Damage
- Shifts in Growing Areas
- Changes in Crops
Chill Units: Target Date when a Critical Number of Chill Units (700) is Reached

Now

40 Years from Now

Implications especially for Deciduous Fruit Industry

Areas out of Production
New Varieties
Change in Deciduous Fruit Species
Example: POTATOES

Historical Temperature Regions for Growing Potatoes
(1950 - 1999)

Temperature Regions for Growing Potatoes in the Intermediate Future (2045 - 2065), Based on Outputs from Multiple GCMs

These Regions Will Shift

Grow in 5 suitable Region

Changes in Potential Dryland Potato Yields (t/ha)
Based on Outputs from Multiple GCMs,
from Present (1971-1990) to Intermediate Future (2045-2065)

Projected % Change Dryland Yield
Thank you for listening

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