

NRM on farms



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

April 2015

CONTENTS

[Biodiversity](#)

[Climate](#)

[Climate resources](#)

[Emissions](#)

[Energy](#)

[Events](#)

[Food](#)

[Land use](#)

[Soils](#)

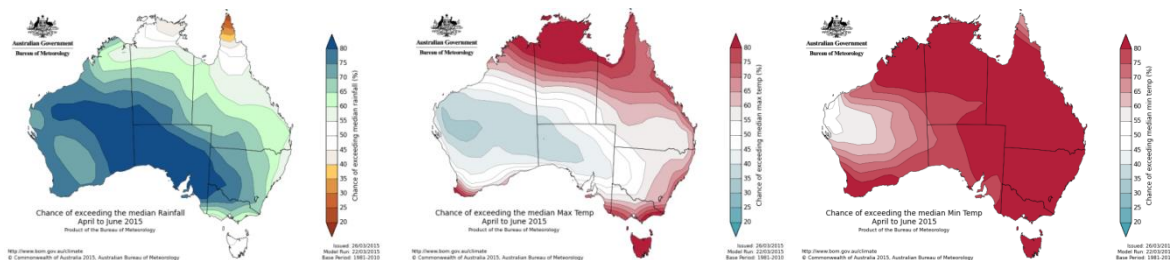
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[Sustainability](#)

[Water](#)

CLIMATE

Seasonal outlook



April to June is likely to be wetter than normal for most of NSW, with warmer than normal days over the coastal region and much warmer nights. The major climate influence is the warmer than normal sea surface temperatures in the Indian Ocean and surrounding much of the Australian coastline. Further warming is expected in the tropical Pacific, with a possible El Niño by winter.

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

Monthly climate outlook on video

BoM's monthly Climate and Water Outlook video covers rainfall, streamflow and temperature for the next three months. The next video will be available on 23 April 2015.

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



1



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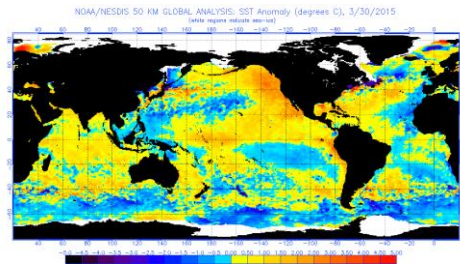
Ocean temperatures

The past two weeks have seen significant increases in sea surface temperature anomalies across the eastern half of the tropical Pacific, especially along the coast of South America. SSTs for the NINO3 region, in the eastern Pacific, have increased by the largest amount for any two-week period since at least July 2001.

Warm anomalies remain across a large part of the northeast of the Pacific Basin, waters between Australia's east to southeast and New Zealand, and to Australia's west and northwest, extending across most of the Indian Ocean. The warm anomalies in the eastern Indian Ocean are forecast to contribute to above-average rainfall during April to June.

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

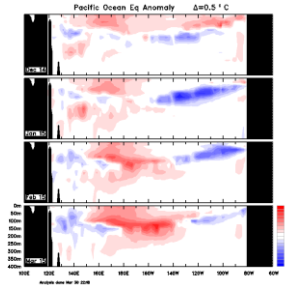
<http://www.bom.gov.au/climate/enso/>



Pacific subsurface is warming

Cool anomalies in the east Pacific weakened while warm anomalies in the central to western Pacific strengthened, a pattern which has been observed since January 2015.

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



El Nino remains at watch status

The Bureau's ENSO Tracker remains at El Niño WATCH status. This means that when current observations and model outlooks are considered together, there is about a 50% chance of El Niño developing in the coming months, which is twice the normal likelihood.

Model outlook

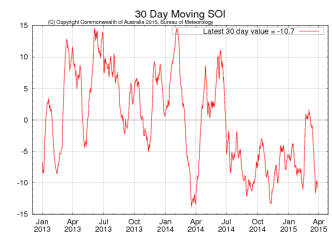
International climate models indicate the central tropical Pacific Ocean is likely to continue to warm, with all models predicting El Niño thresholds will be reached or exceeded by mid-year. However, the accuracy of model outlooks at this time of year, is lower than for outlooks made at other times of the year, so caution is needed when using the outlooks to predict the likelihood of El Niño.

<http://www.bom.gov.au/climate/ahead/model-summary.shtml#tabs=Pacific-Ocean>

SOI remains negative

The SOI has fallen to values which can be indicative of El Niño if sustained. It remains to be seen whether this fall in the SOI is a result of transient tropical weather systems, or a more sustained shift towards El Niño-like conditions. Sustained negative values below -8 may indicate El Niño.

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



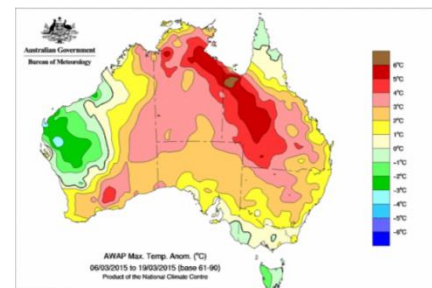
Record March temperatures

Maximum temperatures averaged $5-7^{\circ}\text{C}$ above average over most of the Gulf Country in March with records set over large parts of NT, Queensland, outback SA and

2



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northern NSW on 19-20 March. The timing of the event in the second half of the month is particularly noteworthy as the potential for extreme heat in central and southern Australia normally declines rapidly through March. The heat resulted from lack of monsoonal activity and the region's long term drought, with dry soils and reduced vegetation cover leading to low transpiration and evaporative cooling. The heat is also likely to have exacerbated the impact of the drought.

<http://www.bom.gov.au/climate/current/statements/scs51.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

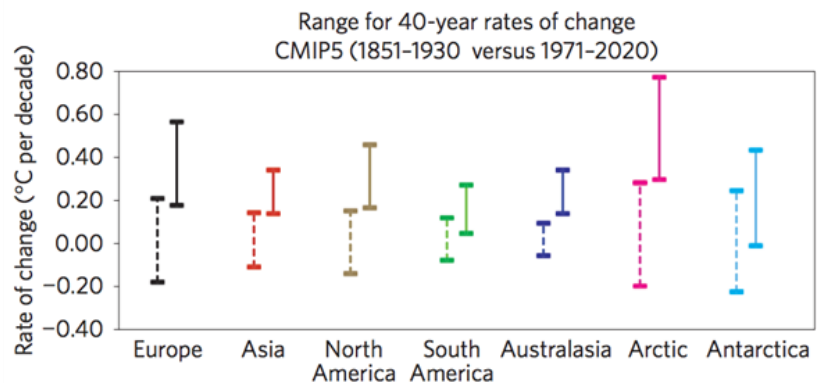
Rate of warming is speeding up

A new Nature Climate

Change study shows that the rate of climate change we're experiencing now is faster than at any time in the past 1000 years.

Scientists looked at the rate of warming in 40 year periods and found that in the 900 years before the 20th century, few 40-year periods showed warming of more than 0.1 degrees per decade. But the rate of surface temperature rise in the Northern Hemisphere is now over 0.2 degrees per decade. This rapid temperature rise highlights the need for both mitigation and adaptation.

<http://www.pnnl.gov/science/highlights/highlight.asp?id=3931>

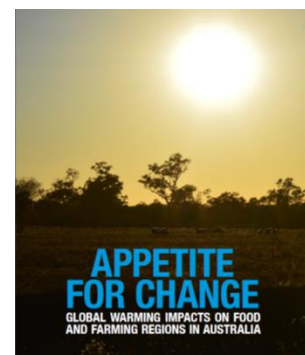


Above: Range of past (1851-1930, dashed lines) and near-future (1971-2020, solid lines) regional rates of surface temperature change per decade. Bars show the range of climate model results, based on emission scenario RCP4.5.

Appetite for change

This University of Melbourne report identifies the impacts of global warming on Australia's key farming regions and on 55 household food items including wheat, seafood, dairy products, poultry, meat, grains, fruit and vegetables.

http://sustainable.unimelb.edu.au/sites/default/files/MSSI_AppetiteForChange_Report_2015.pdf



Towards a climate smart agriculture

This paper from Nature Climate Change outlines the principles of Climate Smart Agriculture. CSA emphasises agricultural systems that utilise ecosystem services to support productivity, adaptation and mitigation.

<http://www.fao.org/climatechange/climatesmart/en/>

Anticipate ecosystem impacts from adaptation

A UK study has found that adaptation to climate change to benefit humanity will need to anticipate and manage 'knock on problems' in ecosystems before these problems occur. For instance, intensifying agriculture will increase nitrates and phosphates in streams and rivers and may also affect water availability, wildlife, biodiversity, and recreation space.

<https://www.uea.ac.uk/about/-/adapting-to-climate-change-will-bring-new-environmental-problems>

The science of sea level rise

This NZ Parliament report aims to make the science of sea level rise accessible and relevant for New Zealanders and provide a basis for the debate on what action must be taken by government.

<http://www.pce.parliament.nz/assets/Uploads/Changing-Climate-and-Rising-Seas-Web.pdf>

Bushfire preparedness study

Interviews with residents caught in bushfires in Victoria, WA, Tasmania and NSW between 2009 and 2014 found that a significant percentage did not believe they were at-risk and had neither planned nor prepared for a possible bushfire. Only 5% of the 1760 people interviewed had a written bushfire survival plan.

<http://www.bnhcrc.com.au/hazardnotes/004>

Guide to bushfire spread

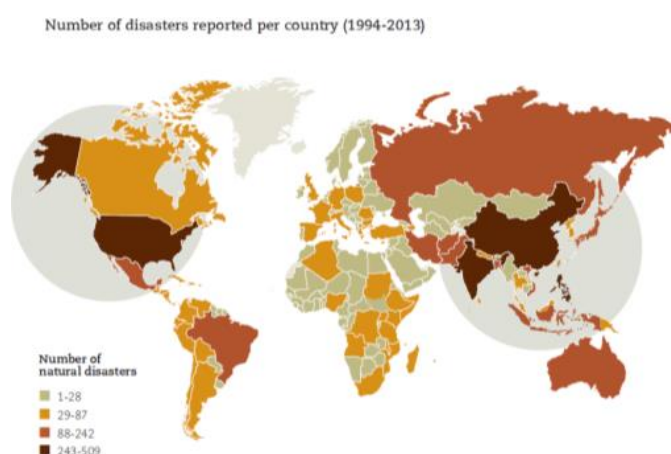
The Australasian Fire and Emergency Service Authorities Council and CSIRO have released a new guide to help predict bushfire spread. The guide explains fire spread models used in Australia and the science that underpins them, and covers fire behaviour in grasslands, shrublands, native eucalypt forests and pine plantations.

<http://www.afac.com.au/research/news-details/2015/02/01/guide-prediction-bushfire-spread>

The human cost of natural disasters

Between 1994 and 2013 natural disasters around the world cost at least US\$ 2600 billion. Overall, the number of disasters reported annually was significantly higher by 2013 than in 1994, due to a sustained rise in the number of climate-related disasters such as storms and floods

http://emdat.be/human_cost_natdis



EMISSIONS

CSIRO project to estimate biomass carbon

CSIRO is developing cost-effective approaches to estimating biomass carbon in complex woody systems such as biodiverse woodlands. The ultimate outcome will be a new Emissions Reduction Fund reforestation method, covering several existing project activities and allowing for both modelled and measured estimates of carbon stocks.

<http://www.environment.gov.au/climate-change/publications/emissions-reduction-fund-update>

FullCAM carbon storage modelling tool updated

An updated version of FullCAM is due for public release in April. Participants running projects under methods that use FullCAM to model carbon storage must use the latest version for their offsets reports. FullCAM is available for download.

<http://www.environment.gov.au/climate-change/greenhouse-gas-measurement/land-sector>

Carbon farming fact sheets

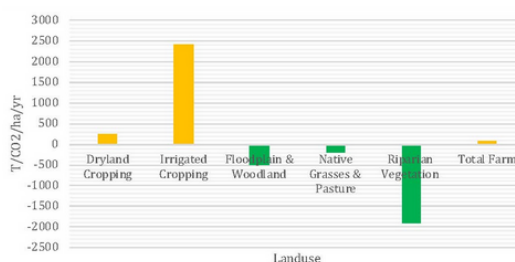
WA's Dept of Agriculture and Food has produced a number of carbon farming fact sheets describing the potential of activities to reduce greenhouse gases and/or store CO₂ and highlighting the potential risks and opportunities for land managers. The fact sheets are grouped in five categories: soil, cattle, sheep, fuels, and plantings.

<https://www.agric.wa.gov.au/climate-change/carbon-farming-fact-sheets>

The carbon neutral cotton farm

This Mungindi case study outlines how farm vegetation offsets greenhouse gas emissions from diesel and electricity use, with riparian vegetation playing the most valuable role.

<http://us9.campaign-archive2.com/?u=48d1c0404d4f8dbd74944aba3&id=a4ac64664a>



Fertiliser practice to reduce emissions

Spanish researchers have found that ammonia emissions from fertilisers can be reduced without affecting production levels by adding manure and removing urea fertilisers.

http://www.upm.es/internacional/UPM/UPM_Channel/News/966d9a6c84c2c410VgnVCM10000009c7648aRCRD

Social cost of atmospheric release

A US developed framework, the Social Cost of Atmospheric Release, estimates the costs of a broad range of health, climate and environmental damages linked to anthropogenic emissions. For example, a gallon of gasoline costs about \$3.80 more than the pump price when the environmental and human health toll is factored in.

<https://nicholas.duke.edu/news/new-models-yield-clearer-picture-emissions-true-costs>

WATER

NSW water storages

At the end of March NSW's water storages were 3.4% lower than in February, and 4.2% lower than this time last year.

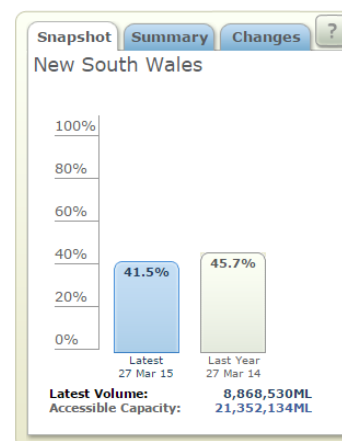
<http://water.bom.gov.au/waterstorage/awris/>

MDB environmental watering outlook 2015-16

Combined storage levels for the southern Basin are at 45% of capacity and the northern storages (including the Lachlan) at 24%, and the Basin is likely to be dry for the 2015-16 water year.

Key areas of focus to maintain ecological health include watering vegetation in the mid-Murrumbidgee wetlands, restoring flow diversity by manipulating River Murray weir pools, facilitating fish movement between the Coorong, Lower Lakes and Murray Mouth, providing refuge habitat in the Macquarie Marshes and a more natural flow regime in the Gwydir catchment.

<http://www.mdba.gov.au/media-pubs/publications/basin-environmental-watering-outlook-2015-16>



SOILS

Plant responses to drought soils

US Geological Survey has developed a model to evaluate how plant species will respond to increases in temperature and drought. The study found that water moves horizontally and vertically through the landscape. Deep-rooted plants were not as vulnerable to drought on soils that allowed for deep-water flow. Shallow-rooted plants were better buffered from drought on soils that promoted water retention near the surface.

http://www.usgs.gov/newsroom/article.asp?ID=4119&from=rss#.VRlwc_yUc6I

Impact of soil degradation on production

This paper examines the latest research on the impact of soil degradation processes such as soil erosion, compaction, loss of organic matter and soil biodiversity, and soil contamination on food production. Every year, an estimated 12 million hectares of agricultural land are lost to soil degradation, leading to a potential loss of at least 20 million tonnes of grain each year. Comprehensive soil conservation practices are required to respond to soil degradation if the world is to feed more than 9 billion people by 2050.

<http://link.springer.com/article/10.1007/s12571-015-0437-x>

Regenerating our landscapes

This publication from Future Directions International provides an introductory overview to the role of carbon, water, nutrients, organic matter and microbes in healthy soils.

http://www.futuredirections.org.au/files/sap/2015/Regenerating_our_Landscapes.pdf

Minimising loss of agricultural phosphorus

The journal *Ambio* has a special issue devoted to minimising phosphorus losses from agriculture. This overview paper details the major challenges and research needs, and identifies a future roadmap for catchment management.

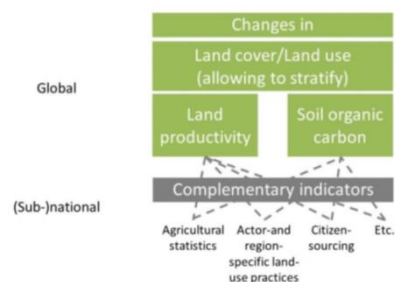
<http://link.springer.com/journal/13280/44/2/suppl/page/1>

Global land and soil indicators

An international group of experts on sustainable land and soil management has proposed three indicators to measure land use and soil health to help the UN monitor its future Sustainable Development Goals. The indicators are land cover/land use change, land productivity change and soil organic carbon change.

<http://www.iass->

potsdam.de/sites/default/files/files/land_and_soil_indicators_proposal.pdf



Victorian composting guideline released

The Victorian EPA has released its guideline for designing, constructing and operating composting facilities.

<http://www.epa.vic.gov.au/~media/Publications/1588.pdf>

Microorganisms and carbon degrade atrazine

A Finnish study has found that adding decomposer microorganisms or the nutrients they need, such as carbon, to the soil is the most promising way to remediate soil and groundwater contaminated with the pesticide atrazine. Atrazine is the most common pesticide found in groundwater in Finland despite its use in that country being discontinued 25 years ago.

[http://www.environment.fi/en-US/Waters/Doctoral_dissertation_Enhancing_microbia\(32725\)](http://www.environment.fi/en-US/Waters/Doctoral_dissertation_Enhancing_microbia(32725))

Video clips celebrate IYS

The Soil Science Society of America has developed a series of monthly themes to celebrate the International Year of Soils. The themes are, in order: Soils sustain life, support urban life, support agriculture, clean and capture water, support buildings/infrastructure, support recreation, are living, support health, protect the natural environment, products we use, climate, culture and people. The SSA is producing monthly video clips to match each theme, as is the US Natural Resources Conservation Service.

SSA IYS materials <https://www.soils.org/iys>

NRCS video clips https://www.youtube.com/watch?v=dzJT2O29xtM&list=PL4J8PxoprGZ3gPDXRfa_DNBYXoF-ruG2

Save our Soils

The international Save Our Soils campaign aims to raise consumer awareness about the importance of soil for our health, food security and climate. It wants to make people aware of the problem of degraded soils, and point towards solutions.

<http://www.saveoursoils.com/>



ENERGY

Nyngan solar plant switches on

Australia's largest solar plantfarm, located in Nyngan, has been switched on, and is now feeding power to the national electricity grid. The plant is currently operating at less than a quarter of its planned 102 MW capacity and is expected to be fully operational in July 2015. A 53 MW plant is also being built at Broken Hill. The two plants will produce approximately 360,000 megawatt hours of electricity a year, enough to power 50,000 NSW homes.

<http://www.agl.com.au/about-agl/media-centre/article-list/2015/march/agl-nyngan-solar-plant-starts-generating>

BIODIVERSITY

Managing and restoring SE Australia's native grasslands

This new book from CSIRO includes a wealth of practical experience from policy makers, farmers, community activists and on-ground grassland managers.

<http://www.publish.csiro.au/nid/18/pid/7219.htm>

Pests and diseases affecting bee pollinators

In the UK, more than 250 species of bees pollinate crops and wild flowers. This information sheet outlines the environmental and social-economic factors affecting bees, and how pests and diseases are interacting with these factors to cause bee decline.

http://www.lwec.org.uk/sites/default/files/attachments_biblio/LWEC%20PP%20Note%2017_WEB.pdf

Flowers sown in fields build bee numbers

A two-year study of UK farms in West Sussex and Hampshire saw significant growth of bumblebee populations where strips of flowers such as clover and birdsfoot trefoil were sown into farmers' fields.

<http://www.sussex.ac.uk/newsandevents/?id=29749>

Shrinking global habitats will impact ecosystems

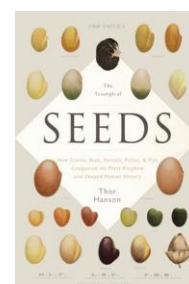
A global study of forest habitat has found that 70 percent of existing forest lands are within a half-mile of the forest edge, which points to major trouble for a number of the world's ecosystems and the plants and animals living in them. Management options include conserving and maintaining larger areas of habitat; utilising landscape corridors, connecting fragments still operating productively, and increasing agricultural efficiency.

<https://news.ncsu.edu/2015/03/bad-effects-shrinking-habitats/>

The triumph of seeds

Subtitled 'How grains, nuts, kernels, pulses, and pips conquered the plant kingdom and shaped human history' this book explores the natural and cultural history of seeds and explains why they are so dominant in nature, and why we depend on them.

<http://www.thorhanson.net/the-triumph-of-seeds.html>



FOOD

Dual purpose cropping systems increase food productivity

The latest issue of the CSIRO journal Crop & Pasture Science covers research into dual purpose cropping systems where grain crops are a forage source during their vegetative stage, and then regrown for grain. This increases the productivity of food from the same land area with minimal impacts on the environment and lower farm risk.

<http://www.publish.csiro.au/nid/40.htm>

Towards food security by 2050

The next 35 years is a critical transition period for food, energy, the environment and water. Business as usual will not deliver on both food availability and sustainable ecosystems. The world needs to connect the farm gate to the dinner plate, and focus on the factors that promote higher production, but not at the expense of critical environmental functions.

<http://link.springer.com/article/10.1007/s12571-015-0445-x>

The future of food production research in the rangelands

The uncertain availability of a well educated and trained workforce may hamper the world's rangelands from contributing to global food security and national conservation goals.

<http://www.publish.csiro.au/nid/202/paper/RJ14090.htm>

How to build food security and nourish growth

A resilient food economy requires efficient, innovative agricultural production, tailored trade and investment approaches, functioning domestic markets, and strategic reserves of food and water. Strengthening these factors will enable any country to build a sturdy, integrated domestic food system that delivers nutrition and economic growth.

<http://www.mckinsey.com/insights/>

Climate change and food safety

Food Research International has published an open access special issue on the implications of climate change for food safety.

<http://www.sciencedirect.com/science/journal/09639969/68>

Food Climate Research Network

The FCRN is a global network of researchers, practitioners and policymakers working at the intersection of food, climate, and broader sustainability issues to achieve a fair, healthy and ethical food system that sits within environmental limits.

<http://www.fcrn.org.uk/>

LAND USE

SIX Maps

SIX Maps is a NSW government online mapping tool with access to cadastral and topographic information, satellite data and aerial photography.

<https://maps.six.nsw.gov.au/>

9



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SUSTAINABILITY

Survey on drought preparedness

NSW DPI's Rural Resilience Program is surveying farmers, farm workers and their families to build a picture of how drought-affected farming communities have coped personally and in their farm businesses. The survey is confidential and no personal contact details are recorded. It will take about three minutes to complete and closes on 30 June 2015.

www.surveymonkey.com/r/droughtinformation

EVENTS

2015	International Year of Soils http://www.fao.org/soils-portal/en/
April 12-16	Australian Rangeland Society conference, Alice Springs http://www.arsconference.com.au
April 16-17	Environmental solutions from soil science, Canberra Richard.greene@anu.edu.au
May 12-14	Ozwater'15, Adelaide http://www.ozwater.org/
May 26-27	NSW Nature Conservation Council bushfire conference, Sydney http://www.nature.org.au/healthy-ecosystems/bushfire-program/conferences/
May 26-28	Irrigation Australia regional conference, Sydney http://www.ial2015.com.au/
June 3-4	Primary Industries Education Foundation Conference, Canberra http://www.primaryindustrieseducation.com.au/
June 12	Biodiversity in rural landscapes, Ballarat http://www.csu.edu.au/_data/assets/pdf_file/0003/1297524/2015-BAB-Conference-Flyer.pdf
July 7-10	National Carbon Farming Conference Expo, Albury carbonfarmingconference.com.au
July 14	Agriculture and environment research symposium, Sydney “ Uta.stockmann@sydney.edu.au
July 15-17	Australian Meteorological and Oceanographic Society conference, Brisbane http://www.amos.org.au
July 23-24	Current issues for soil science. Moree woodlots3@bigpond.com

SUBSCRIBE

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.