

Natural Resources

Sustainable cotton landscapes

By JANE TRINDALL

Natural areas on and surrounding cotton farms provide ecosystem services which can benefit the farming enterprise. Beneficial insects live in natural vegetation which provides resources otherwise not found in cropping fields especially when in fallow. Native vegetation can increase natural pest control early in the growing season in adjacent fields and may keep your pest insect thresholds lower for longer. Riparian vegetation prevents erosion along waterways and provides a natural filter for farming inputs protecting soil, nutrients and chemicals from entering rivers and protecting fish and their habitats. Healthy soils on the natural areas on your farm can sequester carbon and improve nutrient cycling.

Three key principles below are listed below to assist you better understand and manage the natural assets on your farm for both environmental and production benefits.

Healthy landscapes

Improving the health of individual stands of natural vegetation and linking them together on your farm and in the district will improve the numbers and diversity of plants and animals on your farm, including beneficial insects, bats and birds which provide natural pest control.

What to do:

- Map areas of natural vegetation, weeds and pests on your farm.
- With your neighbours map areas of natural vegetation, weeds and pests in your district.
- Investigate the plants and animals in your natural vegetation.
- Graze areas of natural vegetation sustainably.
- Leave logs, rocks, dead trees and litter in natural areas where ever you can.
- Work with your neighbours to control weeds and pests in the natural areas in the district.
- If you would like to revegetate areas on your farm, think about linking corridors between natural areas and use local species to improve natural pest control and increase the numbers of plants and animals on your farm.

Healthy rivers

Across the country, cotton farms are located along the rivers in the northern Murray Darling basin and the



Cotton farmers are custodians for an average of nine kilometres riparian land of which more than 85% is actively managed (2012 Cotton Industry Survey). (Photo: Cotton Australia: Greg Kauter)

reef catchments of the Fitzroy. On many cotton farms rivers, wetlands and billabongs are lined with majestic River Red Gums and iconic Coolibahs that define rural Australia. Many studies have shown that these areas are in good condition (as in 'near natural') and harbour many species of birds. The riparian zone also provides an important buffer between agricultural activity and the waterway, helping to maintain water quality and protect aquatic habitats

What to do along waterways:

- Be extra careful when spraying and farming.
- Reduce or prevent traffic access to prevent erosion.
- Work with neighbours upstream and across the river to control weeds and pests.
- Leave logs, rocks, dead trees and litter.
- Allow understorey shrubs and young trees to regrow.
- Protect existing trees and revegetate.
- Retain or replace natural snags in the river.
- Work with your local catchment body to secure eroded river banks.
- Leave a grassy buffer zone between your fields and waterway.
- Graze sustainably.
- Enter into your local Carp Muster!

Healthy soils

Whether in your field or in the natural areas of your farm, healthy soil can make farming a whole lot easier. Without the insurance of healthy soil issues like salinity, sodicity and erosion are can require an ongoing investment of time and money to restore. Simple practises to maintain soil biology, structure, organic matter and carbon will protect your farm for the long haul.

What to do:

- Manage irrigations to minimise deep drainage and salinity risks (see Chapter 8 and Water Quality Section below)

- Manage traffic
- Maintain groundcover
- Graze sustainably
- Match Landuse with Land capability
- Benchmark % groundcover based on soil type/capability

Water quality for sustainable irrigation

By PETER VERWEY

Irrigating with poor quality water, can result in soil salinisation, sodification and nutritional stress. Crop production can decline if the salts in irrigation water exceed certain levels. It may be difficult to recognise salinity problems in the paddock because there can be a significant yield decline before the signs of salinity are obvious. There may be no obvious plant symptoms or signs of salt on the surface. Cotton is reasonably tolerant to salinity in the later stages of development but very sensitive during the early stages (see WATERpak Chapter 5.4 for details). Water quality can also impact on irrigation equipment and spray quality.

Resource condition and management of groundwater aquifers is an important factor to consider. Groundwater levels can change over time, where an aquifer may either gain or lose water. Groundwater can also be susceptible to contamination, for example with an increase in salinity. It is important to note that once there is an impact detected at the point of use then significant zones of the aquifer will already have undergone an irreversible deterioration in water quality

By regularly monitoring your water quality and keeping records of test results, a baseline condition can be established and any trends or changes in water quality and availability can be acted upon and considered in the farm management plan to both maximise crop yield and to ensure the long term viability of the farm water resources

TOLERANCES

pH Reference Data		
	Lower Boundary	Upper Boundary
Corrosive to pumps	0	6.5
Low corrosive nature	6.5	9
SAR Reference Data		
	Lower Boundary	Upper Boundary
No problems likely	0	2
Suits most crops and conditions	2	8
Sensitive crops and soils affected	8	18
Fully evaluate before use!	18	46
General Water Quality Benchmarks		
	EC (dS/m)	
Rainwater	0.00	
Desirable limit for people	0.83	
Environmental impacts may occur	1.50	
Safe limit for people	1.56	
Limit for mixing herbicides	4.70	
Seawater	> 55	

For more information go to Cottassist website (<http://www.cottassist.cottoncra.org.au>)

WATER SALINITY LIMITS FOR SURFACE IRRIGATION (in dS/m)

Soil type	Well drained		Moderate to slow draining		Very slow draining soils	
	Up to 10%	25%	Up to 10%	25%	Up to 10%	25%
Cotton	7.7	12.5	5.1	8.3	2.5	4.2

More EC reference data for other crops can be found in WATERpak Section 5.3, pg 240-241.

Water quality monitoring

What to test:

- As a minimum test EC, pH and SAR, and for bores, the groundwater level should be monitored.
- A wider range of baseline water quality parameters such as hardness, turbidity, nutrients, organics, and trace metals can also be assessed. This not only provides useful information for on farm use of irrigation water, but helps to build a profile of the surrounding landscape resource condition.

For further information on what tests to conduct contact your nearest NATA accredited water testing laboratory.



Consider the impact of water quality on irrigation equipment as well as soils. (Photo: Cotton Australia: Tim Haffey)

When to test:

- Water quality testing should be done at least once every year, preferably more often.
- The groundwater level should be measured at least at the start and end of every irrigation season. Data loggers to measure groundwater level are available and can provide the best information on the rise and fall of the aquifer throughout the year, clearly showing the effects of pumping and recharge.

How to test:

- To reduce risk of contaminating sample discuss water sampling protocols with the laboratory prior to sampling. Records such as time, GPS coordinates, ambient temperature and notes about recent local weather and other visual signs (look/smell of water).
- For groundwater, it is important to purge the bore before collecting any water sample for testing to ensure that the water being tested is representative of the aquifer and not the water that has been sitting in the bore casing between pumping. To do this, start the pump and allow it to run for at least half an hour before collecting the water sample. This will guarantee that the sample is taken from the aquifer water supply and will give accurate results of the groundwater quality.



The other side of the farm. (Photo: Cotton Australia: Irene Fletcher)

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Who can analyse:

- The full range of recommended tests can only be done in a laboratory and these tests for water quality should be performed by a NATA (National Association of Testing Authorities) accredited laboratory to ensure the accuracy and reliability of the test results.
- pH and EC tests as well as some nutrients/chemicals can be conducted on farm by growers using inexpensive and easy to operate equipment/dip tests. The quality of the results using this equipment might not match laboratory results, however these on-farm tests are well suited to continued in-season testing and monitoring changes throughout the irrigation season between laboratory tests..
- The groundwater level can be tested using a measuring tape and 'dipper' device, alternatively a commercial dip meter designed to measure the groundwater level will provide a more accurate result.

Water quality tool

A Water Quality Tool is available on the CottASSIST website (<http://www.cottassist.cottoncrc.org.au>) to assist landholders assess suitability of water for irrigation. The tool can also help growers make water shandyng decisions to dilute the impacts of poorer quality bore water.

For more information the following resources and tools are available at https://www.mybmp.com.au/auth_user/grower_tools_and_resources.aspx

- The Australian Cotton Water Story
- WATERpak
- CottASSIST Water Quality Tool
- DIY Groundwater Monitoring Fact Sheet
- Ecosystem Services Fact Sheet
- www.mybmp.com.au Natural Assets Module

You local NRM groups or CMA may be able to provide additional advice and resources.