

Woolgrowers know only too well that Australia has a highly variable climate with natural wetter and drier cycles, and that drought is a regular feature of this variability.

Climate projections for the coming decades indicate an increasing risk of below average rainfall for southern and eastern mainland Australia, higher temperatures and evaporation, and below average runoff. In particular there is a significant projected increase in the frequency of extremely hot years and extremely dry years.

Australian agriculture is likely to be one of the industry's most adversely affected by climate change, given the climate's influence on agricultural productivity.

The Australian wool industry has a strong history of being able to adjust and adapt successfully to external drivers like drought and changes in global markets.

Continuing improvement in productivity and international competitiveness by the Australian wool industry will be integral as Australian agriculture potentially faces more extreme impacts of climate change than its international competitors.

The good news is that by adopting best practice wool production, Australian woolgrowers will be well positioned to adapt to the potential impacts of climate change.

Glossary of agricultural climate change terms

Climate change discussions are peppered with terms specific to climate change. This climate change glossary describes climate change terms related agriculture and land management. Use this list to better interpret and assess ways to deal with climate change on your property and as part of the Australian wool industry.

Anthropogenic

Changes caused by humans and human activities, e.g. burning fossil fuels, methane production from sheep and cattle enterprises

Abatement

Reducing the intensity of greenhouse gas emissions

Adaptation

Practical steps to protect countries, industries and communities from the likely disruption and damage that will result from effects of climate change.

Carbon credits and Australian Carbon Credit Units (ACCU)

Carbon credits are a record of greenhouse gas abatement by:

- Reducing or avoiding emissions, e.g. through the capture and destruction of methane emissions from landfill or livestock manure; or
- Removing carbon from the atmosphere and storing it in soil or trees, e.g. by growing a forest or reducing tillage on a farm in a way that increases soil carbon.

Australian Carbon Credit Units (ACCUs) are units of carbon abated and issued under the Carbon Farming Initiative. Two types of ACCU can be issued depending on whether the ACCU meets Australia's commitments under the Kyoto rules:

- “Kyoto carbon credits” will be issued for abatement activities that Australia currently includes under international accounting and reporting against Kyoto targets, e.g. reducing methane and nitrous oxide emissions from livestock enterprises, and sequestering carbon through forestry management activities.
- “Non-Kyoto carbon credits” will be issued for activities that Australia opted to exclude from the national greenhouse gas inventory under the Kyoto Protocol, e.g. soil carbon emissions or sequestration on agricultural land. Soil carbon was excluded because changes in soil carbon due to man-made changes cannot be separated from natural changes under the international accounting rules.

Woolgrowers and other land managers would sell ACCUs from these activities to individuals or companies who must cancel out or 'offset' the emissions they generate during their day-to-day life or normal course of business, e.g. by consuming electricity or catching a plane.

Carbon dioxide equivalent (CO₂-e)

A standard unit of measure to describe the warming effect of different greenhouse gases compared to the warming effect of carbon dioxide. A tonne of methane, for example, has 21 times the warming effect of a tonne of carbon dioxide, and a tonne of methane emissions would therefore be 21 tonnes CO₂-e emissions (AFI 2011).

Carbon Farming Initiative

An Australian Government scheme through which farmers, forest growers and landholders can earn income from reducing emissions like nitrous oxide and methane by changing agricultural and land management practices, to reduce carbon pollution and help the environment. In August 2011, Parliament passed legislation to make the CFI a national scheme that regulates the creation and trade of carbon credits from farming and forestry.

Carbon footprint

A measure of the impact of a company's or individual's activities on the environment in terms of the amount of greenhouse gases produced, measured in units of carbon dioxide equivalent

Carbon Sink

A natural or manmade system that absorbs and stores CO₂.

Climate change

Long-term (decades or longer) trends in climate averages such as the global warming observed over the past century, and long-term changes in variability, e.g. in the frequency, severity and duration of extreme events

Climate variability

Shorter term (daily, seasonal, annual, inter-annual, several years) variations in climate, including the fluctuations in temperature and rainfall associated with El Niño (warmer and drier) or La Niña (cooler and wetter) events

Emission Intensive Trade Exposed (EITE) industries

Industries which will be eligible for assistance under a carbon tax or carbon trading scheme, to stay internationally competitive. Agriculture is considered an EITE industry.

Emissions

The release of greenhouse gases into the atmosphere over a specific area or period of time

Global Warming

Often used interchangeably with “climate change,” global warming refers to the rise of average global surface temperatures caused by the greenhouse effect.

Greenhouse gases

Gases that work like the roof of a greenhouse over the earth to trap and retain the heat from the sun. The “roof” is dominated by carbon dioxide, with fossil fuel combustion for electricity and transport, and deforestation increasing carbon dioxide concentrations in the earth’s atmosphere to 36% above pre-industrial levels. Other greenhouse gases are:

- **Carbon dioxide** – both a naturally occurring gas and a by-product of burning fossil fuels and biomass, other industrial processes and land-use changes. It is the main greenhouse gas that affects anthropogenic changes to the earth’s temperature (The Treasury, Australian Government).
- **Methane** - a gas that comes mainly from livestock, in particular sheep and cattle, otherwise known as ruminants. It is also emitted from landfills, coal mining and other sources. It is the second most common gas of the six greenhouse gases controlled by the Kyoto Protocol.
- **Nitrous oxide** – fertilisers, agricultural soils, livestock urine and manure, and stubble and savannah burning are the most common agricultural sources of nitrous oxide. This gas makes up about 4% of Australia’s total greenhouse gas emissions or 23% of agriculture’s total emissions. Nitrous oxide is 310 times more potent than carbon dioxide over a 100 year period, so each tonne of nitrous oxide will have a greater effect on Australia’s total emissions.

Kyoto Protocol

An international agreement that, amongst other things, sets binding targets for reducing greenhouse gas emissions by Australia and other the industrialised countries that signed the agreement. Six greenhouse gases are targeted, namely:

- Carbon dioxide
- Methane
- Nitrous oxide
- Hydrofluorocarbons
- Perfluorocarbons
- Sulphur hexafluoride

Land Use Land Use Change and Forestry (LULUCF)

Activities, designed to provide a relative way to lower greenhouse gas levels by increasing the removal of greenhouse gas from the atmosphere (for example, by planting trees) or by reducing emissions (for example, by preventing deforestation or changing land use i.e. from cropping to grazing.)

Mitigation

Avoid or reduce the impacts of climate change by reducing greenhouse gas emissions and increasing the uptake and storage of greenhouse gases.

National Carbon Offset Standard (NCOS)

An established standard for carbon credits issued in return for the abatement of greenhouse gases from land-based activities including agriculture. The NCOS defines a voluntary offset, and sets minimum requirements for

calculating, auditing and offsetting the carbon footprint of an organisation or product to achieve carbon neutrality. The six components of NCOS are:

1. *Additionality* – credits for carbon abatement that would not normally have occurred via processes which have not been widely adopted, and can improve agricultural productivity and provide genuine environmental benefits.
2. *Measurable and verifiable* – the amount of carbon emissions avoided, or carbon stored must be directly measured (not deemed or estimated “up front”) using adequately detailed, comprehensive methods that satisfy an audit.
3. *Leakage* – no additional emissions can be produced elsewhere as a result of the activity, eg, increased nitrogen fertilizer applications can increase soil carbon but also increase nitrous oxide emissions; de-stocking sheep on one property may increase sheep numbers on another property if demand for sheep and wool is unchanged.
4. *Internationally consistent* – the methods used to estimate the amount of carbon abated must adhere to internationally recognized accounting standards so the credits can be counted towards Australia’s Kyoto Protocol, which covers the major greenhouse gases produced by human activity.
5. *Supported by peer-reviewed science* – the environmental integrity of Australian Carbon Credit Units will rely on the use of methodologies that incorporate or apply peer-reviewed methods, models or data that are generally accepted by the scientific community.
6. *Account for cyclical variability* – the amount of carbon stored in soils and some forms of vegetation varies according to management practices and climatic cycles, so carbon estimation methods must be able to account for these variations to avoid issuing ACCUs for temporary increases in carbon storage.

Offset

An activity that compensates for all or part of the greenhouse gas emissions produced by an individual or organisation, by reducing or absorbing those emissions

Positive and Negative Lists for the Carbon Farming Initiative

The CFI will use standardized activity (Positive and Negative) lists to assess the “additionality” of carbon abatement activities, rather than individual projects. Woolgrowers can look at the Positive List and see whether their activity is additional. They do not need to undergo an intensive additionality assessment for the carbon abated in their individual project. The Positive and Negative Lists will grow over time as new abatement activities are identified, methodologies are developed, or risks are identified.

- The Positive List identifies activities that would be considered additional under the National Carbon Offset Standard (NCOS) and eligible to participate in the scheme
- The Negative List identifies activities that are ineligible in certain circumstances because of potential negative impacts on communities and the environment.

Soil Carbon

Is the carbon stored within the soil. It takes two forms – organic and inorganic. Organic carbon includes decaying plant matter, soil microbes and organisms and can be increased through different land practices. Inorganic carbon is mineral based and relatively stable, Management factors which impact on soil carbon levels include:

- Over grazing
- Fallowing
- Cultivation

- Stubble burning or removal.

Management practices which lead to increase productivity are also linked to increase soil carbon. These include:

- Improved grazing and cropping rotations
- Improved crop and pasture cultivars
- Fertilizer application
- Reduced tillage

Sequestration

The uptake of carbon from the atmosphere and storage of that carbon by plants and soil and in underground/deep sea reservoirs. Underground storage is also called geological sequestration.

References and further reading:

Climate variability, climate change and drought in eastern Australia: www.csiro.au/science/climate-and-drought-in-eastern-Australia.html

Project impacts of climate change on Australian Agriculture: www.climatechange.gov.au/climate-change/impacts/agriculture.aspx

Glossaries of climate change terms

- Price Waterhouse Cooper: www.pwc.com.au/consulting/assets/publications/Climate-Change-Sep09.pdf
- The Treasury, Australian Government: www.treasury.gov.au/lowpollutionfuture/report/html/10_Glossary.asp

Impact of climate change in your region at the CSIRO “Climate Change in Australia” website:

<http://www.climatechangeinaustralia.gov.au/index.php>

The Kyoto Protocol

http://unfccc.int/kyoto_protocol/items/2830.php

The Carbon Farming Initiative:

<http://www.daff.gov.au/climatechange/cfi>

The Climate Kelpie – connects Australian farmers to tools and information about climate to help you make decisions about your farm business. Visit the Climate Kelpie to learn more about:

- Climate Change – the scientific basis for concern: http://www.climatekelpie.com.au/images/stories/pdfs/2%20climatechangebackground_final.pdf
- Climate change projections for a range of Australian states and territories: <http://www.climatekelpie.com.au/see-forecasts/climate-change-projections>