- The way Australia developed and implemented the National Drought Policy.
Roger Stone, University of Southern Queensland, Australia
Elizabeth Robertson, Department of Agriculture Fisheries and Forestry, Canberra,

"Developing and Implementing National Drought Policy" (Plenary Session VIII)
Acknowledgements: Mark Tucker, Deputy Secretary, Department of Agriculture, Fisheries and Forestry; Australian Managing Climate Variability Program (MCVP)
Key points (R Stone):

• The key role major drivers of climate variability impact on drought and drought preparedness in Australia.

• Establishing the linkages between these key climate drivers and the capability to utilise this knowledge to aid management preparedness for drought conditions.

• Development of major advances that have been made in Australia in regards to: climate modelling and forecasting - integrated climate-agricultural simulation modelling - on-farm financial forecasting - establishing links to drought preparedness.

• The role played by leading farmers and agribusiness in utilising advances made in whole farm modelling, farm management and improved understanding of drought preparedness.

• Acknowledgement of the ‘changing face of Australian agriculture’ – drought regarded as part of climate variability.

(key words: extreme climate variability, technological advances, on-going changes in Australian agriculture, climate forecasting, decision-support systems)
Part 2:
Elizabeth Robertson

• Developing and implementing Australia’s National Drought Policy

• Reviews of drought policy and programs

• Keys to success
Australia has remarkably high annual rainfall variability—which is increasing…

Variability of Annual rainfall

<table>
<thead>
<tr>
<th>Country</th>
<th>Coefficient (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>18.5</td>
</tr>
<tr>
<td>S. Africa</td>
<td>14.5</td>
</tr>
<tr>
<td>Germany</td>
<td>10.5</td>
</tr>
<tr>
<td>France</td>
<td>9.5</td>
</tr>
<tr>
<td>NZ</td>
<td>8.5</td>
</tr>
<tr>
<td>India</td>
<td>7.5</td>
</tr>
<tr>
<td>UK</td>
<td>6.5</td>
</tr>
<tr>
<td>Canada</td>
<td>5.5</td>
</tr>
<tr>
<td>China</td>
<td>5.5</td>
</tr>
<tr>
<td>USA</td>
<td>4.5</td>
</tr>
<tr>
<td>Russia</td>
<td>3.5</td>
</tr>
</tbody>
</table>

(Love, 2005)
and also long-term shifts in rainfall (mm/decade)
Rainfall deciles in Australia for respective 9 month periods: April to December, 2000 and 2002 – ‘the wet periods should prepare us for the impending dry periods ahead’.
The variability in annual climate also translates into variability in crop yields – comparison with other OECD countries (Kimura and Anton, 2011)


Figure 3.1 Variability in crop yields—Australia and other countries (based on historical time-series data 2001–07)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Australia</th>
<th>Estonia</th>
<th>Italy</th>
<th>United Kingdom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barley</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oils</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Grains and oilseed production in Australia has the highest volatility in farm production (Hatt et al., 2012)
Agricultural management decisions on many scales – knowledge that climate systems operate on many time scales relevant to Australia = opportunities for preparedness

(Weinke and Stone, 2005).

<table>
<thead>
<tr>
<th>Decision type (eg. only)</th>
<th>Frequency (year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logistics (eg. scheduling of planting / harvest operations)</td>
<td>Intraseasonal (&gt;0.2)</td>
</tr>
<tr>
<td>Tactical crop management (eg. fertiliser/pesticide use)</td>
<td>Intraseasonal (0.2-0.5)</td>
</tr>
<tr>
<td>Crop type (eg. wheat or chickpeas)</td>
<td>Seasonal (0.5-1.0)</td>
</tr>
<tr>
<td>Crop sequence (eg. long or short fallows)</td>
<td>Interannual (0.5-2.0)</td>
</tr>
<tr>
<td>Crop rotation (eg. winter or summer crop)</td>
<td>Annual/biennial (1-2)</td>
</tr>
<tr>
<td>Crop industry (eg. grain or cotton, phase farming)</td>
<td>Decadal (~10)</td>
</tr>
<tr>
<td>Agricultural industry (eg. crop or pasture)</td>
<td>Interdecadal (10-20)</td>
</tr>
<tr>
<td>Landuse (eg. Agriculture or natural system)</td>
<td>Multidecadal (20+)</td>
</tr>
<tr>
<td>Landuse and adaptation of current systems</td>
<td>Climate change</td>
</tr>
</tbody>
</table>
Clear production links to key climate drivers -
Mean /std production levels associated with ENSO – example for sorghum and wheat /Australia (Hansen and Stone, 2012)
Understanding that climate systems link directly to farm cash income - understanding the key climate drivers - and the potential for preparedness through careful use of seasonal climate forecasting..

Example for the Eastern Darling Downs (after Nelson and Kokic, 2004)
Extreme events - changes to drought occurrence?

Spatial distribution of the increase (or decrease) in moderate drought - precipitation potential evaporation anomaly - using Hadley centre model or 11 Model ensemble (courtesy Burke and Brown, 2007)

Future drought policy needs to ensure agricultural industry (and water industry) understands and is prepared for climate change influences.
“Climate forecast information may have no value unless it changes a management decision” — enhanced knowledge that opportunities exist for effective drought management strategies (source: Productivity Commission, 2009).

<table>
<thead>
<tr>
<th>Industry</th>
<th>Some impacts of drought</th>
<th>Farm-level management strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadacre grazing</td>
<td>Reduced pasture growth; consequent reduced meat and wool production</td>
<td>Destocking</td>
</tr>
<tr>
<td></td>
<td>Reduced land carrying capacity</td>
<td>Supplementary feeding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Containment paddocks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agistment</td>
</tr>
<tr>
<td>Dryland cropping</td>
<td>Quantity and timing of rain prior to and during the growing season influences yield</td>
<td>Variable use of inputs as season evolves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diversification of the farm business</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change crop varieties and/or types, adjust planting dates, change fertiliser regimes</td>
</tr>
<tr>
<td>Irrigated cropping</td>
<td>Water allocation reduced or nil allocation depending on drought severity</td>
<td>Choose not to plant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Temporary switch to dry land production</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diversification of the farm business</td>
</tr>
<tr>
<td>Horticulture</td>
<td>Reduced to low water allocation</td>
<td>Allow some plants to die</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pruning to minimise water use</td>
</tr>
<tr>
<td>Dairy farming</td>
<td>Reduced pasture growth</td>
<td>Increased supplementary feeding</td>
</tr>
<tr>
<td></td>
<td>Heat stress</td>
<td>Animal shading, sprinklers</td>
</tr>
</tbody>
</table>

Source: Adapted from Productivity Commission 2009.
Realisation of the value of changing planting dates (using Decision Support Systems (DSS)) to aid in drought preparedness: (“When to sow my sorghum crop with an impending drought”?)

Effect of sowing date on sorghum yield range at Miles South QLD with a ‘consistently negative SOI phase’ for September/October (Other parameters - 150mm PAWC, 2/3 full at sowing, 6pl/m², medium maturity. (Whopper Cropper DSS pre-run data from APSIM, Potgieter, 2006)
Planning for Agricultural Drought Purposes - Realisation of The Key Value in use of Crop Simulation Modelling

**Agricultural Production Systems Simulator (APSIM) simulates**

- Provides historical yield of crops and pastures
- Assimilates key soil processes (water, N, carbon)
- Assimilated surface residue dynamics & erosion
- Provides a range of management options
- crop rotations + fallowing
- short or long term effects
Acknowledgement of the changing face of Australian agriculture.

• *Land use and farming systems continue to evolve and diversify* - responding to commodity prices, market arrangements, natural resource conditions and opportunities.

• *Livestock industries reached a plateau* - areas under cotton, sugar cane, potato, rice and horticulture all increased since 1983 - viticulture expanding in many regions.

• *Farm numbers have decreased* from 178,000 in 1982 to 145,000 agricultural holdings in 1996/97 - average property size increased in the cropping and grazing industries.

• *Cereal grain yields per hectare have improved* in many regions between 1982 and 1997, notably where crops are more diversified in regions of more reliable rainfall (elsewhere, yield trends have been less spectacular).

• *Improved nitrogen management has been associated with strong productivity gains in several regions.*
• **Annual variations in wheat yields - due to climate - have been reduced** through development of drought-tolerant species and disease control.

• **The area of irrigated agricultural land in Australia has increased** by 26% in the last 20 years.

• Two-thirds of all irrigated land is in the Murray-Darling Basin; nearly half is used for pasture. Irrigated areas Australia-wide under cotton, sugar cane, pasture and fruit increased.

Australian Government policies and programs that have sought to assist Australian farm businesses to manage their risks:

• **Farm Management Deposits** which have helped farmers better manage the variability that can arise from climate variability and market fluctuations,

• **Tax relief measures** – income averaging, fuel rebates,

• **Decision Support Systems** and tools and climate forecasting – Bureau of Meteorology services, ‘the Long Paddock’ (Queensland) monthly seasonal updates, industry specific services..

• **Training and farm business planning** – eg: ‘Plan, Prepare, and Prosper’ workshops for farm planning management (Western Australia) and ‘ProFarm’ courses (NSW).

• **Major government grants** that influence drought preparedness: ‘Caring for our Country; ‘The Carbon Farming Initiative’
Acknowledgement of the commercial risk management strategies available to Australian farmers and agricultural businesses:

• Price hedging – used as a price risk management tool – using futures contracts, options and swaps in commodity markets to offset gains or losses made in physical markets or in foreign exchange markets,


• Purchase of insurance – primarily for named perils such as hail, fire, frost.

• Aspects of some general insurance products such as ‘drought clauses under livestock policies’

(source: NRAC – National Rural Advisory Council - Feasibility of agricultural insurance products in Australia for weather-related production risks, September, 2012)
Australia’s Drought Policy

Elizabeth Robertson
13 March 2013
Relative volatility in annual output of Australian sectors
1975–2011

Source: Australian Farm Institute, Farm Policy Journal, Autumn Quarter 2012
Volatility of national agricultural output
1961-2009

 Uruguay, AUSTRALIA, Agrentina, Netherlands, Poland, South Africa, India, Canada, Chile, New Zealand, France, Brazil, Mexico, USA, Denmark

Source: Australian Farm Institute, Farm Policy Journal, Autumn Quarter 2012
Australia’s National Drought Policy

• Pre-1989: Drought part of natural disaster policy
• 1992: National Drought Policy established

• Objectives:
  • encourage self-reliance
  • maintain resource base
  • ensure early recovery

• Placed greater responsibility for managing risk on the farmer

• Still relevant today
Exceptional Circumstances

• Arrangements to provide assistance under rare and severe events
• Climate: rare and severe
• Farm income: rare and severe downturn
• Not be predictable or part of a process of structural adjustment
National review of drought policy

• Climatic
  • Exceptionally hot years are likely to be more frequent
  • One in 20-25 year event no longer appropriate

• Social
  • Governments should focus on social wellbeing

• Economic
  • Drought assistance programs should be restructured
  • Help farmers plan and prepare for drought
  • Don’t wait until crisis to offer assistance
National review of drought policy

• Role for farmers:
  • Assess the risks
  • Adopt risk management strategies
• Role for government:
  • Encourage farmers to be self-reliant and prepared
  • Encourage research, development, extension and training
  • Provide a safety net that avoids ongoing reliance on assistance
WA Drought Pilot - July 2010 – June 2012

- Practical measures
- Helping farmers adapt and prepare
- No drought declaration
Review of drought pilot

- Examined efficiency, effectiveness and appropriateness

- Recommendations:
  - income support safety net
  - social support services
  - farm business planning
  - Farm Management Deposits
Drought program reform

• Risk management and preparedness
• Available without a drought declaration

• Income support (welfare)
• Farm Management Deposits and taxation measures
• Farm business training
• Social support services
• Tools and technologies
Keys to success

• Cooperation
• Consultation
• Communication
• Evidence-based policy
• Timing

DroughtPolicy@daff.gov.au
Summary:

• It has been realised that Australia is naturally subject to extremely high levels of year-to-year climatic variability – which translates to high levels of variability in crop yields and in other core agricultural outputs.

• There has realisation of an ongoing ‘changing face of Australian agriculture’ that is becoming more efficient and technologically aware, especially of climate risk/drought risk.

Acknowledgement of major technological advances made in Australia over recent decades in regards to:

• climate modelling and forecasting;
• integrated climate-agricultural simulation modelling;
• on-farm financial forecasting;
• thus high potential for improved drought preparedness and associated drought policy developments that focus on self-reliance.
Further key aspects

• A major shift in drought policy from pre-1989 when drought was part of natural disaster policy - to 1992 when the National Drought Policy was established.

• Key Objectives of the National Drought Policy to encourage self-reliance, maintain the resource base and ensure early recovery.

• Key emphasis to place greater responsibility for managing risk (climate risk) on the farmer – which still remains relevant under the future risk of climate change.

• Governments to focus on social wellbeing.

• Drought assistance programs should be restructured to
  • Not wait until crisis to offer assistance.
  • Help farmers plan and prepare for drought.
THANK YOU