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Putting virtual worlds to work to support improved climate risk decision-making on real world farms

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Farmers in many parts of the world operate under significant climatic risk
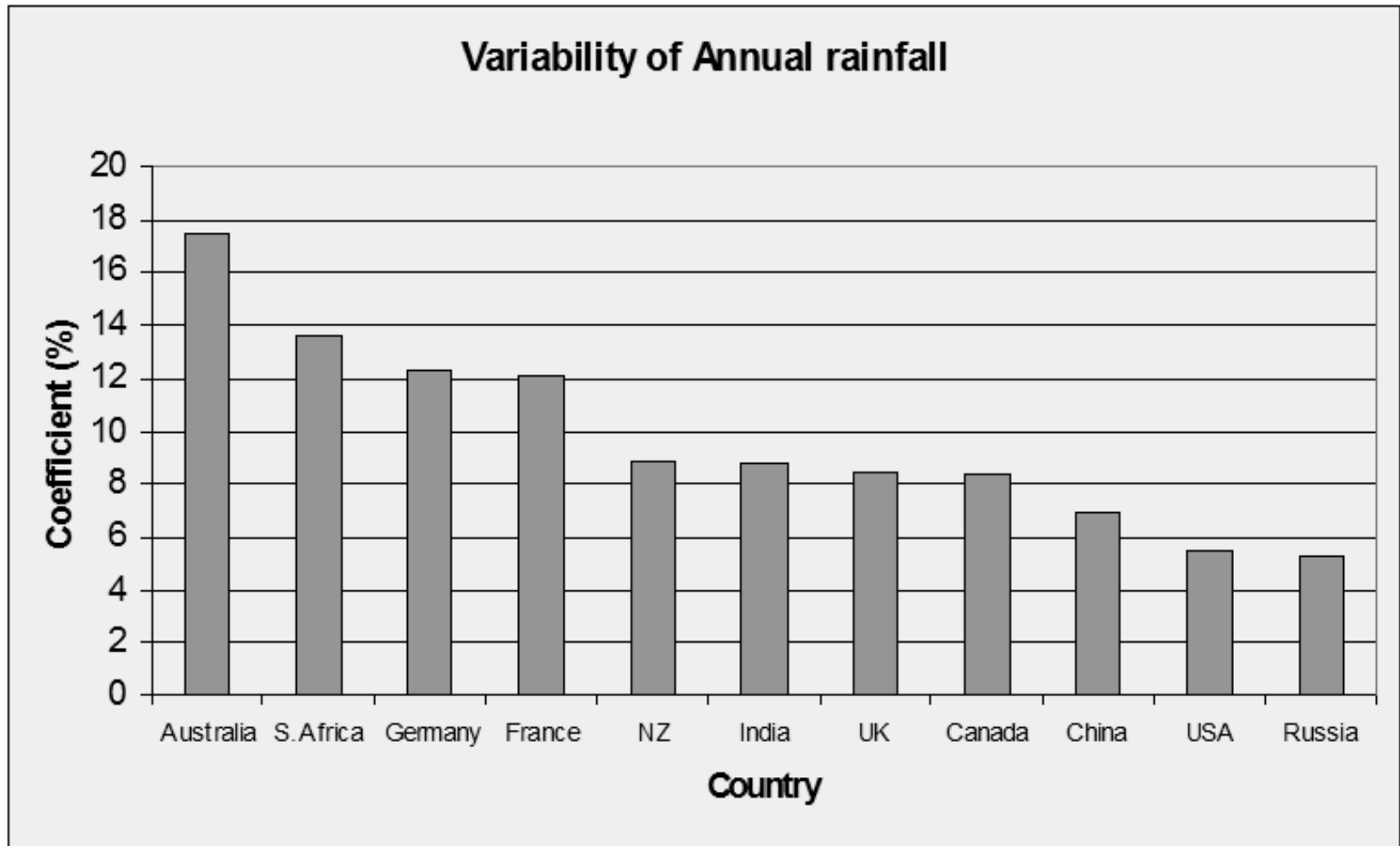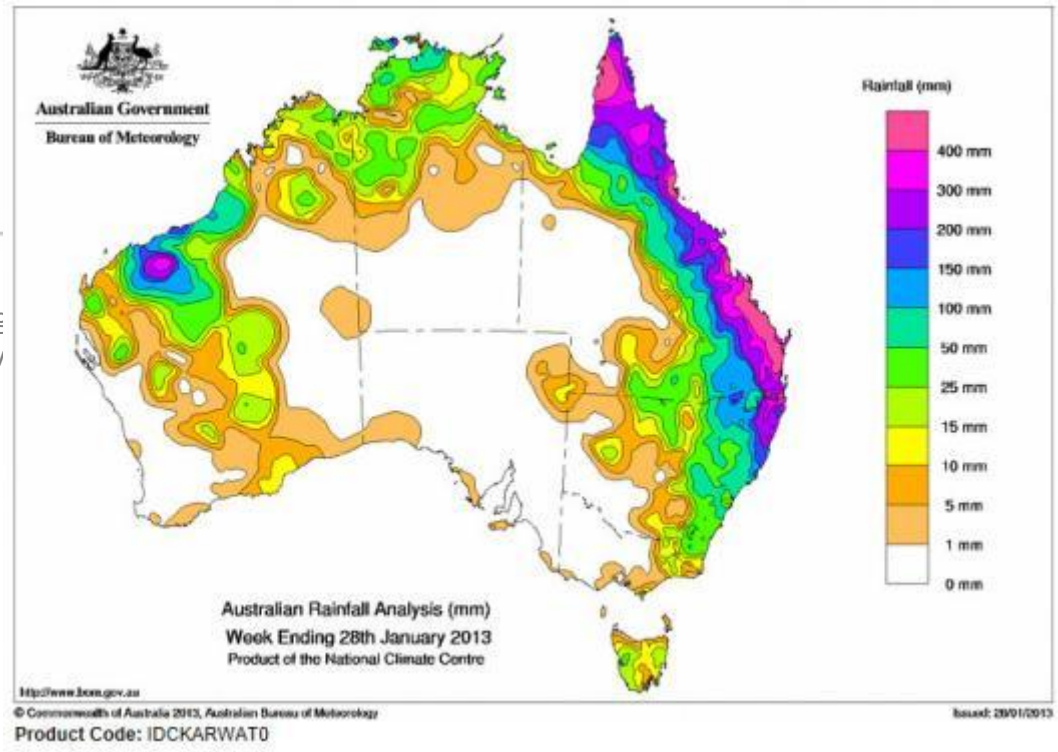

Nicholls *et al*. (1997)

"… droughts and flooding rains …"
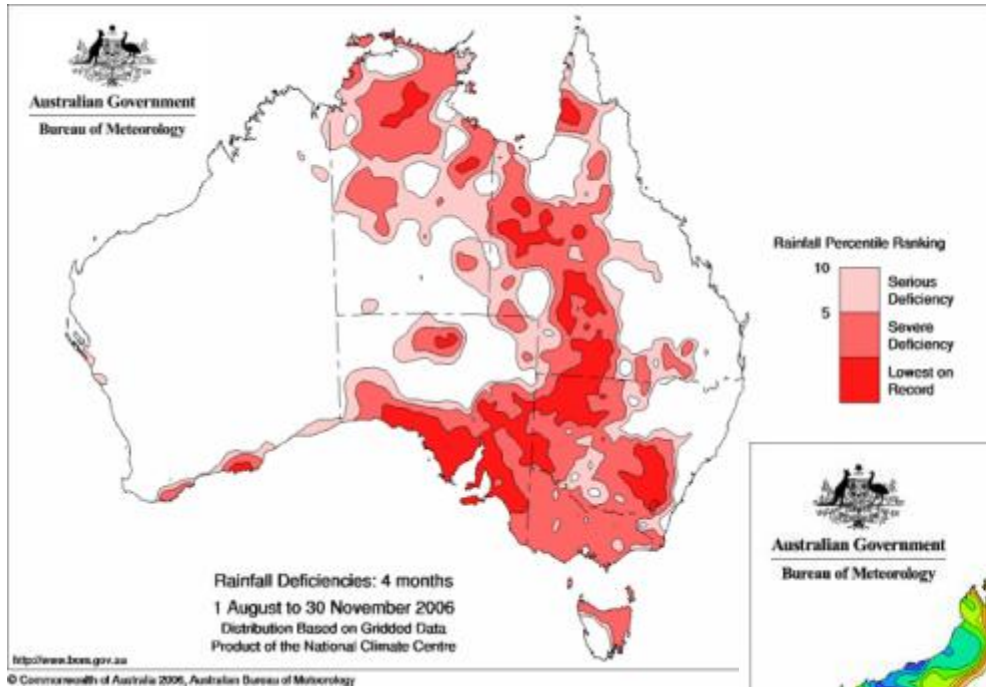
Australia Day, 2013

Source: Australia Bureau of Meteorolog[y]
http://www.bom.gov.au/climate/drought/archiv[e]

Millennium Drought, 1996-2009

Impacts on agriculture

Issues

- Climate change and increasing climate variability pose real challenges to productivity and profitability of farming

- Improved climate risk decision-making and management in agriculture critical

  – well-being and long-term sustainability of farming communities

  – future global food security.

- Decision-making on farms based on assumptions about seasonal conditions and weather events over the cropping season.

- Calls on science to provide information to support complex decision making to manage climate and related risk

Climate information to support adaptation in agriculture

- Targeted climate forecasts to support adaptation

- Link to agricultural systems

  - real time, downscaled regionally-targeted climate information

  - focus on relevant climate variables (e.g. temperature extremes)

  - analysis of potential impacts of climate change

  - solutions for effective adaptation to a changing environment
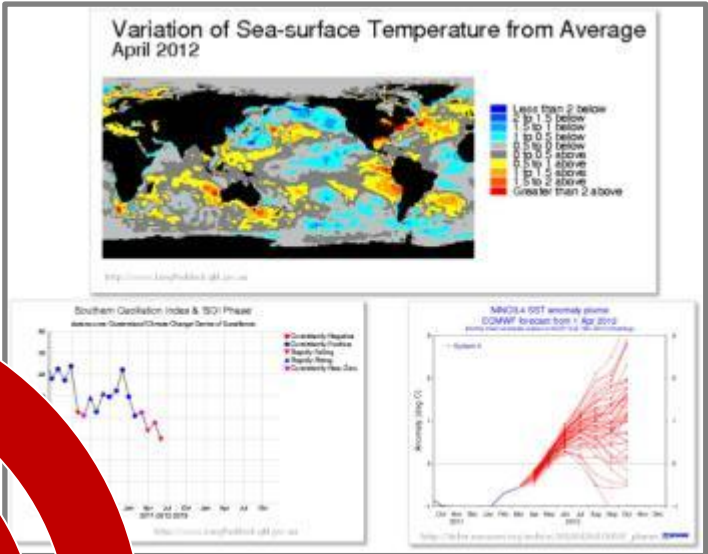
"… climate information has no value unless it changes a management decision."

Targeted support for on-farm decision-making

Variation of Sea-surface Temperature from Average April 2012

Seasonal forecast modelling

Farming systems science & BMPs

Understanding decision-making and adoption behaviour

Digital Futures-Collaborative Research Network (DF-CRN) Project 3

"Investigating the impact of a web-based discussion-support agricultural-climate information system on Australian farmers' operational decision making"

- Digital technologies:

  - alternative for delivery & communication of agricultural information

  - complement and expand the reach of conventional ag extension

- Sophisticated digital platforms & application in learning environments offer new opportunities for knowledge exchange

Objective

- To develop digital tools for cost-effective delivery of timely, targeted, contextualised agri-climate information and knowledge services

Strategy

- **Create and trial a virtual discussion-support system** that integrates climate information with farm management decision-making.

- **Assess the effectiveness** of the virtual discussion-support system in building capacity for improved decision-making and effective climate change response in a target group of farmers

Second Life

- A virtual world

- User-created content and virtual marketplace

- Avatars can be customised & manipulated

- Machinima (animated video clips) created

  - storyboarding

  - scripted conversations

  - recorded soundtracks

  - screen capture software (e.g. FRAPS)

  - folio (background sounds)

"Sweet success" machinima

- Contextualized settings - Qld sugar cane farm & landscape

- Customised avatars – Australian sugar farmers

- Back stories – incorporate decision-making types (Jorgensen *et al.* 2007)

- Decision making scenarios

- Scripted conversations – incorporating industry BMPs

"Sweet Success" scenarios

Four videos developed:

Irrigation and climate risk management:
https://vimeo.com/user10756933/review/121433887/e0c4e4ce9b

Fertiliser application and climate risk management:
https://vimeo.com/user10756933/review/121433884/d8df03eac5

Harvesting and climate risk management:
https://vimeo.com/user10756933/review/121433686/b353f16ff3

Planning and climate risk management:
https://vimeo.com/user10756933/review/121433430/7720212dc0

Research questions

- Potential for machinima to provide a relevant engaging technology rich learning environment?

- Effectiveness as a discussion support and capacity building tool?

- Readily adapted for different farming systems and locations by using culturally appropriate clothing, language and settings?

- Able to be disseminated widely and cost-effectively?

- Contribution to sustainable land management?

Evaluation

1. Workshops (4), group discussions and semi-structured interviews (20-24 pre and post workshop) plus qualitative analysis

2. Online surveys – 300-400 canegrowers

    —   Responses to machinima

    —   Farming background

    —   Approach to risk

    —   Decision-making style

3. Cost-effectiveness analysis

Pilot evaluation – participants' comments

Comment Category	Interviewee Quotes
Good (28/40)	**Farmers:** 'Very real, a good way of doing it'; *'Good tool for prompting and helping a discussion and opening a discussion up'*; 'It gives an opportunity for questions to be asked in a discussion'; 'High value'; *'It will promote discussion, that is the strong point'* **Extension Officers:** *'Excellent to use at a workshop or shed meeting to get discussion going'*; 'It has the capacity to create interaction and discussion'; 'I'd like to see it tested' **Canegrowers Organisation:** 'Very innovative'; 'With increasing costs and climate change this information needs to be made available to growers to support their decision making'; 'I'm passionate about it'; *'Run by someone in a group, quite effective in the context of a group discussion'*.
Improve (12/40)	**Farmers:** 'Older growers won't look at it on a computer'; 'Younger growers are more up to speed so you don't want [you] to talk down to them'; 'Need other discussions related to forecasts, especially extremes of wet or dry'; *'you need more meat [in message] to promote a robust discussion'*. **Extension:** 'If the characters flowed and moved more naturally, that would enhance the visual experience'; *'For a more knowledgeable audience, incorporate an expert character into the video'*; 'If changes were made its usefulness as a tool for creating discussion and information transfer would improve and its value would go up'. **Canegrowers:** 'For individual growers, not as effective'; 'Younger growers will not need this prompting'; *'It's not appealing at all as farmers would relate more to real people than animations'*.

Future challenges

- Availability of suitable technology for dissemination into rural areas in Australia and elsewhere, including developing countries (~ 600 million farmers, globally)

- Ensuring the relevance of the system to diverse cultures, traditions, farming systems.

- Customising, in conjunction with stakeholders, to ensure acceptance by Australian & international farming communities

- Investigating whether such discussion support systems influence decision-making and result in measurable changes in terms of on-ground outcomes

- How best to deliver (e.g. WAMIS)

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- Research partners:

    - Top Dingo http://www.topdingo.com/

    - CANEGROWERS Australia http://www.canegrowers.com.au/

    - University of South Australia

    - Australian National University

Literature cited

Jørgensen, L.N. *et al.* (2007). Decision support systems: barriers and farmers' need for support. *EPPO Bulletin* 37(2), 374-377.

Nicholls, N. *et al*. (1997). Australian rainfall variability and change. *Weather* 52(3), 66-72

Project website

https://adfi.usq.edu.au/projects/virtual-extension

Contact

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Thank you