NRM on farms

A monthly news summary about climate and natural resources in agriculture. December 2015

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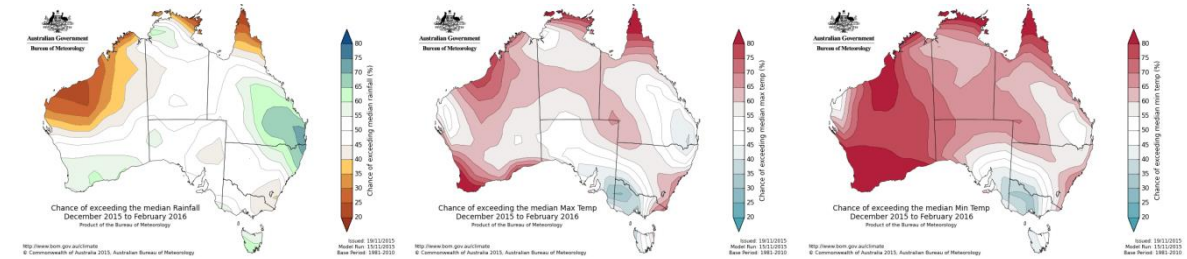
CLIMATE

NSW seasonal outlook



The December to February outlook for NSW is for average rainfall over most of the state, slightly above average in the north-east and slightly below average in the south-east. Warmer than average day and night temperatures are likely in the northwest and south east and average to cooler elsewhere. Current climate influences include a combination of a strong El Niño in the Pacific, a decaying positive Indian Ocean Dipole, and very warm Indian Ocean temperatures.

http://www.bom.gov.au/climate/outlooks/#/overview/summary/

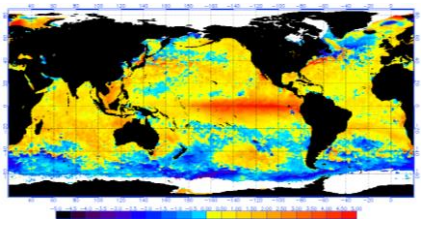
Video: http://www.bom.gov.au/climate/outlooks/#/overview/video

Ocean temperatures

Warm sea surface anomalies occur across most of equatorial Pacific, much of the Indian Ocean, and surround most of Australia with the exception of the Coral Sea.

http://www.ospo.noaa.gov/Products/ocean/sst/anomaly/index.html

http://www.bom.gov.au/climate/enso/#tabs=Sea-surface



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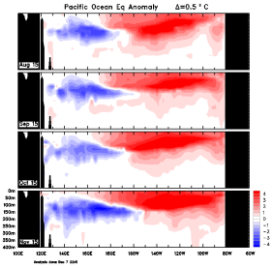
Subsurface temperatures

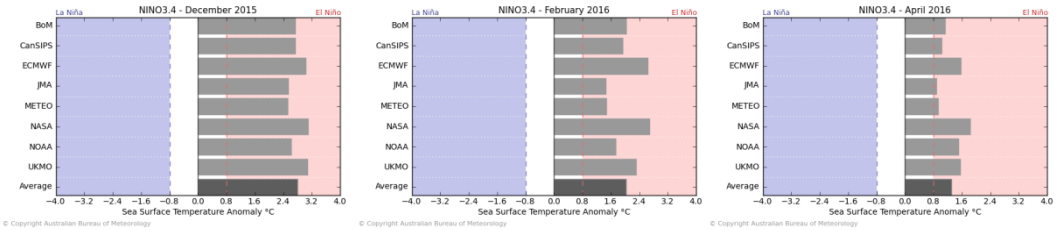


Warm anomalies continue in the top 200 m of the equatorial Pacific, with monthly anomalies reaching more than+4°C. Cool anomalies persist in the sub-surface of the western equatorial Pacific, and have strengthened in the last month.
http://www.bom.gov.au/climate/enso/

El Niño near its peak but will persist into 2016

El Niño is near its peak but likely to persist well into 2016. Sea surface and sub-surface temperatures, westerly wind anomalies in the central Pacific, and cloudiness near the Date Line, remain well above El Niño thresholds. This El Niño is likely to rank in the top three events of the past 50 years. Several key indicators fall short of their 1997–98 and 1982–83 values; subsurface temperatures have peaked around +8°C, compared to +12 °C in 1997-98, and SOI monthly values peaked around –20, while 1982–83 had several months at –30).
On average an El Niño summer brings below-average rainfall across northern Queensland, and a slight drying influence across the southeast of Australia. Conversely, inland WA often sees above-average rainfall at this time of year during El Niño.
http://www.bom.gov.au/climate/enso/

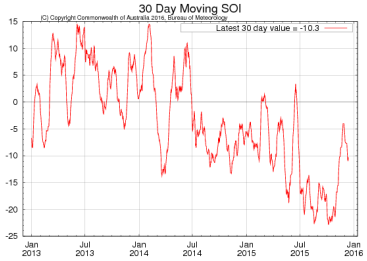
Model outlook



Sea surface temperatures across the central tropical Pacific Ocean are likely to peak in December (left), followed by a rapid weakening in February (centre) and April (right). The all-model average NINO3.4 outlook for December is +2.8 °C, but drops to +1.3 °C by April.
http://www.bom.gov.au/climate/ahead/model-summary.shtml#tabs=Pacific-Ocean

SOI swings to neutral and back

The 30-day SOI value to 6 December was −7.7 after moving briefly into neutral territory. Fluctuations of the SOI during Australia's northern wet season (October–April) are not unusual as the passage of tropical systems affects atmospheric pressure. During this period, the SOI should be used cautiously; 90-day values may provide a more reliable guidance. The current 90-day SOI is −15.4. Sustained negative values below −7 typically indicate El Niño.
http://www.bom.gov.au/climate/enso/#tabs=SOI



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Above average rain and heat in November

NSW rainfall and temperatures were well above average in November, with a wet start to the month followed by a hot, dry end and the ninth-warmest mean minimum temperatures on record.
http://www.bom.gov.au/climate/current/statements/scs52.pdf

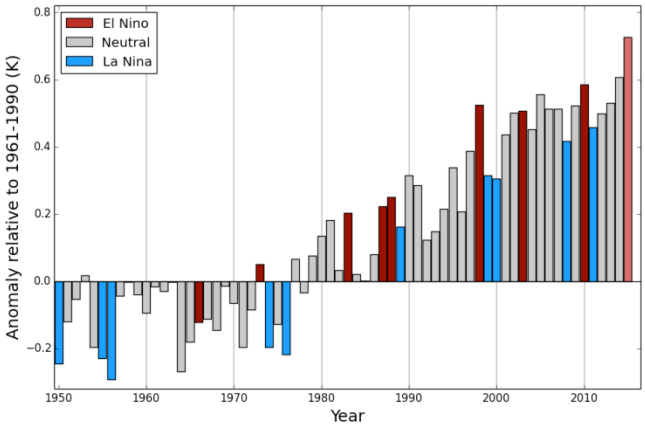
NSW DPI seasonal conditions report

Subscribe to NSW DPI's seasonal conditions report, and the climate summary which provides a snapshot of the monthly report in an easy to read four-page format with additional graphs and charts.
http://www.dpi.nsw.gov.au/agriculture/emergency/seasonal-conditions/regional-seasonal-conditions-reports

CLIMATE RESOURCES

2011-2015 hottest five year period on record

2015 is likely to top the charts as the hottest year in modern observations, with 2011-15 the hottest five-year period on record. This year's record is down to a combination of rising greenhouse gases and a boost from the strong El Niño. The global average temperature is on track to reach the symbolic and significant milestone of 1° Celsius above the pre-industrial era. The WMO indicates this is due to a combination of a strong El Niño and climate change.
https://www.wmo.int/media/content/wmo-2015-likely-be-warmest-record-2011-2015-warmest-five-year-period



Global risks 2015

Failure to adapt to climate change is a major risk facing the world according to the World Economic Forum's 2015 survey of global risks.
http://reports.weforum.org/global-risks-2015/

Precipitation may be less than predicted

A new study suggests that global precipitation will increase less than many climate models predict due to increases in the amount of near-infrared sunlight absorbed by water vapour.
http://www.nature.com/nature/journal/v528/n7581/full/528200a.html

Extreme events from a climate perspective

This special report from the American Meteorological Society includes Australian events that indicate that climate change has increased the likelihood of their occurring again. Adelaide's record-breaking heatwave in January 2014 is now 186 percent more likely; Brisbane's 38°C temperatures in November 2014 are 44 percent more likely; and Australia's 19-day heatwave

in May 2014 is 23 percent more likely. The implications of recurring extended periods of raised temperatures include stress for native species and agriculture.
https://blogs.csiro.au/ecos/climate-change-and-extreme-weather-understanding-the-link/

Future climate impacts in NSW

The NSW Office of Environment and Heritage has released new research conducted with the UNSW Climate Change Research Centre about the future impacts of heatwaves, urban heat, storms, bushfires and changes to water storage, surface runoff and soils across NSW over the next 15-55 years due to climate change.
http://www.climatechange.environment.nsw.gov.au/Impacts-of-climate-change

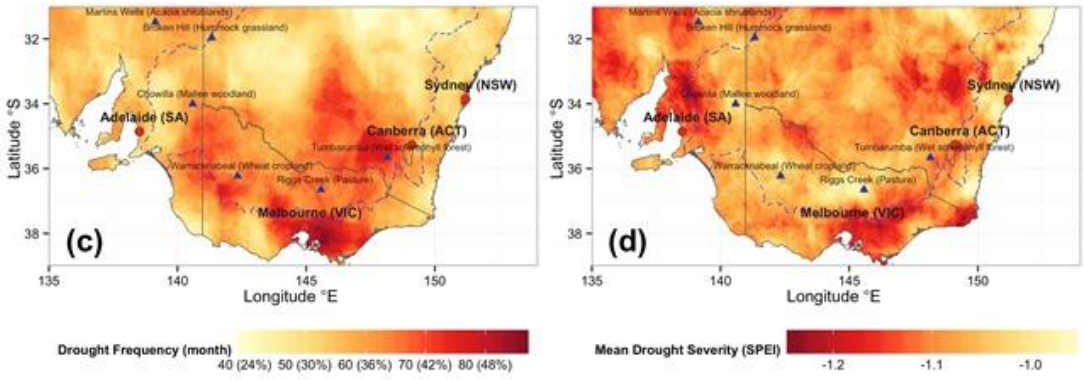
DroughtHub website for primary producers

DroughtHub is a new website for NSW primary producers to source key information to enhance drought preparedness. It currently includes financial support, training, information resources, transport assistance, wellbeing support and relevant R&D projects.
www.droughthub.nsw.gov.au

Agricultural ecosystems are most vulnerable to drought

Ongoing research from UTS scientists confirms that Australia's agricultural ecosystems, including cropland and pasture, are much more vulnerable to drought than native shrublands and grasslands. Native dryland ecosystems, such as Acacia shrublands and hummock grassland, are more resilient to protracted drought. Semi-arid ecosystems, which cover 70% of Australia, are most vulnerable to climatic extremes and could be susceptible to severe loss of ecosystem resilience in future mega-drought events.

Below: Drought frequency and drought severity in south-eastern Australia 2000-2013. Hot-spots include almost all of southern Victoria and southwestern NSW.



http://www.uts.edu.au/research-and-teaching/our-research/climate-change-cluster/news/sensing-drought-understanding

Australia and New Zealand drought atlas

Analysis of drought and wet periods since 1500 shows that despite the severity of the Millennium Drought, the five worst drought years occurred before 1900. But 2011 was the wettest year in the 513-year record.
https://www.youtube.com/watch?v=9w-xzhQoyUY
https://theconversation.com/500-years-of-drought-and-flood-trees-and-corals-reveal-australias-climate-history-51573

Native grass techniques for drought survival

Queensland research has found that the native grass, *Tripogon loliiformis*, survives extreme environmental stresses due to sugar manipulation and the controlled sacrifice of cells. The grass accumulates trehalose (a non-reducing sugar found in plants) which it then uses to trigger degradation and recycling of plant cells. The findings have implications for breeding food crops such as chickpea and rice to withstand environmental stresses.
https://www.qut.edu.au/news/news?news-id=100705

Heat stress tolerance of wheat

This GRDC research e update explains that the effects of heat stress on grain yield can be equally as important as drought or frost. Damage is greatest during flowering, but the likelihood of stress increases during grain filling. However, many current varieties have good levels of tolerance.
https://www.grdc.com.au/Research-and-Development/GRDC-Update-Papers/2015/02/Heat-stress-tolerance-of-wheat

Frost Check wants feedback

GRDC is developing Frost Check to help growers and advisers assess and respond to frost damage. The online resource will include information on minimising frost risk, crop choices, and guidelines for calculating local frost and heat risk 'windows'. Developers want to hear directly what grain growers and advisers need to minimise frost exposure.
http://www.grdc.com.au/Media-Centre/Media-News/National/2015/11/Have-a-say-on-your-frost-information-needs

New weather stations in NSW wine areas

Eight new automated weather stations have been installed in the wine grape production areas of NSW, complementing 10 existing stations in the Riverina and Mudgee regions. The new stations are located in the Canberra, Hunter Valley, Orange and Tumbarumba wine growing regions. There is currently interest in further developing the network by linking with existing DPI weather stations and privately owned weather stations.
http://www.awri.com.au/industry_support/weather-nsw/

Climate change and the Australian bushfire threat

This report from the Climate Council found the length of the fire season increased by almost 19% globally between 1978 and 2013. Longer fire seasons are reducing opportunities for controlled burning and intensifying pressure on firefighting resources.
https://www.climatecouncil.org.au/burningissuereport2015

National Climate Resilience and Adaptation Strategy

The Federal Government has released its National Climate Resilience and Adaptation Strategy which covers several sectors, including agriculture, forestry and fisheries, water resources and natural ecosystems.
https://www.environment.gov.au/climate-change/adaptation/strategy

Southern Gippsland Agricultural Climate Resilience Project

This project aims to facilitate climate change adaptive strategies for food producers. Strategies include soil management, and adaptive species.
http://sustainabilitygippsland.com/group/agricultural-climate-adaptation-project-southern-gippsland

Farmer mental health affected by seasonal variability

WA research has found that wheatbelt farmers have lost confidence in the consistency of weather patterns and their ability to predict them. Lack of rain and resultant land degradation are affecting their mental health.
http://www.abc.net.au/news/2015-12-14/climate-change-impacts-farmers-mental-health/7026804

Australian attitudes to climate change: 2010-2014

This CSIRO survey finds that just under 80% of respondents believe climate change is happening and 62% believe that human activity accounts for these changes. The most common combined projection from respondents is that their region will become hotter and drier. More than half of respondents report experiencing injury, loss, or damage as a result of extreme high temperatures (61%), heatwaves (61%), heavy rain (59%), drought and water scarcity (57%), or hailstorms (51%). People report being least able to cope with bushfires and storms if they occur in the future.
https://publications.csiro.au/rpr/download?pid=csiro:EP158008&dsid=DS2

Citizen science project recording adaptation activities

NSW residents are invited to note changes they have made in response to climate events such as increased temperatures, rainfall variation, extreme weather events such as floods and storms, and intense bushfires. Responses might include changes to water collection, harvesting routines, gardening practices, recreational activities or transport. The research is being conducted by CSIRO, UTs and OEH.
https://csiro.mysocialpinpoint.com/adapt

Greenhouse 2015

Presentations from the Greenhouse 2015 conference, including several on agriculture and climate, are now available online.
http://greenhouse2015.com/presentations

Agronomy conference proceedings

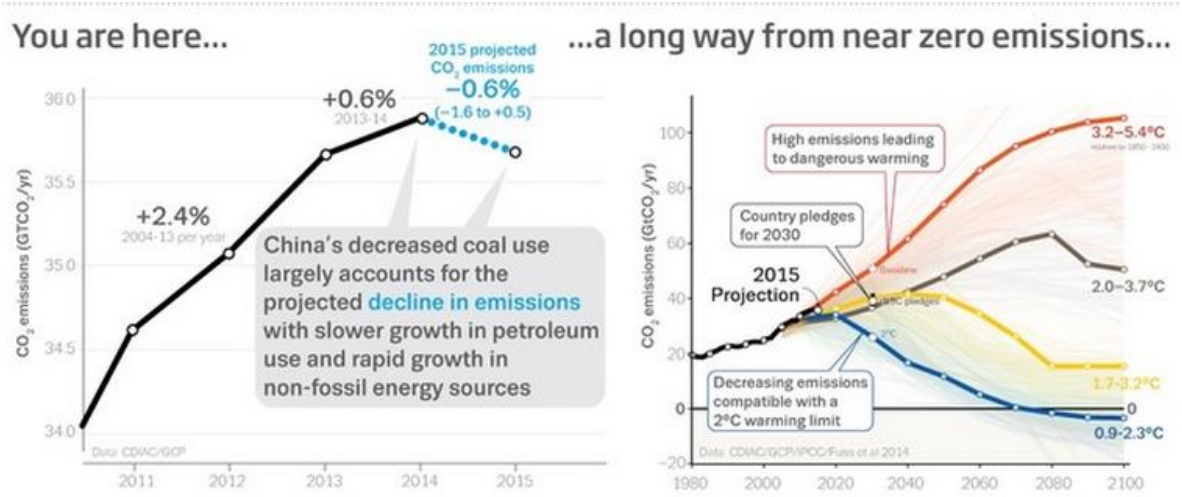
Proceedings of the 2015 Australian agronomy conference include several papers on climate adaptation and emissions mitigation in agriculture.
http://www.agronomy2015.com.au/proceedings

EMISSIONS

Paris climate agreement at a glance

Signed by 196 nations, the Paris Agreement is the first comprehensive global treaty to combat climate change, and will follow on from the Kyoto Protocol when it ends in 2020. It will enter into force once it is ratified by at least 55 countries, covering at least 55% of global greenhouse gas emissions.
https://theconversation.com/the-paris-climate-agreement-at-a-glance-50465

Global emissions slowing



After a decade of rapid growth, global CO2 emissions have slowed, due largely to lower coal use by China.
https://theconversation.com/growth-in-fossil-fuel-emissions-slowed-in-2015-so-have-we-finally-reached-the-peak-51669

Third ERF auction to be held in April

The Clean Energy Regulator will hold the third Emissions Reduction Fund auction for carbon abatement contracts on Wednesday 27 and Thursday 28 April 2016. Anyone who plans to bring a new project to the third auction must apply for project registration by 9 March 2016.
http://www.cleanenergyregulator.gov.au/

Second ERF auction results

In the second Emissions Reduction Fund auction held in early November, the Clean Energy Regulator awarded 129 contracts to 77 contractors for 131 projects for 45.45 million tonnes of abatement at an average price of $12.25 per tonne. Around 56% of the contracts were for emissions reduction by vegetation.
http://www.cleanenergyregulator.gov.au/ERF/Auctions-results/November-2015

ERF method priorities

Scoping out methods for reducing emissions from fertiliser use in sugar cane production, sheep flock management and soil carbon sequestration are among the priority activities for the Emissions Reduction Fund. Vegetation priorities include savanna sequestration, abatement through avoided degradation and rehabilitation of Australian woodlands and protection and restoration of mangroves for sequestration and carbon storage.
http://www.environment.gov.au/climate-change/emissions-reduction-fund/methods/method-development

My carbon farming website

This website is for farmers, land managers and other stakeholders wanting information on carbon farming and Emissions Reduction Fund (ERF) projects.
http://www.mycarbonfarming.com.au/

Nitrous oxide emissions in southern Australia

Recent trials investigating nitrous oxide losses across southern Australia showed that adding nitrogen increased emissions, but top-dressing N over the season, rather than applying it at sowing, reduced emissions. Rates of loss were strongly correlated to soil water levels. Loss of N through other pathways such as denitrification to N2 can be large. Measurements using 15N tracers have shown a range of loss from 20 to 90 percent of fertiliser applied.
http://carbonfarmingknowledge.com.au/wp-content/uploads/2013/11/Session-4-Horsham_Nitrogen-emissions-from-fertiliser.pdf

Lake methane emissions rise with warming temperatures

Swedish research shows that global warming will progress faster expected due to greater methane emissions from freshwater lakes as temperatures rise. The researchers found that a temperature increase from 15 to 20 degrees Celsius almost doubled the methane level. This means that warming will be faster than expected from anthropogenic greenhouse gas emissions alone.
http://www.liu.se/forskning/forskningsnyheter/1.661226?l=en

Visualising methane emissions

Researchers have developed a technique to film methane as it's released into the atmosphere. The approach uses infrared imaging, and will help overcome some of the challenges in traditional ways of monitoring methane emissions, the researchers say.
http://www.carbonbrief.org/video-visualising-methane-emissions-as-they-happen

Earth's seasonal cycles from space

This time-lapse animation from NASA shows the cyclic nature of CO2 airborne levels and the seasonal vegetation that traps it. On land, the green colour represents plants and forests. In the oceans, it is phytoplankton. The animation uses combined data from different satellite instruments over many years.
http://www.carbonbrief.org/video-nasa-satellites-show-our-breathing-planet-in-action

Rangelands carbon conference presentations

Most of the presentations from the recent rangelands carbon conference at Cobar are now available for viewing online. Click on the link below and scroll down to the end to find the link to the presentations.
http://western.lls.nsw.gov.au/land-and-water/climate-change.

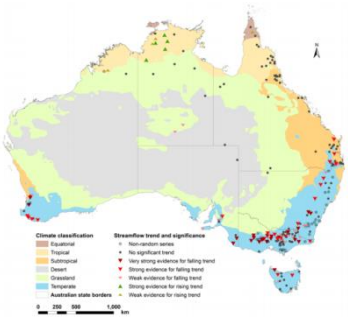
WATER

Water in Australia 2013-14

This overview from BoM examines Australia's water sources and use. Most water use occurs in the Murray–Darling Basin and around metropolitan cities. These areas mostly experienced drier than average conditions in 2013–14, with generally below average rainfall and runoff. Dry cool-seasons across southern Australia are part of below average rainfalls associated with systematic change in atmospheric circulation patterns over Australia. High pressure systems have intensified and shifted south, which forces rain-bearing weather systems south of Australia and brings dry weather. There is evidence that runoff has been reduced in

southern Australia even more than expected from the rainfall decline. The decline in rainfall seems to be drying the landscape and dropping groundwater levels so that rainfall that used to generate runoff no longer does so. The persistence of dry cool-seasons in southern Australia, and their attribution to changes in climate that are projected to continue, means that it is likely that cool-season runoff will continue to be frequently below the historical average in future. This has significant implications for future water supplies.
http://www.bom.gov.au/water/waterinaustralia/files/Water-in-Australia-2013-14.pdf

Decreasing trend for NSW streamflows



Analysis of streamflow trends around Australia reveals just nine sites with an increasing annual streamflow trend, and 72 sites with a decreasing trend, including most stations in south-eastern Queensland, NSW and Victoria. Decreasing trends were also found in seasonal streamflow, high and low streamflow and groundwater discharge, except in the Northern Territory and northern Queensland.
http://www.bom.gov.au/water/hrs/

Water security is stronger going into drought

Since the Millennium Drought, Australia's water security has been strengthened considerably. City water supplies have been augmented with climate-resilient sources and many novel water conservation measures have been locked in. In the bush, irrigation systems have been modernised, water trading systems have been enhanced and environmental water reserves have been established. However Australia's rainfall is too variable to drought-proof the continent, and climate change is making it even more so.
https://theconversation.com/as-el-nino-bites-its-time-to-take-stock-of-our-water-49898
https://theconversation.com/as-drought-looms-the-murray-darling-is-in-much-healthier-shape-just-dont-get-complacent-50063

IrriSAT App for water management

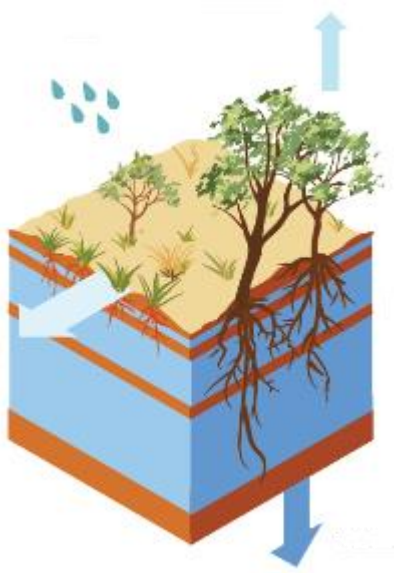
IrriSAT is a weather based irrigation management and benchmarking technology that uses remote sensing to provide site specific crop water management information across large spatial scales. The app provides easy access to the IrriSAT crop water use data which, coupled with weather and crop water use forecasts, enables irrigators to track their soil moisture deficit and better manage irrigation schedules. Spatial crop water use information determined by IrriSAT is also available through the app and will allow users to investigate water use difference within and between fields. This information can be used for changing management decisions along with investigating the impacts of these decisions.
https://irrisat-cloud.appspot.com/

Crop water management under drought

A review of crop water management under drought concludes that understanding site-specific stress hydrology is imperative to select the most efficient measures to mitigate stress. Sites with a climatic dry season require adaptation via phenology and water saving to ensure stable yields. Intermittent droughts can be buffered via the root system, which is still largely underutilised for better stress resistance. Short term solutions include mulching and

date of seeding; longer term solutions include changing tillage systems and breeding new varieties with higher stress resistance.
http://link.springer.com/article/10.1007%2Fs13593-015-0283-4#page-1

Landscape water balance



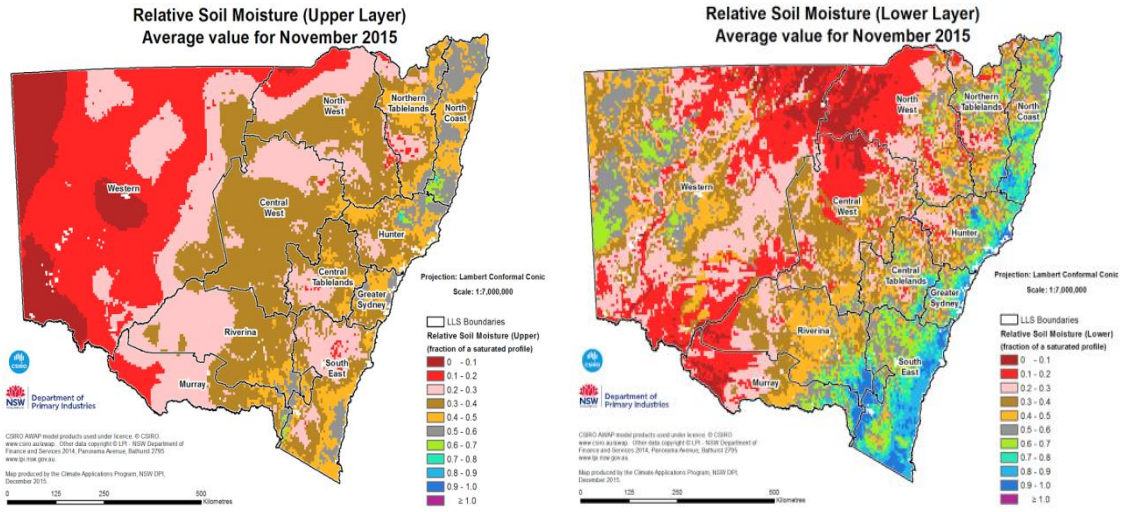
The landscape water balance is the sum of the hydrological processes that keep water moving through a landscape and determine how much moisture is in the soil. BoM has developed a new interactive website that shows data for key landscape water balance variables—soil moisture, runoff, evapotranspiration, deep drainage and precipitation—which can be aggregated by day, month or year and view to a resolution of 5 by 5 kilometres.
http://www.bom.gov.au/water/landscape/

Australian water accounts 2013-14

Agriculture accounted for 62% of Australia's water consumption in 2013-14. It consumed 11,588 GL, an 8% decrease from 2012-13, largely due to a 20% decrease in NSW from 6,210 GL in 2012-13 to 4,983 GL.
http://www.abs.gov.au/ausstats/abs@.nsf/0/34D00D44C3DFB51CCA2568A900143BDE?Open

SOILS

Soil moisture layers



NSW topsoils (left) are dry across the state apart from the central coast; subsoil moisture levels (right) are highest along the coast and ranges, particularly in the south east.
http://www.dpi.nsw.gov.au/agriculture/emergency/seasonal-conditions/regional-seasonal-conditions-reports

eDIRTand eSPADE: NSW soils systems for all

eDIRT is a web system developed by the NSW Office of Environment and Heritage for anyone recording soil information in the field. eSPADE is the NSW Office of Environment and Heritage's map-based information system that allows free and easy access to soil and land information from across NSW.
http://www.edirt.environment.nsw.gov.au

Iconic soils of NSW

NSW Soil Knowledge Network has produced short videos about NSW's important soils, describing their characteristics, identification, distribution, land uses and their social, environmental and economic contributions.
https://www.youtube.com/playlist?list=PLAemIB505mFqwFX0d-xp0pX-3HIcmh0CF

Nitrogen use efficiency must increase

Currently, the global average for nitrogen use efficiency is approximately .4, meaning 40 percent of the total nitrogen added to cropland goes into the harvested crop while 60 percent is lost to the environment. A global analysis suggests that NUE should increase to 70 percent, with only 30 percent lost to the environment, if food production is to be maintained.
http://wws.princeton.edu/news-and-events/news/item/save-earth-better-nitrogen-use-hungrier-planet-must-be-addressed

Southern Farming Systems probe trial

Southern Farming Systems have installed 62 soil probes across the high rainfall zones of Victoria and Tasmania to improve nitrogen use efficiency of growers. The probes record temperature and moisture in 10 cm increments, to a metre below the soil surface, every 15 minutes. Graphs of this data are available on the SFS website, allowing farmers to monitor their soils, and make informed management decisions, particularly fertiliser applications.
http://www.sfs.org.au/AOTGSoilProbeNetwork

WA NUE research focusing on wheat with smaller roots

WA scientists are changing the direction of their breeding efforts to improve nitrogen uptake by wheat, after the release of findings suggesting wheat genotypes with smaller root systems might be better suited to WA's water and nitrogen leaching soils.
http://www.sciencewa.net.au/topics/agriculture/item/3967-size-does-not-always-matter-for-root-systems

The contentious nature of soil organic matter

It has long been accepted that soil organic matter is composed of inherently stable and chemically unique compounds, but evidence does not support formation of large-molecular-size and persistent 'humic substances' in soils. This paper argues that soil organic matter is a continuum of progressively decomposing organic compounds, which has implications for aquatic health, soil carbon-climate interactions and land management.
http://www.nature.com/nature/journal/v528/n7580/full/nature16069.html

Erosion not accounted for in carbon storage models

A recent CSIRO study has found that the land surface model used in Australia and elsewhere in the world to calculate carbon storage fails to account for soil and wind erosion. On this basis, the Australian National Greenhouse Gas inventory overestimated the net C

flux from cropland by up to 40% and the potential (100 year) C sink is overestimated by up to 17%. Including soil erosion in land surface models should reduce uncertainty in SOC flux.
http://www.nature.com/nclimate/journal/vaop/ncurrent/abs/nclimate2829.html
http://www.smh.com.au/environment/csiro-teams-study-erodes-credibility-of-key-soil-carbon-model-20151026-gkisyw

Soil carbon in Victorian cropping and pasture systems

Victorian results of the Soil Carbon Research Program (SCaRP) found a huge range in TOC in the top 30cm of soil, from 2t/ha to 239t/ha, which corresponded to a range of 0.5 to 11 percent in the top 10 centimetres. Climate was the key influencing factor, followed by soil. Together, they explain 80-86 percent of TOC variations. Researchers suggest growers can use the following rule of thumb: TOC increases by 12t/ha for every 100mm rainfall.
http://carbonfarmingknowledge.com.au/1557-2/

Role of fungi in carbon sequestration

This interview with University of Sydney's Peter McGee outlines how certain types of fungi may have an important role in the long-term sequestering of carbon in soil.
http://www.futuredirections.org.au/publications/fdi-feature-interviews/2451-soil-carbon-and-the-role-of-fungi-in-the-long-term-sequestering-of-carbon-in-soil-associate-professor-peter-mcgee.html

What's the story with soil carbon?

Victorian researchers have produced a seven minute overview of soil carbon in agriculture in collaboration with Fertiliser Australia to be used in national advisor training.
https://m.youtube.com/watch?v=LEYOkgcu6Cw

Soil carbon snapshot

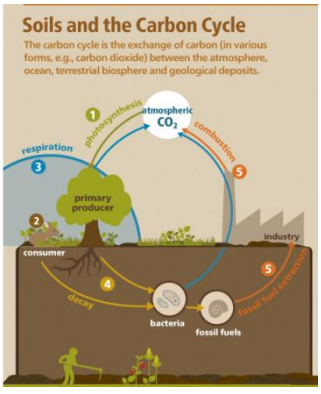
This summary from Fertcare provides a snapshot of current knowledge and signposts the key messages and reports coming from recent research and investigations across Australia.
http://www.fertilizer.org.au/files/pdf/fertcare/Fertcare%20Soil%20Carbon%20Snapshot.pdf

SmartSoil toolbox

SmartSoil is a European initiative aimed at reducing threats to soils under climate change. The toolbox has been designed to help advisers and farmers identify cost effective management options to optimise crop yields and soil carbon for their particular farming systems, soils and climates. The toolbox includes a decision support tool, case studies, fact sheets and videos.
http://smartsoil.eu/smartsoil-toolbox/about/

FAO climate and soils

A new soil and climate infographic from FAO outlines the importance of sustainable management practices such as crop rotation, zero tillage, conservation agriculture, agroforestry and agroecology, in decreasing greenhouse gas emissions, enhancing carbon sequestration and building resilience to climate change.
http://www.fao.org/resources/infographics/infographics-details/en/c/340783/



NSW GOVERNMENT Department of Primary Industries

Management strategies for water-repellent soils

A range of management strategies has been developed to offset the impact of water repellence on crop production. Mitigation strategies minimise the effects of water repellence without reducing the non-wetting status of the soil, and effects can last from a few months to two years. Amelioration strategies correct or remove water-repellent topsoil with benefits usually lasting three years or more.
http://www.grdc.com.au/Media-Centre/Ground-Cover-Supplements/Ground-Cover-Issue-118-Soil-constraints/Maintain-water-channels

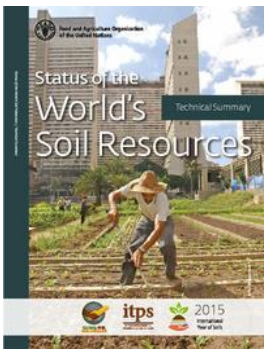
Warrumbungles soil erosion study

After the destructive 2013 bushfires in Warrumbungle National Park an intense storm immediately following the fires caused flash-flooding and massive soil erosion. Research projects in the park aim to determine the extent of the damage, and rates of recovery.
http://www.nationalparks.nsw.gov.au/conservation-programs/after-fire-warrumbungle-national-park-soil-erosion-and-water-quality

Nature articles on soils

This collection of articles from Nature explore soil's roles in shaping the Earth's environment and human society. Topics include deep influence of soil microbes, climate-proof farms and the influence of soils on human health and extreme poverty.
http://www.nature.com/collections/fyyphcfxjb

Status of the World Soil Resources

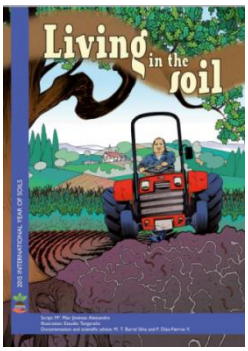


Almost one-third of the world's farmable land has disappeared since 1975 due to erosion from ploughed fields, with intensive agricultural practices severely impacting the ongoing viability of crop lands according to this new UN report. The world's soils are rapidly deteriorating due to soil erosion, nutrient depletion, loss of soil organic carbon, soil sealing and other threats. However, this trend can be reversed if countries promote sustainable management practices and appropriate technologies.
http://www.fao.org/news/story/en/item/357059/icode/

Soil biodiversity contributes to human health

Soil biodiversity is increasingly recognised as providing benefits to human health because it can suppress disease-causing soil organisms and provide clean air, water and food. Promoting the ecological complexity and robustness of soil biodiversity through improved management practices represents an underutilized resource with the ability to improve human health.
http://www.nature.com/nature/journal/v528/n7580/full/nature15744.html
http://espade.environment.nsw.gov.au

Living in the soil



Spain's Soil Science Society published this comic to celebrate the Year of Soil, and it has now been translated into English.
http://www.secs.com.es/wp-content/uploads/2015/07/Comic-ingl%C3%A9s-WEB.pdf

LED lamp powered by soil microorganisms

Peru researchers have developed a low-cost LED lamp that uses plants and soil as batteries. Each unit consists of a planter with an electrode grid buried in the soil, in which a single plant is growing. The electrode grid grabs free electrons generated by oxidation processes and stores the energy in a conventional battery, also buried in the soil. The battery then powers the low-consumption LED lamp, attached to the side of the planter.
http://news.discovery.com/tech/alternative-power-sources/plant-lamp-draws-electricity-from-soil-151124.htm

BIODIVERSITY

Biodiversity recovers on removal of nitrogen

Rothamsted Research's 160-year-old park grass experiment shows a positive response of biodiversity to reducing nitrogen. Legumes, species richness and diversity increased as N deposition declined. Plots that stopped receiving inorganic N fertiliser in 1989 have recovered much of the diversity that had been lost, especially if limed. It is likely that the recovery of plant communities has been facilitated by the twice-yearly mowing and removal of biomass.
http://www.nature.com/nature/journal/vaop/ncurrent/abs/nature16444.html

Link between overgrazing and locusts

Research in Inner Mongolia has shown that overgrazing promotes locust outbreaks by lowering plant nitrogen content. These patterns in behaviour are currently being tested in rangelands in West Africa and Australia, including DPI's Trangie research station. These experiments may help to explain how grazing management in Australian rangelands influences locust outbreaks in higher rainfall areas and lead to better predictive tools and management of Australian locust plagues.
http://bioscience.oxfordjournals.org/content/65/6/551.full

TAPPAS wind dispersal tool

CSIRO, along with the Bureau of Meteorology and Intersect, has launched TAPPAS, an online tool for modelling the wind dispersal of living organisms, to better prepare for and respond to wind-borne threats. TAPPAS can be programmed to study long-distance wind dispersal relevant to many fields including biogeography, ecology, pollen allergens, dust and smoke.
https://research.csiro.au/TAPPAS

Australia has healthy bees

Australia's first national survey of honey bee viruses has found we have one of the healthiest honey bee *(Apis mellifera)* populations in the world. Researchers used molecular tools to screen 1240 hives representing 155 apiaries across Australia for 10 honey bee viruses, as well as using hive inspections at each apiary and molecular testing to monitor the spread of non-viral pests and diseases.
http://www.rirdc.gov.au/news/2015/11/03/healthy-bee-population-proves-good-for-exports

Non-bee pollinators also important

UNE-lead international research into pollination has found that non-bee pollinators such as flies, butterflies, moths, beetles, wasps, ants, and thrips performed 25 to 50 per cent of the total number of flower visits. Although non-bees were less effective pollinators than bees per flower visit, they provided slightly more visits, resulting in pollination services similar to bees. Fruit-set in crops increased with non-bee insect visits, independently of bee visitation rates, indicating that non-bee insects provide a unique benefit not provided by bees. Non-bee pollinators were also less sensitive to habitat fragmentation than bees."
https://www.uq.edu.au/news/article/2015/11/bee-may-not-be-be-all-and-end-all-crop-pollination

Riparian strips boost pollinators

UK research has found that riparian margins along waterways support more insect pollinators than grassland fields; the wider the buffer the more abundant the pollinators. Management to promote flowering plants may enhance the biodiversity value of buffer strips.
http://openaccess.sruc.ac.uk/handle/11262/10779

Outbreak pest and disease website revamped

The Department of Agriculture and Water Resources' new look Outbreak website includes interactive maps, the ability to search by state and territory or a particular pest or disease, and links through to local information.
www.outbreak.gov.au

RHD Boost for rabbit control

RHD Boost is a national project involving the roll out of a new naturally occurring overseas strain of rabbit calicivirus called RHD K5. RHDV K5 release is pending APVMA approval. Approval is expected 2015/16 and release is proposed to follow in autumn of 2016 or 2017 – a time of year when kitten numbers are at their lowest.
http://www.pestsmart.org.au/what-is-rhd-boost/

Fruit fly trap proves its worth

A female fruit fly trap invented in Victoria and developed and tested at DPI's Horticultural Market Access Laboratories at Ourimbah has proved successful in reducing fruit flies in several fruit-growing districts.
https://nucleus.iaea.org/sites/naipc/twd/Documents/Biotrap_Evaluation_Jessup.pdf

ENERGY

Australian Bioenergy Fund established

The Clean Energy Finance Corporation has committed $100 million to a new equity fund for bioenergy and energy-from-waste. The Australian Bioenergy Fund will invest in a range of technologies including sustainably sourced biomass-to-energy projects, production of biofuels, and energy from agricultural waste.
https://www.cleanenergyfinancecorp.com.au/media/158193/cefc-factsheet_australian-bioenergy-fund_lr.pdf

Bioenergy and energy from waste in Australia

This report looks at the potential of the energy from waste market, including waste from intensive livestock and food processing industries, and plantation forest residues.
http://www.cleanenergyfinancecorp.com.au/media/107567/the-australian-bioenergy-and-energy-from-waste-market-cefc-market-report.pdf

SA bioenergy roadmap

A bio-energy roadmap for South Australia reports that agricultural biomass such as crop stubbles, and fruit and nut processing wastes have potential for bioenergy production.
http://www.renewablessa.sa.gov.au/files/a-bioenergy-roadmap-for-south-australia--report--version-1-appendix-a-removed.pdf

Wheat ethanol plant for Deniliquin?

Korean company Dongmun Greentec is looking to invest $77 million in a new ethanol plant southwest of Deniliquin that will produce 115 million litres/yr from 300,000 tonnes of locally grown wheat. The project would consume upwards of 870 million litres of water annually, half from recycling and half from the city's water system.
http://dongmungreentec.com.au/

WA oat husk biomass unit

A new biomass unit in Wagin WA is using oat husks to generate heat and power in an oat mill to reduce operating costs and emissions.
http://ecogeneration.com.au/news/new_wa_biomass_unit_uses_oat_husks_to_reduce_emissions/99705

FOOD

Climate change, food security and the US food system

This new USDA report on the impacts of climate change on US food systems warns that climate change will likely have far-reaching impacts on food security worldwide, especially for the poor and those in tropical regions. Warmer temperatures and altered precipitation patterns will affect food production, transportation, and safety.
http://www.usda.gov/oce/climate_change/FoodSecurity.htm

Food futures

'The future of food is uncertain. Not since the Second World War has there been a more pressing need to look again at how we produce, distribute, value and consume our food.' This report from UK's Waste and Resources Action group looks at food trends and ways forward to ensure a productive and sustainable food system.
http://www.wrap.org.uk/sites/files/wrap/Food_Futures_%20report_0.pdf

Eating in Sustainia: Food systems of tomorrow

This report emphasises that we need to consider both the nutritional and sustainability aspects of food policies if we are to have healthy and secure dinners in 2050. This includes the need for careful analysis and research to ensure that every step of the food production and distribution system has the smallest environmental footprint possible, yet maximises

population health outcomes. There are practical ideas for policymakers, food producers, food providers and consumers.
http://sustainia.me/resources/publications/Eat_in_Sustainia_2015.pdf

Local food movements in review

A review of local food movements in the US and UK in recent decades has found that more effective strategies for national policy change required social-movement building strategies, joining together separate rural, farming, food, and health interests. Single issue campaigns often undermined long-term policy change.
https://www.routledge.com/products/9781138888432

The Crunch

The Crunch is a new program from the Wellcome Trust, an independent charitable foundation dedicated to improving health around the world. The Crunch program emphasises the interconnections between food, health and planet, and aims to contribute to national food policy.
http://thecrunch.wellcome.ac.uk/the-crunch

Rabobank report food system recommendations

The food and agriculture industry must increase production, availability and access to food significantly over the next ten years if it is to meet the demands of a larger, increasingly urban global population according to a new report presented by Rabobank.
https://www.rabobank.com/en/press/search/2015/20151016-farming-and-agriculture.html

Changing climate, changing diets

This report from UK thinktank Chatham House explores attitudes towards the relationship between meat and dairy consumption and climate change. It recommends government and society action to reduce meat and dairy consumption and global emissions.
https://www.chathamhouse.org/publication/changing-climate-changing-diets

The role of cities in climate resilient food systems

This briefing from Foodprint Melbourne outlines the importance of city region food systems in creating resilient and sustainable food production as climate pressures increase and natural resources become less available.
http://www.ecoinnovationlab.com/wp-content/attachments/Foodprint-Briefing-Role-of-cities-in-climate-resilient-food-systems.pdf

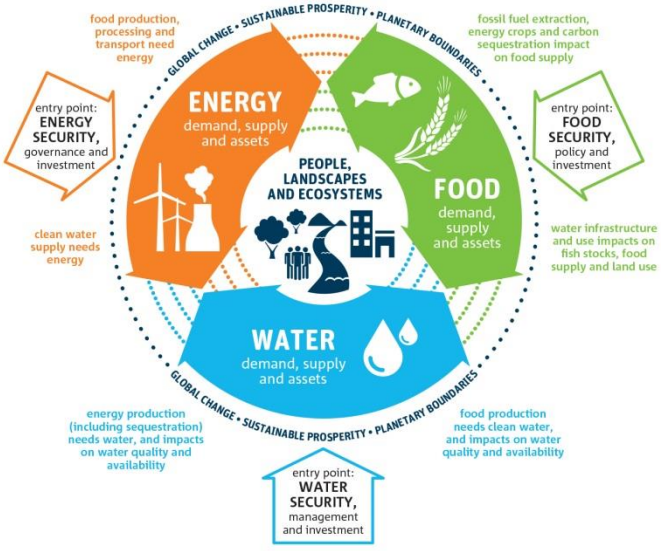
Cities and agriculture

This book provides an overview of crucial aspects of urban food systems based on an up to date review of research results and practical case studies.
https://www.routledge.com/products/9781138860599

SUSTAINABILITY

CSIRO: National Outlook 2015

This outlook identifies key future global drivers, particularly the 'energy-water-food nexus' and the prospects for Australia's materials- and energy-intensive industries. In relation to agriculture, future agricultural prices and land sector incomes are projected to trend upwards. Australia's most productive agricultural land is likely to continue to be used for productive agricultural use. Productivity growth combined with new land sector markets could lift agrifood exports and deliver regional economic benefits. With productivity improvements in line with long-term trends, Australian agricultural output volumes are projected to rise by at least 50% by 2050 – even in scenarios where bioenergy and plantings for carbon sequestration increase. New markets and policy settings that enable carbon farming, especially in currently less productive areas, would allow many rural landowners to increase and diversify their incomes.



http://www.csiro.au/nationaloutlook/
http://www.nature.com/nature/journal/v527/n7576/full/nature16065.html

Banksia award winners

Winners of 2015 Banksia Foundation awards for sustainability excellence include the Australian dairy industry's sustainability framework, SA's Kalleske Organic Wines, Gold Coast Council's flood emergency decision support system, and Victoria's Grown and Gathered sustainable food and farming system.
http://banksiafdn.com/winners/

Natural capital impacts in agriculture

This FAO report assessing natural capital impacts of cropping and livestock production found that the natural capital costs of global crop production are almost nearly USD 1.15 trillion, over 170 percent of its production value. Natural capital costs of livestock production are over USD 1.18 trillion, 134 percent of its production value. Most of the natural capital costs occur on farm.
http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Final_Natural_Capital_Impacts_in_Agriculture_-_Supporting_Better_Business_Descision-Making_v5.0.pdf

TEEB for Agriculture & Food: an interim report

This report from The Economics of Ecosystems and Biodiversity says that most of the impacts from various different types of agricultural and food systems are economically

invisible and do not get the attention they deserve from decision-makers. There is therefore a need to evaluate all significant externalities of eco-agri-food systems, to better inform decision-makers in governments, businesses and farms. Furthermore, there is a need to evaluate the eco-agri-food systems complex as a whole, and not as a set of silos.
http://www.teebweb.org/agriculture-and-food/

EVENTS

February 14-16	2nd National EcoArts Australis Conference, Wollongong http://www.ecoartsaustralis.org.au/events-and-projects/conference-2016
February 14-18	6th Greenhouse gas and animal agriculture conference, Melbourne http://www.ggaa2016.org/
April 27-28	Climate Change Research Strategy for Primary Industries, Sydney http://www.ccrspi.net.au/event/ccrspi-2016-primary-industries-striving-climate-resilience
May 1-3	PIEFA food and fibre matters conference, Canberra http://www.piefa.edu.au/conference2016/
May 24-26	Irrigation Australia International Conference and exhibition, Melbourne http://irrigationaustralia.com.au/
July 5-7	Climate change adaptation 2016 conference, Adelaide http://climate-adaptation.org.au/events/climate-adaptation-2016/
December 4-8	7th International Nitrogen Initiative Conference, Melbourne http://www.ini2016.com/

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NRM on Farms is a monthly newsletter that summarises recent information about climate and natural resource management relevant to agriculture to keep farmers and agricultural and NRM advisors and researchers up to date. It is freely available to anyone interested or involved in agriculture or NRM. To subscribe, email Rebecca Lines-Kelly at rebecca.lines-kelly@dpi.nsw.gov.au.