

NRM on farms

News about climate and natural resource management in agriculture

December 2017

Photo courtesy Jayfields Nursery, Holbrook in southern NSW. If you would like to submit a photo for the masthead illustrating good NRM management in agriculture please send it to nrmonfarms@iprimus.com.au

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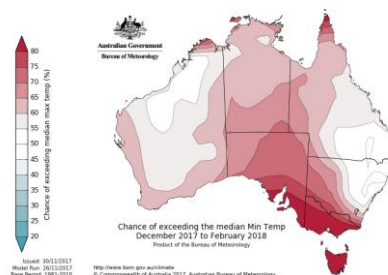
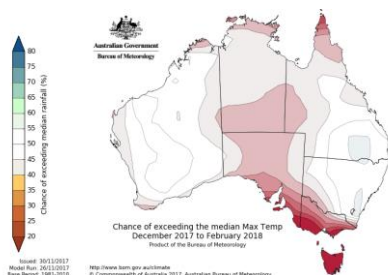
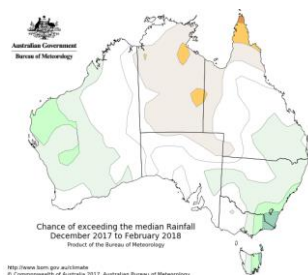
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CLIMATE

Seasonal outlook



The December to February rainfall outlook shows no strong swing towards a wetter or drier conditions for most of Australia, but December is likely to be wetter than average for southeast Australia. Temperatures are likely to be warmer in far north, central and southern Australia.

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

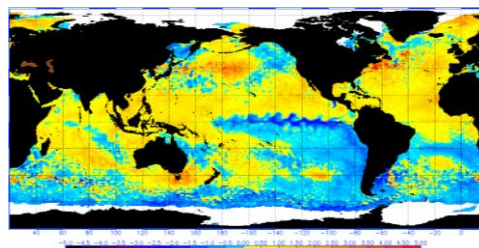
<http://www.bom.gov.au/climate/outlooks/#/overview/video>

Ocean surface temperatures cooling

Sea surface temperatures are cooler than average in the eastern Pacific Ocean and along South America while warm temperatures are occurring along southern Australia, and south of Japan.

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

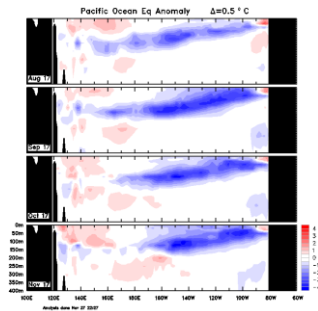
<http://www.bom.gov.au/climate/enso/#abs=Sea-surface>



Subsurface temperatures cooling

Cool anomalies persist across eastern equatorial Pacific Ocean down to 200m while warmer anomalies expand in the west.

<http://www.bom.gov.au/climate/enso/>

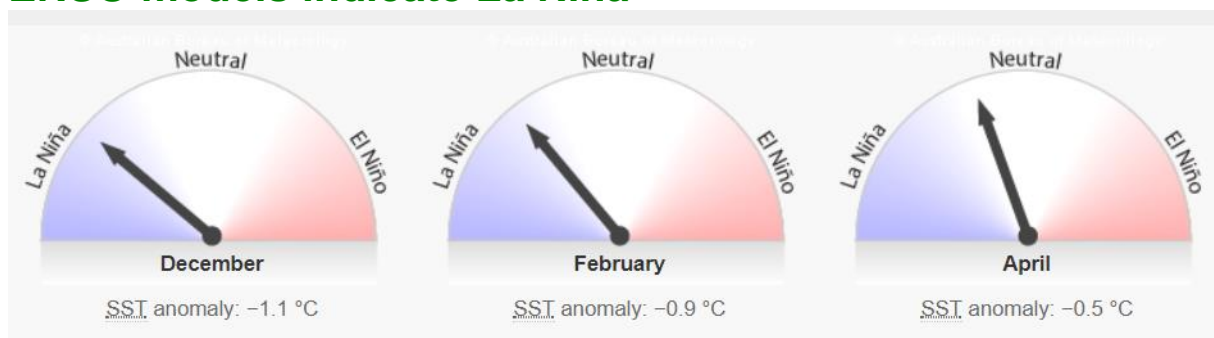


ENSO is at La Niña ALERT

There is approximately a 70% chance of La Niña occurring so BoM has raised its ENSO Outlook to La Niña ALERT. All international climate models suggest further cooling of the tropical Pacific is likely. La Niña typically brings above average rainfall to eastern Australia during late spring and summer, but sea surface temperature patterns in the Indian Ocean and closer to Australia are not typical of La Niña, reducing the likelihood of widespread summer rainfall. La Niña can also increase the chance of prolonged warm spells for southeast Australia.

<http://www.bom.gov.au/climate/enso/outlook/>

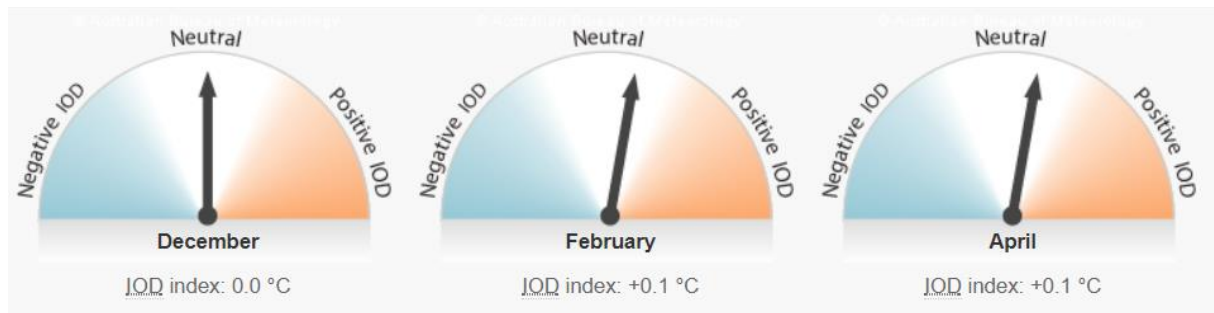
ENSO models indicate La Niña



All models reach La Niña thresholds in December 2017, and most maintain these values until at least February 2018.

<http://www.bom.gov.au/climate/model-summary/>

IOD models continues neutral



The Indian Ocean Dipole (IOD) is currently neutral. IOD events are typically unable to form between December and April.

<http://www.bom.gov.au/climate/enso/#abs=Indian-Ocean>

SOI

The 30-day Southern Oscillation Index (SOI) to 19 November is +5.7. 30-day values have dropped back to the neutral side of La Niña threshold values, but the 90-day value (+7.5) remains within the La Niña value range.

<http://www.bom.gov.au/climate/enso/#abs=SOI>

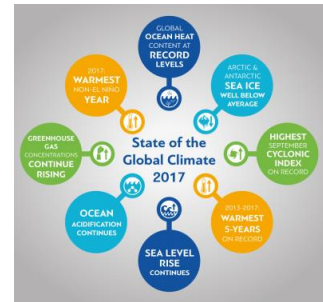


GLOBAL CLIMATE

2017 likely to be one of three hottest years on record

The World Meteorological Organisation says it is very likely that 2017 will be one of the three hottest years on record, with many high-impact events including catastrophic hurricanes and floods, debilitating heatwaves and drought. Long-term indicators of climate change such as increasing carbon dioxide concentrations, sea level rise and ocean acidification continue unabated. Arctic sea ice coverage remains below average and previously stable Antarctic sea ice extent was at or near a record low.

<https://public.wmo.int/en/media/press-release/2017-set-be-top-three-hottest-years-record-breaking-extreme-weather>



Climate Science Special Report

This report, published by 13 US federal agencies, has found that evidence of global warming is stronger than ever, and that more than 90% of it has been caused by humans. The report finds that: 'it is extremely likely that human activities, especially emissions of greenhouse gases, are the dominant cause of the observed warming since the mid-20th century... there is no convincing alternative explanation supported by the extent of the observational evidence'.

<https://science2017.globalchange.gov/>

Historic cold periods linked with changed Atlantic currents

Analysis of ancient sediments in the North Atlantic Ocean show that during historic cold periods, icy-cold waters from the Arctic flowed south into the Labrador Sea in the North Atlantic, altering the ocean circulation patterns and potentially slowing down the currents that transport heat to Europe. This slowing occurred during the Little Ice Age 1300-1850, and in the 6th century when there were widespread crop failures and worldwide famines. The Atlantic is currently receiving more freshwater from melting Arctic ice, which is in turn affecting the movement of the waters in the North Atlantic.

<https://www.sciencedaily.com/releases/2017/11/171123094328.htm>

CLIMATE IMPACTS

Clear link between climate change and bushfire conditions

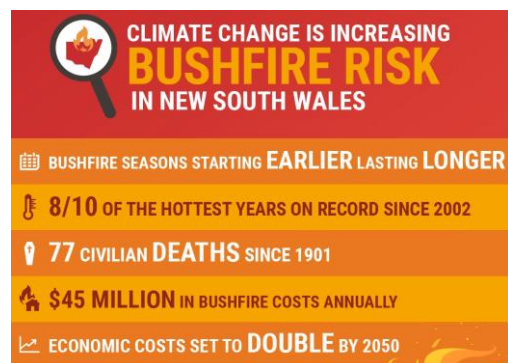
Analysis of weather conditions that influence fire activity has shown a clear link between climate change and bushfire conditions over the past 67 years, including a trend to more dangerous fire weather conditions in some regions. Increases in average Forest Fire Danger Index values for spring and summer show that fire weather conditions in southern Australia have become increasingly more dangerous in recent decades. Extreme fire weather has also become more frequent for some seasons and regions of Australia.

<http://nеспclimate.com.au/more-dangerous-bushfire-conditions-due-to-climate-change/>

NSW bushfires: Earlier, more frequent and more dangerous

The Climate Council says NSW is facing increasingly dangerous bushfire seasons, commencing earlier and lasting longer as a result of intensifying climate change exacerbating record breaking heat in winter and early spring.

<https://www.climatecouncil.org.au/nsw-bushfires-2017>

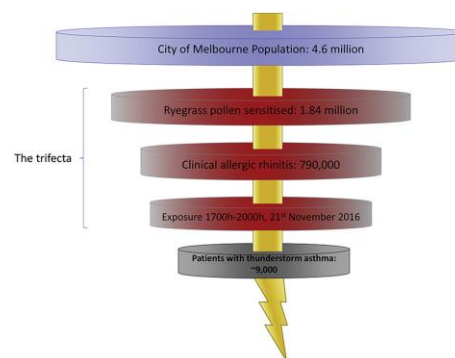


Thunderstorm asthma and pollen forecasts

Research has shown that most patients affected by thunderstorm asthma in Victoria last year were outside, or inside with open windows, at the onset of the storm. People who may be vulnerable to pollen allergies and thunderstorm asthma should be aware that exposure to weather and environmental conditions can lead to exacerbation of symptoms. During high-risk periods, they should stay indoors with all windows shut.

<https://theconversation.com/thunderstorm-asthma-whos-at-risk-and-how-to-manage-it-86397>

<http://www.sciencedirect.com/science/article/pii/S0954611117303517>



US models predict La Nina entering second year

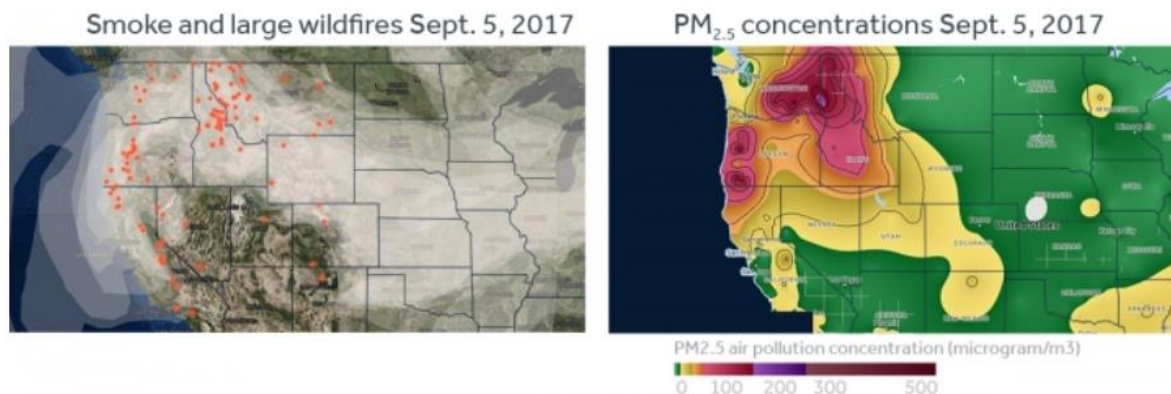
US research into La Nina has found that La Niña's impact on atmospheric circulation and southern US drought becomes stronger in the second year despite a weakening of La Niña's cooling over the tropical Pacific relative to the first year. During the second year, the tropical Pacific cooling weakens in a narrow band along the equator, but becomes broader. The broader cooling appears more effective at influencing the atmosphere far away from the tropical Pacific, according to analysis of historical observations.

<https://www.sciencedaily.com/releases/2017/11/171116114206.htm>

Wildfires increase air pollution

While California air is becoming cleaner overall, it's getting dirtier during the lengthening fire season. Wildfires are a source of PM_{2.5} (particulate matter less than 2.5 microns in diameter), which can become lodged in lungs and cause or intensify a wide array of health problems such as asthma and heart disease. Sacramento Valley is now seeing 50 to 60 percent of PM_{2.5} exceedances occurring during the fire season in some years, compared with 10 percent in earlier years.

<http://www.climatecentral.org/news/report-wildfires-undermining-air-pollution-progress-21753>



CLIMATE TOOLS

Dual polarisation radar identifies hail

BoM is now using dual-polarisation radar technology to identify hailstones in thunderstorms. 'Dual-pol' uses two simultaneous beams aligned horizontally and vertically. When these beams scatter off precipitation, observers can see the difference between flatter shapes of rain droplets and the rounder shapes of hailstones. Dual-pol information is now streaming from the recently upgraded operational radars in Adelaide, Melbourne, Sydney and Brisbane but more work is needed to accurately estimate hail size.

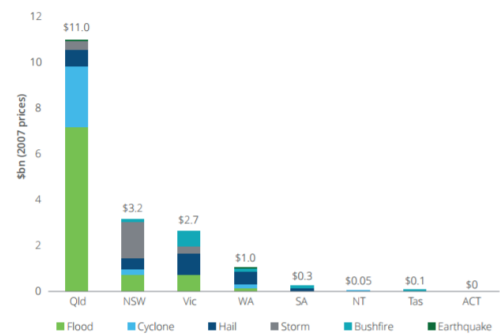
<https://theconversation.com/all-hail-new-weather-radar-technology-which-can-spot-hailstones-lurking-in-thunderstorms-86856>

Building resilience to natural disasters

This report from the Australian Business Roundtable for Disaster Resilience & Safer Communities assesses the resilience of our states and territories to natural disasters and how resilience can be built by more effective collaboration between government, business and community groups.

<https://www2.deloitte.com/content/dam/Deloitte/au/Documents/Economics/deloitte-au-economics-building-resilience-natural%20disasters-states-territories-161117.pdf>

Chart 2.4: Total economic cost of natural disasters, by state, average 2007-2016 (\$bn)



Climate-smart agriculture sourcebook

This FAO digital publication comprises a wide range of knowledge and expertise on the concept of CSA to make agricultural sectors (crops, livestock, fisheries and forestry) more sustainable and productive, while responding to the challenges of climate change and food security.

<http://www.fao.org/climate-smart-agriculture-sourcebook/en/>

Seven trends that could avert climate change

The Guardian reports that a series of fast-moving global megatrends, spurred by trillion-dollar investments, indicates that humanity might be able to avert the worst impacts of global warming. These megatrends are: plant-based foods, renewable energy, decline of coal, electric cars, battery storage, energy efficiency and tree planting.

<https://www.theguardian.com/environment/2017/nov/08/seven-megatrends-that-could-beat-global-warming-climate-change>

EMISSIONS

Fossil fuel emissions hit record high

Global greenhouse emissions from fossil fuels and industry are on track to grow by 2% in 2017, reaching a new record high of 37 billion tonnes of carbon dioxide, according to the 2017 Global Carbon Budget. The rise follows a three-year period during which global CO2 emissions barely grew, despite strong global economic growth.

<https://theconversation.com/fossil-fuel-emissions-hit-record-high-after-unexpected-growth-global-carbon-budget-2017-87248>

Critical Decade 2017: Accelerating Climate Action

This new report from the Climate Council shows that Australia is failing to tackle climate change with emissions rising and a lack of a coherent, long-term national approach to reduce emissions in the short, medium or long term. Amongst the G20 countries, Australia's emission reduction target of 26-28% on a 2005 baseline is unusually weak.

<https://www.climatecouncil.org.au/critical-decade-2017>

British livestock and climate change

This booklet of 23 case studies details livestock improvements in farm productivity and efficiency to enhance resilience, reduce the industry's greenhouse gas footprint and ensure that carbon accounting systems 'credit' mitigation benefits that agriculture can deliver.

<https://www.nfuonline.com/assets/101493>



Warming temperatures encourage release of methane

More and more methane is bubbling up from water due to climate change. Researchers predict that a temperature rise of 1°C leads to 6-20 percent higher emission of methane bubbles.

<https://www.sciencedaily.com/releases/2017/11/171122093100.htm>

SOILS

World Soil Day 5 December

The theme of World Soil Day 2017 is 'Caring for the planet starts from the ground. Soil is a finite natural resource, but despite its essential role in human life, there is a worldwide increase in degradation of soil resources due to inappropriate management practices, population pressure driving unsustainable intensification, and inadequate governance.

<http://www.fao.org/world-soil-day/en/>

Soil fungi and manure

This short video from Boorowa farmers David Marsh and Charlie Arnott outlines how soil fungi help to recycle animal manure to fertilise farm soils.

<http://www.arlash.com/2017/11/11/natures-recyclers-fungi-and-manure/>

Breeding more salt-tolerant grapevines

Australian scientists have found a specific mutation in a sodium transport protein in grapevine roots which leads to more salt leaking into the shoots of vines from the soil. The discovery has led to development of genetic markers to breed more salt-tolerant grapevine rootstocks specifically for Australian conditions.

<https://www.sciencedaily.com/releases/2017/11/171123131202.htm>

Manuring regimes differ in SOM and yield results

A UK trial of five different manuring regimes found that treatments giving the greatest yield increases were not necessarily those improving key soil health indicators. A double rate of green compost was most effective in improving soil organic matter and increasing earthworm populations while chicken manure actually reduced earthworm numbers. Farmyard manure produced the best wheat yields and water infiltration rates.

<http://www.agrii.co.uk/agrii-east-journal-autumn-2017/?page=1>

The fate of plant inputs in the soil

US scientists have found that while plant inputs affect total carbon and nitrogen retention, the soil horizon affects how the litter-derived soil organic material is stabilised in the long term. In the organic horizon, litter was retained in the coarse particulate size fraction over 10 years, most likely due to conditions that limited its physical breakdown. In the mineral horizon, litter-derived carbon and nitrogen were broken down quickly, and retained in a finer size fraction (less than 2 millimeters), most likely due to association with minerals that prevented microbes from fully accessing the carbon and nitrogen.

<https://www.sciencedaily.com/releases/2017/11/171115152729.htm>

Flooded soils and organic matter

A US study has found that timing plays a key role in how well wet soils retain organic matter. While soils with consistently high moisture content do retain organic matter over the long term, soils may actually lose organic matter during shorter spans of flooding. The findings have implications for agricultural fields that are poorly drained or flood for a few weeks of the year before drying out. The study also shows that wetlands, thought of as a useful tool for conservation and carbon sequestration, may require consistent flooding to realise environmental benefits from organic matter accumulation.

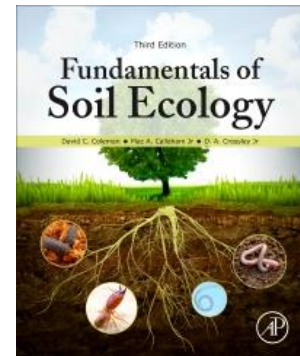
<https://www.sciencedaily.com/releases/2017/11/171124084933.htm>



New edition: Fundamentals of soil ecology

The third edition of this book includes an expanded treatment of microbial ecology and new sections on advances in molecular techniques and climate change research. The book offers a holistic approach to soil biology and ecosystem function, emphasising the increasing importance of soils as the organising centre for all terrestrial ecosystems.

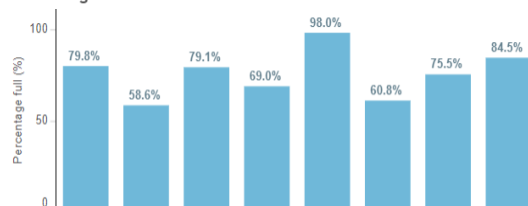
<https://www.elsevier.com/books/fundamentals-of-soil-ecology/coleman/978-0-12-805251-8>



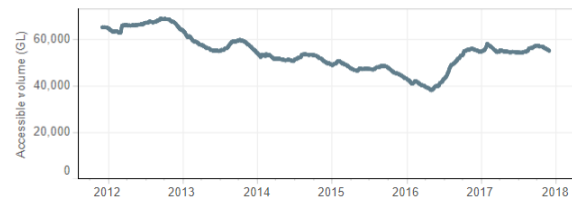
WATER

Water storages

Percentage full - States and Territories



Accessible volume - Australia



MDB water compliance review recommendations

Recommendations by the recent MDB water compliance review include a 'no meter, no pump' policy; a mandate for standardised metering; NSW and Qld to accurately measure 95 per cent of floodplain harvesting and update their assessment of take; and each state to review its hydrologic models, publish an improvement program for hydrologic models and, by June 30 2018, review compliance and governance arrangements, publish compliance strategies, and review legislation and propose necessary amendments.

<https://www.documentcloud.org/documents/4310150-MDB-Compliance-Review-Final-Report.html>

NSW Ombudsman investigation into water compliance

This progress report from the NSW Ombudsman outlines the status of a current investigation into the enforcement of the principles and rules of effective water management. The report explains the background to its current investigation, the nature of the allegations being investigated, the procedural steps undertaken so far, the work required to complete the investigation and the projected date of completion.

<https://www.ombo.nsw.gov.au/news-and-publications/publications/reports/state-and-local-government/investigation-into-water-compliance-and-enforcement-2007-17>

Onfarm digital networks save water

North Queensland cane farmers are saving up to 20% on irrigation costs courtesy of onfarm digital networks that include LoRaWAN (long range wide area network) gateways, micro-weather stations, pump flow meters and soil moisture sensors. The networks provide real time data on the soil moisture levels to prevent over irrigation and water wastage.

<http://www.agrifutures.com.au/news/smart-startup-saving-water-australias-ionic-reef/>

BIODIVERSITY

Pest exclusion fence to reduce grazing pressure

Western NSW's Gilgunnia cluster fencing project has built a 210 km perimeter fence around 177,000 hectares to exclude pest animals such as wild dogs, pigs and kangaroos from 22 properties and reduce total grazing pressure. Landholders have already reported significant reductions of pest animals along their section, with one remarking it has stopped several hundred pigs from entering their property every evening.

<https://landcareaustralia.org.au/project/landholders-work-together-to-control-grazing-pressure-and-pest-animals>

Restoring rock habitat on farming land

A new Threatened Species Recovery Hub project will develop and trial novel methods for restoring critical rock habitat in farming landscapes in NSW and will evaluate the response of threatened grassy woodland vegetation and reptile communities to these techniques.

<http://www.nespthreatenedspecies.edu.au/projects/enhancing-critical-habitat-for-the-pink-tailed-worm-lizard-in-agricultural-landscapes>

Biodiversity Strategy submissions close 15 December

Submissions for the Draft Biodiversity Conservation Investment Strategy 2017–2037 close at 5pm on 15 December. The strategy sets the government's priorities for investing in private land conservation over 20 years.

<http://www.environment.nsw.gov.au/conservationprograms/biodiversityconservation-investment-strategy.htm>

FrogID app

FrogID is a new smartphone app from the Australian Museum to help people count and locate Australia's frogs. The app records male frogs' chirps, barks and croaks to aid identification. Of the 240 native Australian species, four frogs are already extinct, five are critically endangered, 14 are endangered and 10 are vulnerable.

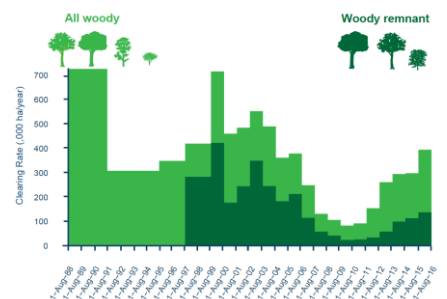
<https://www.froid.net.au/>

Australia is a major deforester

Eastern Australia is one of the world's major deforestation fronts due mainly to land clearing in Queensland where 395,000ha was cleared in 2015-16: an increase of one third on 2014-15.

<https://theconversation.com/australia-is-a-global-top-ten-deforester-and-queensland-is-leading-the-way-87259>

<https://publications.qld.gov.au/en/dataset/land-cover-change-in-queensland-2015-16>



Restoring hawthorn hedges

Tasmanian and Victorian farmers are restoring hawthorn hedge fences originally planted by convicts. The hawthorn bushes are cut, pushed, bent and chainsawed to create thick hedges that keep livestock contained and provide valuable bird habitat.

<http://www.abc.net.au/news/2017-11-04/restoring-tasmanias-hawthorn-hedges/9106960>

ENERGY

Forest residues could power thousands of homes

New research suggests there are enough residues in the NSW north coast's sustainably managed forests and sawmills to power more than 200,000 local homes per year. The research found more than one million tonnes of forestry residues from harvesting operations surrounding regional hubs Grafton, Kempsey and Bulahdelah could be used for bioenergy, with no adverse environmental impacts.

<https://www.dpi.nsw.gov.au/forestry/north-coast-residues-project>

Solar power pumps water for date farm

A Central Australian date farm now waters its palms through a single solar-powered bore after previously consuming about a litre of diesel per kilo of dates. The 18-kilowatt solar panels power the farm's water bore to pump about 500,000 litres a day to water 700 palms and supply domestic water without batteries or large tank storage.

<http://www.abc.net.au/news/rural/2017-11-14/outback-palm-farm-getting-more-from-the-bore-on-solar/9142582>

Floating solar farm to power Lismore's sewage plant

Australia's first floating solar farm is being established at Lismore NSW. Solar panels float on the surface of an overflow pond at the East Lismore Sewage Treatment Plant and the

generated electricity partially powers the plant. The cooling properties of water also help the solar panels last longer and perform better, while increased shade over the pond reduces evaporation and algal growth. Walkways on the floating island allow maintenance workers to keep the solar panels clean.

<http://www.abc.net.au/news/2017-11-16/australias-first-floating-solar-farm-will-be-buoyant-in-lismore/9157878>

Agrophotovoltaics increase land use efficiency

A German agrophotovoltaics pilot project combining crops and overhead solar energy systems has increased power supply to the farm and slightly reduced crop yields. The 720 bifacial solar modules produce solar electricity on their front side and back with solar radiation reflected from the surroundings. About 40 percent of the electricity produced on the farm was used directly to charge the electric vehicles and process harvested crops. In summer, the load demand could be almost completely met by the photovoltaic system.

<https://www.sciencedaily.com/releases/2017/11/171127124817.htm>



FOOD

Swapping crops could feed an extra 825 million people

A study of crop water-use models and yield maps for 14 major food crops suggests that increasing production of groundnuts, roots, soybeans, sorghum and tubers and decreasing millets, rice, sugar and wheat, which consume more water but have lower calorie and protein yields per hectare, would produce 10 percent more calories and 19 percent more protein while reducing consumption of rainwater by 14 percent and irrigation water by 12 percent.

<http://blogs.ei.columbia.edu/2017/11/06/swapping-where-crops-are-grown-could-feed-an-extra-825-million-people/>

Healthy food tool

The Heart Foundation's Healthy food tool focuses on planning, to recognise the importance of food and improve the availability and accessibility to healthy food.

<http://www.healthyactivebydesign.com.au/design-features/healthy-food>

Unravelling the food-health nexus

This report from the International Panel of Experts on Sustainable Food Systems identifies channels through which food systems affect human health, and how prevailing power relations and imperatives in food systems shape our understanding of the impacts they generate.

<https://futureoffood.org/unravelling-the-food-health-nexus/>

Plate of Food index

The World Food Program has calculated the relative price of a nutritious meal in countries around the globe compared to average daily income and finds that the world's poorest have to pay more than a day's wages for a single plate of sufficient food.

<https://www.wfp.org/content/2017-counting-beans-true-cost-plate-food-around-world>

LAND USE

LLS to manage private native forestry approvals in NSW

From next year NSW Local Land Services will advise landholders and manage approvals for private native forestry. The EPA will continue to regulate private native forestry and ensure licence conditions are met. A review into the Private Native Forestry Codes of Practice will also be undertaken.

https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0003/748020/Niall-Blair-Media-Release-Management-of-Private-Native-Forestry-Approvals.pdf

Updated mapping of Australian land use

Over 585 million hectares, or 76 per cent, of Australia's land use mapping information has been updated for the 'Catchment scale land use of Australia – Update September 2017'. Land use is mapped using high resolution imagery and is then verified through local, expert and industry input and field validation. The data has a currency of 2003 to 2017 (reflecting when an area was last mapped) and a scale of 1:5,000 to 1:250,000. Areas updated since May 2016 include NSW, Victoria, Tasmania, WA, NT and parts of SA and Qld.

<http://www.agriculture.gov.au/abares/news/media-releases/2017/updated-mapping-provides-status-land-use-aus>

SUSTAINABILITY

Cluster fencing group wins Queensland landcare award

A Barcaldine cluster fencing group of five properties is the winner of Queensland's Landcare award for innovation in agriculture and land management award. The owners have fenced in 33,545ha to exclude feral animals while maintaining normal numbers of native animals and normal grazing practices. It expected the resulting pasture condition will encourage the return of ground nesting birds, small mammals and lizards.

<http://www.queenslandcountrylife.com.au/story/5086287/barcaldine-cluster-wins-landcare-award/>

New national Landcare organisation on the way

The boards of the National Landcare Network and Landcare Australia met in Canberra on 23 November to establish a new national Landcare organisation. They agreed on the next steps to make this happen, with the due diligence to be completed by Christmas and the new entity to be established before the end of this financial year. The new organisation will combine and build on the representative capacity and voice of the NLN and the marketing, education, fundraising and program delivery skills of Landcare Australia.

<https://landcareaustralia.org.au/project/new-national-landcare-organisation-talks-progress/>

Sustainable agriculture researcher wins Farrer Medal

The 2017 Farrer Memorial Medal has been awarded to CSIRO's Dr John Kirkegaard for sustainable agriculture research focussed on understanding soil-plant interactions to improve productivity, efficiency and sustainability of dryland farming systems. Dr Kirkegaard and his research teams and collaborators have investigated aspects of improved crop sequences, rotational benefits and productivity of canola and other Brassica species, improved sub-soil water use, development and integration of dual-purpose crops and improved productivity in conservation agriculture.

<https://www.dpi.nsw.gov.au/about-us/media-centre/releases/2017/2017-farrer-memorial-medal-awarded-to-sustainable-agriculture-researcher>

EVENTS

December 5	World Soil Day http://www.fao.org/world-soil-day/en/
February 6-9	2018 Agricultural and Resource Economics (AARES) conference, Adelaide http://www.aares.org.au/iMIS_Prod
February 23-24	2nd Australian urban agriculture forum, Melbourne https://www.eventbrite.com.au/e/2018-urban-agriculture-forum-tickets-38988599952
June 2018	Adaptation futures 2018, Cape Town, South Africa http://adaptationfutures2018.capetown/

SUBSCRIBE

NRM on Farms is a monthly newsletter summarising recent information about climate and natural resource management relevant to agriculture, and is freely available to anyone interested or involved in agriculture or NRM. To subscribe to future editions, email Rebecca Lines-Kelly at nrmonfarms@iprimus.com.au