Best practices for climate-related disaster management: The Australian experience

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Overview

- Climate risks and impacts in Australia
- Case study of Spring 2015
- Our domestic products
- International collaboration (COSSPac)
- Development of Climate Information Services
- Moving from Disaster Management: Hazards Risk and Resilience in the Bureau
Climate impacts in Australia

Australia is the driest inhabited continent on Earth

- Increased susceptibility to drought
- Very high bushfire risk (especially in the south)
- Northern tropics are susceptible to cyclones and flooding
- Climate variability highly dependent on ENSO
Spring 2015 seasonal forecast

- Monthly seasonal forecast issued on 24th September 2015 (from model run 20th September)
- Interactive plots available on the public website (temperature data also available)
- Post processed from POAMA (global 250 km resolution coupled ocean–atmosphere model with 33 ensemble members)
- Model predicted warm Indian Ocean to mitigate El Nino impacts over Eastern Australia
• Videos now accompany text and interactive graphics since August 2014
• Feedback from our users (e.g. farmers via state agricultural departments) is very positive
• Reliant on high-bandwidth internet infrastructure
<table>
<thead>
<tr>
<th>Hazard</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bushfire</td>
<td>More likely</td>
</tr>
<tr>
<td>Heatwave</td>
<td>More likely</td>
</tr>
<tr>
<td>Tropical cyclone landfall (Qld east coast)</td>
<td>Less likely</td>
</tr>
<tr>
<td>Tropical cyclone landfall (NT &amp; WA)</td>
<td>Similar</td>
</tr>
<tr>
<td>Widespread flooding (eastern Australia)</td>
<td>Less likely</td>
</tr>
<tr>
<td>Storms (WA)</td>
<td>More likely</td>
</tr>
<tr>
<td>Drought</td>
<td>More Likely</td>
</tr>
</tbody>
</table>
Preceding conditions

- Cool and dry Winter over much of Southern Australia
- Dry conditions continued into September.
- Exacerbating long-term drying trends
- El Nino impacts on Australian rainfall are greatest in Spring
Preceding conditions

IOD Index Time Series

Negative phase

Positive phase
Updated Spring 2015 seasonal forecast

- Model run in 1st week of October incorporated rapid change in IOD
- The strong change in the rainfall signal (indicative of an +IOD and El Nino) required a special update
- Additional ministerial briefings were issued
- Seasonal outlook information included in Critical-Event briefing sent to emergency managers
- Increased bushfire risk
October 2015 rainfall

- Continued dry weather in major agricultural areas, exacerbating current drought areas
- Loss of crops (e.g. wheat) and culling of livestock
- Increased bushfire risk for the upcoming summer
# Better Seasonal Outlooks

## Finer Model Detail
- Moving from 250 km to 60 km resolution
- Australia: 120 to 2000 grid points
- Meaning more localised information by accounting for local conditions

## More Outlook Periods
- Seamless: filling the gap between 7-day and monthly outlooks
- Season, Month, Fortnight, Week
- Outlooks updated weekly
- Meaning the best outlooks for Australia of all international models

## Higher Outlook Skill
- Likely 10% improvement in outlook accuracy
- More intelligence possible:
  - Evaporation
  - Drought
  - Humidity
  - Extremes
  - Wind
  - Tropical Cyclones

## World Class Service
- Information is clear, concise and available when and where you need it
- Not only rainfall and temperature

## Bigger User Returns
- Reduce losses: agricultural production lost from 2010-11 La Niña:
  - More than $2 billion
  - ABARES
- Potential value of improved seasonal forecasts:
  - More than $1 billion per year
  - Centre for International Economics 2014
Realising benefit

- Value to agriculture to ~$1.6 billion per year
- Value to other climate sensitive industry up to $192 million per year
- CIE (for MCV) estimates underestimated
- Benefits through applications and better decisions

<table>
<thead>
<tr>
<th>Industry</th>
<th>Potential annual value of forecast A$m</th>
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</thead>
<tbody>
<tr>
<td>Construction</td>
<td>192</td>
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<tr>
<td>Electricity</td>
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<tr>
<td>Coal mining</td>
<td>68</td>
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<tr>
<td>Oil and gas</td>
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<tr>
<td>Transport</td>
<td>5</td>
</tr>
<tr>
<td>Water supply</td>
<td>28</td>
</tr>
<tr>
<td>Agriculture</td>
<td>1,567</td>
</tr>
</tbody>
</table>

Note: All values are given in Australian dollars at 2012 prices
Source: CIE estimates
Model improvement in resolution

- Resolution increase from 250Km to 60km
- Able to resolve Great Dividing Range, Tasmania, east coastal zone

August Mean Rainfall
Summary of domestic climate products

- Seasonal outlook forecasts available on public website (including video)
- Accompanied with current conditions of major climate mechanisms (ENSO, IOD)
- Briefs to Federal Minister for the environment and other Federal agencies (agriculture, water)
- Intensive media engagement
  - Radio and TV news
  - Commercial and social media
  - Regular slots in Rural TV shows (i.e. Landline)
  - ~500 media interviews per year
- Bureau regional offices engage with state governments and emergency managers
- Bureau's Hazard, Warnings and Forecast division is responsible for issuing of weather forecasts and warnings
Bureau contributes to several international climate services projects including:

- Participation as a Global Producing Centre of Long Range Forecasts (mandated by the WMO)
- Climate and Oceans Support Program in the Pacific (COSSPac)
  - Seasonal Climate Outlooks in Pacific Island Countries (SCOPIC)
  - Online Climate Outlook Forum (OCOF)
  - Malaria Early Warning System (Solomon Islands)
  - Drought Monitoring and Response System (Kiribati)
  - Climate Bulletin
- WMO Tropical Cyclone Panel expert team on TC seasonal forecast (Yuriy Kuleshov)
Example COSSPac products
Developing Climate Services

WMO definition of Climate Services

• “the dissemination of climate information to the public or a specific user. They involve strong partnerships among providers, such as NMHSs [National Meteorological and Hydrological Services], and stakeholders, including government agencies, private interests, and academia, for the purpose of interpreting and applying climate information for decision making, sustainable development, and improving climate information products, predictions, and outlooks”
Climate services global focus

Priority areas

- Agriculture and food security
- Disaster risk reduction
- Energy
- Health
- Water

GLOBAL FRAMEWORK FOR CLIMATE SERVICES
Climate services

Dissemination of information to public or specific users to reduce exposure to climate-related risk

- Working closely with stakeholders and partners
- Focusing on user needs
- Needs to be timely and tailored
- Provides benefits and/or better manages risks

Bureau of Meteorology climate services vision

“To be Australia’s trusted and authoritative source of climate information and advice for governments, industries and communities to assist them manage climate risks and opportunities.”
Access to data

- Daily weather
  - Past observations and statistics
  - Maps, gridded and model data
  - Storm confirmation and legal
  - Other commonly requested data
- Daily rainfall
  - Radar, satellite and MSLP maps
  - Ocean maps and data
  - Solar data
- Climate averages
  - Past forecasts and warnings
  - Ocean maps and data
  - Climate reports and summaries
  - Data and information for schools
- Climate maps
  - Past forecasts and warnings
  - Risk assessment and design
  - Subscriptions and custom services
Key elements of best practice in Climate Information Services

- Understand customer needs
- Produce and adapt products and services to serve needs
- User Interface Platform includes briefings, communication etc.
- Strong service ethic
- Deliver products that customers like using
- Understand existing and emerging policy needs of government
- Outreach and build capability through partnerships

Fig 1.3 from Global Framework for Climate Services Implementation Plan
Looking to the future

Moving from Disaster Mitigation

• Disaster Risk Reduction (managing hazard related risk)
• Disaster Resilience (building capacity to withstand and recover from hazard impacts)
• Costs of disaster mitigation/repair becoming too expensive
• Moving from purely meteorological warnings into community impacts and consequences
• Creation of Disaster Mitigation/Hazard Impacts Program
DMP/HI Program Goals

• Provide evolving social science based support for a forecast and warning service for the Australian community.
• Enhance community understanding of the risks and impacts of severe weather events.
• Support international disaster mitigation activities through building partnerships with international organisations and participating in related activities.
• Through active engagement in international and multi-national forums (including WMO) build new capacity in Bureau services.
Moving towards DM / HI Services

Within the Bureau
• Restructure the Hazards, Warning and Forecast Division
• New services: stronger partnerships

National
• Shared responsibility within a new framework : ANZEMC
• Greater responsibility in Fire and Emergency Services
• National Review of Warnings and Information

International
• WMO – Guidelines on Multi-Hazard Impact Based Forecast and Warning Services:
• UKMO, US Weather Services: ISDR and beyond (Sendai Framework)
Bureau DM towards DM/HI Services

- UKMO (e.g. Climate Hazards and Impact group)
- US National Weather Service (e.g. Impact based warnings)
- ISDR and beyond – Resilient communities, community risk-based information
Thank you

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