

NRM on farms



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

October 2015

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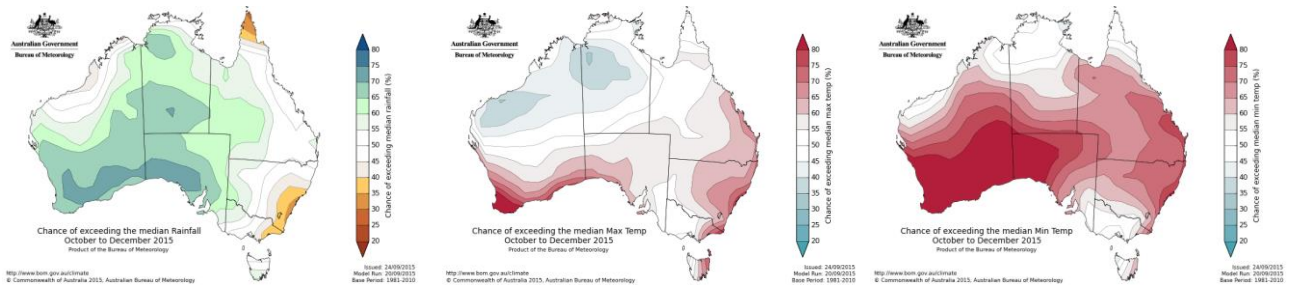
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CLIMATE

Seasonal outlook



The NSW rainfall outlook for the next three months is average over most of the state, and drier in southern coastal areas. Day and night temperatures are likely to be warmer than usual, but average in the south-west. The current outlook reflects a combination of very warm sea surface temperatures in the Indian Ocean, and a mature El Niño in the Pacific.

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

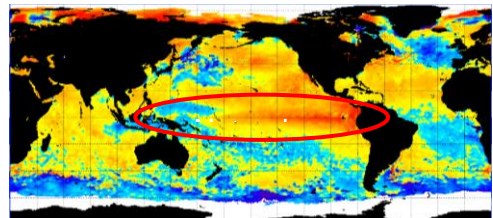
Video: <http://www.bom.gov.au/climate/outlooks/#/overview/video>

Ocean temperatures

Sea surface temperatures in the central tropical Pacific remain high and are likely to rise further. The entire Indian Ocean is warmer than average; the southern Indian Ocean is the warmest on record for winter.

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

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



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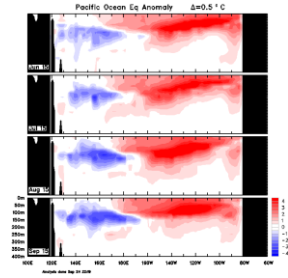


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Subsurface warmth increases

The four-month sequence of sub-surface temperature anomalies show large areas of the eastern half of the equatorial Pacific reaching more than +4°C, and cool anomalies persisting in the west.

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

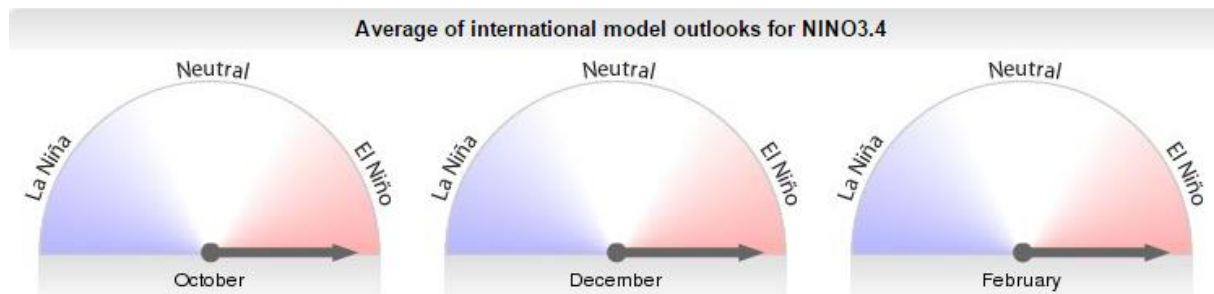


El Niño continues to strengthen

El Niño continues to strengthen, and is unlikely to end before early 2016. All models suggest the event will peak around the end of the year, followed by rapid weakening heading into autumn 2016. It is too early to accurately determine the likely pattern beyond autumn, but a continued El Niño is considered the least likely outcome at this stage.

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

Model outlook

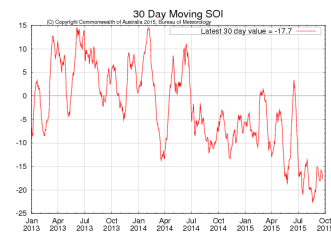


<http://www.bom.gov.au/climate/ahead/model-summary.shtml#tabs=Pacific-Ocean>

SOI remains negative

The SOI remains firmly negative. Sustained negative values below -7 may indicate El Niño.

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



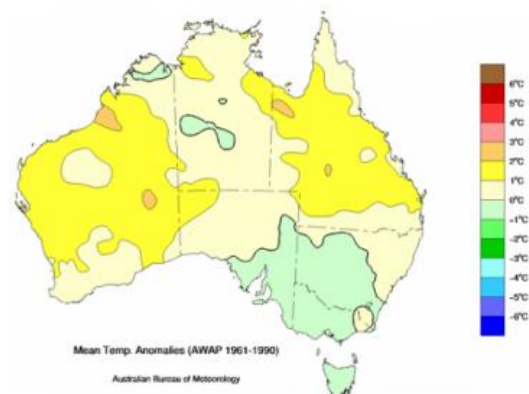
Positive IOD likely

Warm Indian Ocean temperatures and localised cooling near Indonesia means the Indian Ocean Dipole index has been above the threshold for six weeks. If this continues for at least another fortnight, this will be considered a positive IOD event. Forecasts suggest the IOD index will remain above the positive IOD threshold until at least November. A positive IOD typically reduces winter–spring rainfall in central and southern Australia, and can therefore exacerbate El Niño driven rainfall deficiencies.

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

Ninth warmest winter for Australia

While NSW experienced an average winter for both rainfall and temperature, it was Australia's ninth-warmest winter on record, with temperatures nationally averaging 0.8 °C above normal. It was a very warm winter in WA and Queensland, and cooler in the south-east. Many



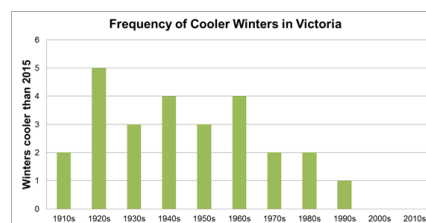
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people believe the winter was particularly cold, but the cool temperatures were the average in the 1950s and 1960s and are now increasingly uncommon.

<http://www.bom.gov.au/climate/current/season/aus/summary.shtml>



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

Heatwave outlook

Analysis of Australian heatwaves has found they are closely correlated with strong El Ninos in eastern and northern Australia, and with a positive southern annular mode (SAM) in SA, Victoria and Tasmania. Heatwaves are also strongly correlated with low soil moisture. This year's very strong El Nino and dry conditions in some areas indicates that the heatwave season may start earlier, heatwaves may be more intense over central and eastern areas, and there may be more heatwaves than usual in northern and eastern Australia.

<https://theconversation.com/this-summer-el-nino-looks-set-to-bring-more-heatwaves-to-australia-north-and-east-47704>

Record hot days now 12 times more likely than record cold

Record hot days are now 12 times more likely in Australia than days of record-breaking cold, and the ratio is increasing as rising greenhouse gases trap ever more heat on the planet, according to new research. During the first 50 years of reliable national temperature records covering 1910-1960, days of extreme heat occurred as often as days of extreme cold. This ratio rose to two-to-one between 1960 and 1980, and to about seven-to-one for 1980-2000 before stepping up further to 12-to-one for the 2000-2014 period

<https://theconversation.com/sure-winter-felt-chilly-but-australia-is-setting-new-heat-records-at-12-times-the-rate-of-cold-ones-35607>

Changes in weather patterns change Southern Ocean

The Southern Ocean is taking in more carbon dioxide due to changing weather patterns. A powerful high pressure system has built up above the Atlantic sector of the Southern Ocean, while a distinct area of low pressure has formed over the Pacific sector. The air pressure gradient between these regions has caused wind patterns to change. Winds now tend to blow in an undulating pattern, whereas in the 1990s they mainly blew straight from the west to the east. The winds are now bringing warm air from subtropical latitudes into the South Atlantic and exceptionally cold air to the Pacific sector of the Southern Ocean. Together, the wind and temperature changes explain much of the Southern Ocean carbon sink changes.

<http://www.sciencedaily.com/releases/2015/09/150910144049.htm>

Above normal fire potential for southern Australia

The Southern Australia seasonal bush fire outlook for 2015-2016 shows that many areas face above normal fire potential due mostly to the strengthening El Niño and warmer Indian Ocean. There have also been significantly below average rainfalls over the last decade across almost all of eastern Australia, the west coast and Tasmania. Such underlying dry conditions mean that any surface moisture from recent rains will quickly decline once temperatures begin to warm.

<http://www.bnhcrc.com.au/hazardnotes/010>

SOUTHERN AUSTRALIA SEASONAL
BUSHFIRE OUTLOOK 2015-16



How dust storms greened the ocean

During Sydney's Red Dawn dust storm in September 2009, 2.5 million tonnes of sediment was lost off the Australian coast. The dust landed in the Tasman Sea where it caused a spike in phytoplankton biomass, as did dust from a second storm in October 2009. The phytoplankton absorb carbon dioxide; more dust storms in future may mean more phytoplankton absorbing more carbon into the sea.

<https://theconversation.com/how-australias-biggest-dust-storm-went-on-to-green-the-ocean-47695>

Natural disaster resilience for Queensland farmers

Queensland Farmers Federation has received Commonwealth Funding to improve the preparedness of Queensland's agricultural sector to manage the impacts of natural disasters. The project will identify opportunities for improving management of the risk of rapid onset natural disaster. The Federation also has a series of short videos with resilience tips for farmers in preparing for, and recovering from, natural disasters.

<http://www.qff.org.au/policy-projects/our-projects/disaster-resilience-planning/>

<http://www.qff.org.au/policy-projects/our-work/cyclone-resilience/>

Australian business leaders issue climate statement

Business leaders from AGL, BHP Billiton, GE, Mirvac, Santos, Unilever, Wesfarmers and Westpac Group have published a statement on climate change risks, challenges and opportunities. The companies support the Australian Government in securing an effective outcome from the Paris climate change negotiations in December.

<http://climateinstitute.org.au/articles/media-releases/business-statement.html>

Vulnerability to climate change impacts in NSW and Qld

This review found that most knowledge about socio-economic vulnerability in NSW and Queensland has only recently emerged and more knowledge has been published about Queensland than NSW. Extreme temperature is the most researched environmental hazard.

<http://onlinelibrary.wiley.com/doi/10.1111/1745-5871.12137/abstract>

EMISSIONS

Cost effective agricultural mitigation

A review of 65 recent international studies shows that highly cost-effective mitigation measures include fertiliser use efficiency, cattle breeding, and potentially improving energy efficiency in mobile machinery. The paper highlights a range of policy options for encouraging the uptake of mitigation measures with focus on information and incentive-based policies.

http://www.oecd-ilibrary.org/agriculture-and-food/cost-effectiveness-of-greenhouse-gas-mitigation-measures-for-agriculture_5jrvvkq900vj-en

Climate mitigation in agricultural supply chains

This report from the UK-based Carbon Disclosure Project encourages food and beverage companies to work closely with their agricultural suppliers to reduce emissions. Over a third of FBT companies report lower costs as a result of carrying out agricultural management practices with climate change benefit, either in their own farm or with suppliers.

<https://www.cdp.net/Documents/climate-mitigation-in-agricultural-supply-chains.pdf>

WATER

Federal responsibility for water moves to agriculture

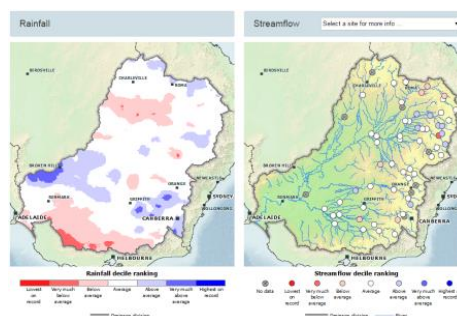
Federal responsibility for water, and control of the Murray Darling Basin process, has been moved to the Department of Agriculture and Water Resources. However, the Commonwealth Environmental Water Holder (CEWH) will stay with the Department of Environment.

<http://www.abc.net.au/news/2015-09-23/anger-over-environmental-water-holder-split-from-water-departmen/6797094>

BoM monthly water update

The Bureau's new Monthly Water Update provides a quick overview of recent rainfall and streamflow. Rainfall is a key driver of streamflow and is shown alongside flows from over 220 gauging stations across Australia's topographic drainage divisions.

<http://www.bom.gov.au/water/monthly-water-update/>



Seven day streamflow forecasts

BoM now forecasts likely streamflows for the next seven days at more than 100 locations across Australia. The forecasts combine rainfall and streamflow observations and rainfall forecasts to indicate whether rivers are likely to rise or fall in the coming week.

<http://www.bom.gov.au/water/7daystreamflow/index.shtml>

Qld rural irrigation standards

This publication outlines accepted irrigation system design standards and code of practice for agricultural irrigation systems in Queensland.

<http://irrigation.org.au/wp-content/uploads/2013/03/Rural-Irrigation-System-Design-Standards-Code-of-Practice-Final-24Aug15.pdf>

2015 Riverprize winners

Lake Eyre Basin has won the 2015 Thiess International Riverprize. In the mid-1990s, moves to develop water resources in the Basin galvanised communities to protect its free-flowing rivers, culminating in the Lake Eyre Basin Intergovernmental Agreement. This 20 year partnership has avoided the costly expenditures incurred in restoration of many rivers around the world, and allowed economic sustainable growth, particularly in tourism and organic beef production. The 2015 Australian Riverprize was won by the Ngarrindjeri Yarlular-Ruwe Program in which the history, values and objectives of the Ngarrindjeri are being incorporated into SA Murray River and wetland management planning and monitoring.
<http://riversymposium.com/>

SOILS

Carbon builds under kikuyu even with cropping phase

WA research comparing carbon stores in soil under annual pasture, eight-year-old kikuyu pasture, 15-year-old kikuyu pasture, 15-year-old kikuyu pasture converted to canola, and 22-year-old kikuyu pasture, has found that after 15 years the total carbon level was significantly higher in the kikuyu grazing system than the annual grazing system. Cropping for up to two years into the kikuyu did not change the total soil carbon. The findings mean that cropping into kikuyu could allow farmers to be more seasonally opportunistic without jeopardising their soil carbon stores and make their grazing systems more robust against future climate variability.

<http://www.sciencewa.net.au/topics/agriculture/item/3772-cropping-into-kikuyu-could-benefit-livestock-soil-carbon>

Multiple practices may build soil carbon in cropping soils

Victorian research into soil organic carbon stocks under various tillage, residue management and rotation treatments concluded that the management practices may not reliably increase SOC on their own, but that significant increases in SOC are possible under some circumstances through the long-term use of multiple practices, such as stubble retention and zero tillage and legume N input and elimination of fallow. The circumstances under which increases in SOC can be achieved require further investigation.

<http://www.publish.csiro.au/nid/84/paper/SR14227.htm>

Crop rotations change paddock biology

WA's Focus Paddock project shows that changes in crop rotations cause changes in paddock biology. Sowing wheat in a paddock for several years in a row resulted in a build-up of wheat pathogens and increase in grass weeds. Canola reduced weed numbers to the extent that wheat could be grown successfully again, but was also a host for the nematode *P.neglectus*. Sub-soil nitrogen fertility and wheat grain yield improved following lupins. The most successful breaks for wheat were obtained when integrated weed management practices were combined with alternative land uses such as cutting hay, crop-topping, spray-topping and chemical fallow. Nitrogen fixation by lupins and serradella, and water storage by fallow in dry years were also important in boosting the yield of the following wheat crop.

<https://www.agric.wa.gov.au/news/media-releases/dafwa-research-highlights-crop-sequencing-trends?nopaging=1>

Fertilisers increase bacteria and reduce fungi

A global study of 25 grassland sites has found that agricultural inputs such as nitrogen and phosphorous consistently shift the natural communities of fungi, bacteria and microscopic organisms called archaea that live in the soil. Generally, nutrient additions favoured fast-growing bacteria and decreased the abundance of fungi that share a symbiotic relationship with grassland plants.

<http://www.news.iastate.edu/news/2015/09/23/soilmicrobial>

Soil biodiversity contributes to ecosystem functions

As much as 32% of the variation seen in ecosystem functions such as carbon storage and the availability of nutrients can be explained by the biodiversity in the soil. In comparison, plant biodiversity accounts for 42%. The authors call for far more attention to this overlooked world of worms, bugs and bacteria in the soil.

<http://www.science.ku.dk/english/press/news/2015/biodiversity-belowground-is-just-as-important-as-aboveground/>

Triaging for soil security

The journal Sustainability has published a special issue on enhancing soil health to mitigate soil degradation. It includes a paper on Australian soils which proposes a triaging approach to prioritise treatment plans increase productivity and improve soil condition.

<http://www.mdpi.com/2071-1050/7/5/4870>

WA carbon farming

DAFWA has developed a series of information leaflets on carbon farming, available online.

<https://www.agric.wa.gov.au/climate-land-water/carbon-farming>

Soilquality.org.au fact sheets

Soilquality.org.au has produced a range of fact sheets explaining biological, chemical and physical soil indicators. Some provide information on a specific soil quality indicator (e.g. microbial biomass), while others give instructions on how to measure and interpret some soil analysis results (eg bulk density). There are also a number of fact sheets introducing different farm management strategies for farmers coming to terms with difficult soil properties, such as compaction or waterlogging.

<http://www.soilquality.org.au/factsheets>

Soil change matters

The CSIRO journal Soil Research has published a special issue featuring papers from the 2014 workshop 'Soil change matters' in Bendigo. Ten of the presentations from the workshop have been developed as full articles and address important aspects of soil change, ranging from the use of soil chronosequences to study long-term changes, to shorter duration surveys and environmental reporting.

<http://www.publish.csiro.au/pid/7560.htm>

Soil: A precious natural resource

This booklet aims to raise awareness of the functions of soil and services it provides.

http://www.ias.ethz.ch/content/dam/ethz/special-interest/usys/ias/institute-of-agricultural-sciences-dam/NPF68%20BODENBROSCHU%CC%88RE_E.pdf

BIODIVERSITY

Draft NSW Invasive Species Plan 2015-2022

NSW DPI has drafted an updated Invasive Species Plan 2015-22 in collaboration with Local Land Services, Crown Lands and NSW National Parks and Wildlife Service. Public consultation on the draft closes on 2 October 2015.

<http://www.dpi.nsw.gov.au/agriculture/pests-weeds/nsw-invasive-species-plan>

WA fire management linked to species decline

There is growing evidence that large intense bushfires are implicated in the recent decline of some plant and animal species, are a significant source of greenhouse gas emissions and degrade populations of long-lived woody plants such as mulga (*Acacia aneura*), which serve important ecological, environmental and cultural functions. This report includes generic fire management principles applicable to most fire-prone regions of the WA rangelands.

http://webadmin.communitycreative.com.au/uploads/rangelands/misc%20documents/Fire%20Forum/RangelandsFireGuidingPrinciples_Aug15_lowres.pdf

US crops are less diverse

US farmers are growing fewer types of crops than they were 34 years ago, which could have implications for how farms fare as changes to the climate evolve. Less crop diversity may also be impacting the general ecosystem.

<http://www.k-state.edu/today/announcement.php?id=21804>

More diverse insect populations mean fewer corn pests

US researchers have found that cornfields with more diverse insect populations have fewer problems with pests. The research team harvested 50 plants during pollination on each of 53 farms. They dissected approximately 2,650 plants and identified more than 37,000 insect specimens. The research suggests that it's not the number of species, but the balance of species within the insect communities that is responsible for pest suppression.

<http://www.sdstate.edu/news/articles/diverse-insect-population-means-fewer-pests-in-cornfields.cfm>

Land for Wildlife Forum 2015

Land for Wildlife Forum Presentations from the 2015 Land for Wildlife Forum are now available online

<http://www.cen.org.au/projects/land-for-wildlife-topmenu-233/forum-presentations-land-for-wildlife-303>

3 trillion trees in the world

An international study estimates that there are more than 3 trillion trees on Earth, but the total number of trees has plummeted by roughly 46 percent since the start of human civilisation. Human activity is the largest driver of tree numbers worldwide; deforestation, land-use change, and forest management are responsible for a gross loss of over 15 billion trees each year.

<http://environment.yale.edu/news/article/Yale-study-reveals-there-are-3-trillion-trees-on-earth>

FOOD

Promoting food by geography

This RIRDC report assesses whether geographical indications on food would be a useful tool to support rural and regional development in Australia.

<https://rirdc.infoservices.com.au/items/15-060>

Revitalising community food systems

This US report examines the growth in local food systems, hurdles to further expansion, and changes to support their development.

http://www.foodandagpolicy.org/sites/default/files/AGree_LFI_2015.pdf

Environmental food choices

The Swedish National Food Agency has published guidelines on healthy food choices that help reduce greenhouse gas emissions and other environmental effects:

<http://www.livsmedelverket.se/en/food-habits-health-and-environment/dietary-guidelines/vuxna/>

LAND USE

Drivers of land use change

Production of animal products has dominated agricultural land use and land use change over the past 50 years, accounting for 65% of land use change. Population expansion has been the largest driver for agricultural land use change, but dietary changes are a significant and growing driver. This suggests that future dietary changes will become the principal driver for land use change, pointing to the potential need for demand-side measures to regulate agricultural expansion.

<http://www.sciencedirect.com/science/article/pii/S0959378015300327>

Economics of land degradation

More than half of the world's arable land is moderately or severely degraded, according to a report by the Economics of Land Degradation Initiative. The report estimates the cost of this environmental destruction, not only from lost agricultural production and diminished livelihoods, but also from the lost value of ecosystem services formerly provided by the land, including water filtration, erosion prevention, nutrient cycling and the provision of clean air.

http://eld-initiative.org/fileadmin/pdf/ELD-main-report_05_web_72dpi.pdf

UK anglers want better land management

UK conservationists and angling organisations are seeking a judicial review of UK waterways protection, arguing that poor land management is causing soils carrying nutrients and pesticides to wash into rivers, harming important fish species. They claim that the Department for Environment, Food and Rural Affairs and the Environment Agency are failing in their legal duty to tackle the problem.

<http://www.theguardian.com/environment/2015/aug/27/government-accused-of-failing-to-protect-waterways-from-farm-pollution>

SUSTAINABILITY

Boggabri farming family wins Landcare innovation award

The Watson family of Kilmarnock Farms at Boggabri will represent NSW in the Innovation in Sustainable Farm Practice category in the 2016 National Landcare Awards. The family are pioneers of irrigated cotton production and are reconfiguring their farm from flood irrigation to low pressure sprinklers. They were early adopters of zero tillage and have planted 16,000 trees and shrubs along the river and in biodiversity strips to encourage birds, bats and beneficial insects in controlling insect pests. Weed trees have been removed from 28 km of the Namoi River, stock access controlled and extensive revegetation undertaken. This year, the family grew record crops using less water and no insect sprays.

<http://www.landcare.nsw.gov.au/groups/nsw-landcare-gateway-support/news/watson-family-nsw-candidate-for-the-national-landcare-awards>

Focus on ecological health increases farm profits

Two western NSW properties that changed their focus from enterprise to supporting the landscape for ecological health have improved the land's natural productivity, and their stocking capacity and gross margins. Short periods of intense grazing following by long periods of rest encouraged plant litter which has protected the soil from the sun, minimised evaporation and supported the soil's natural nutrient cycling processes.

<http://www.stockandland.com.au/news/agriculture/livestock/general-news/stations-reverse-degradation/2743105.aspx?storypage=0>

Review of pest animal management

The NSW Natural Resources Commission will lead an independent review to identify opportunities to assist and improve pest animal management across all land tenures, public and private, in the state. The review will include regional tours to gather information on on-ground issues.

<http://www.nrc.nsw.gov.au/pest-animal-management>

Four essentials for sustaining agriculture

Washington State University agronomist Andrew McGuire says there are four essentials for sustaining agricultural production: protect the soil, maintain soil fertility, use water efficiently and protect the crop. Each component is required, but not sufficient alone; all are needed.

<http://www.biofortified.org/2015/08/sustaining-agriculture/>

UK agri-environment schemes do work

Analysis of UK agri-environment schemes has found that offering financial incentives for farming industries to mitigate the impact agriculture has on the environment has a positive effect on critical areas such as greenhouse gas reduction and increased biodiversity. However, these benefits are still a drop in the ocean compared to government subsidies received by farming industries for environmentally damaging practices.

<http://www.cam.ac.uk/research/news/paying-farmers-to-help-the-environment-works-but-perverse-subsidies-must-be-balanced>

US science report recommends investment in resilience

The US National Science Foundation's recent report America's Future says viewing environmental protection and economic prosperity as conflicting goals is outdated. The US needs to invest in resilience, well-being, stewardship and prosperity rather than warming, stress, conflict and vulnerability,

http://www.nsf.gov/news/news_summ.jsp?cntn_id=136041

17 new sustainable development goals

Last month world leaders met in New York to formalise 17 new Sustainable Development Goals to eradicate extreme poverty and hunger, promote economic growth and prosperity, improve health and education and protect the planet. The new goals build on the Millennium Development Goals agreed by governments in 2000 and which expire this year.

<https://theconversation.com/explainer-the-worlds-new-sustainable-development-goals-47262>

EVENTS

October 16	Soil, food, fibre and environment, Sutton http://www.eventbrite.com.au/e/soil-for-food-fibre-and-the-environment-a-celebration-of-soils-tickets-18239859912?aff=es2
October 28-29	Rangelands carbon conference, Cobar http://western.lis.nsw.gov.au/resource-hub/events/2015/rangelands-carbon-conference
November 6	NSW climate change adaptation conference, Sydney https://www.eventbrite.com.au/e/adaptnsw-2015-nsw-climate-change-adaptation-conference-tickets-18012709499
Nov 7-8	National biological farming conference and expo, Lismore NSW http://www.soilcare.org/national-biological-farming-conference-and-expo-2015.html
Nov 10-13	NSW coastal conference, Forster http://www.coastalconference.com/
November 18-19	Climate change research strategy in primary industries conference, Sydney http://www.ccrspi2015conference.com/program.php
Nov 30-Dec 2	Bioenergy Australia 2015, Launceston http://www.bioenergyaustralia.org/
December 4-8	International nitrogen initiative conference, Melbourne http://www.ini2016.com/
February 14-18 2016	6th Greenhouse gas and animal agriculture conference, Melbourne http://www.ggaa2016.org/
May 1-3	PIEFA food and fibre matters conference, Canberra http://www.piefa.edu.au/conference2016/
July 5-7	Climate change adaptation 2016 conference, Adelaide http://climate-adaptation.org.au/events/climate-adaptation-2016/

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.

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