



focus on **NRM** research

Resilience of the Australian cotton industry

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What are you researching?

I am completing a resilience assessment of the Australian cotton industry at multiple scales (farm, region and industry) to better understand how to best adapt to change and identify critical threats and opportunities for the industry, and strategically target investment and resources. This project is funded by CRDC.

This project uses a resilience assessment approach to develop a whole-of-system perspective that incorporates the economic, social and ecological dimensions of the industry, how these interact and influence each other over time.

The key assets, inputs, outputs, alternate states and dynamics have been identified for each scale, with particular emphasis on identifying the major thresholds or tipping points that are potential risks the industry may need to manage in the future (specified resilience). The attributes of general resilience (capacity to cope with unknown and unpredicted changes) have also been assessed and the linkages between scales and the potential for cross-scale interactions are identified.

What have you found?

There are five key drivers of change acting across the Australian cotton industry: **demand, policy, climate change, climate variability** and **cotton price**. Potential shocks, which are a sudden spike in one of these drivers, relate to climate change and variability, biosecurity, policy, price and social licence.

Industry leaders and growers need to be aware of the impact of those drivers, and of the changing nature, frequency or severity of shocks so as to better prepare and respond. These drivers and shocks have the

potential to push the Australian cotton Industry towards identified “tipping points” critical thresholds which if crossed lead to significant changes in the system dynamics. At the farm scale the critical thresholds identified are water quality and quantity, soil health, farm profitability and habitat proximity.

Network connectivity and function, infrastructure investment, native vegetation cover, water quantity and land availability are critical thresholds at the regional scale. At the whole of industry scale, the critical thresholds are social licence, network connectivity and function, and R&D investment. A case study based on an analysis of two cotton growing regions over the decade of the “millennium” drought demonstrates the way in which growers and cotton growing regions respond to these drivers and thresholds in practice.

Based on this assessment and an initial review of potential intervention points, addressing National R&D, Regional Water availability and Infrastructure, Farm Profitability and Farm Water Availability thresholds should be the highest priority for interventions from a specified resilience perspective. Modularity (the degree of connected/disconnectedness across the system) emerges as the priority general resilience attribute for the industry as a whole. A review of the existing sustainability indicators reveals the extent to which some of these can also be used as resilience indicators at various scales.

Why is it important?

Cotton production in Australia is an increasingly complex business requiring continuous adaptation to changing circumstances. Resilience assessments are undertaken to identify risks, opportunities and strategies in ways that are often not addressed by conventional management approaches.

CRDC is using this approach to better understand how to best adapt to change and identify critical threats and opportunities for the industry, and strategically target investment and resources.

The process of undertaking a resilience assessment in collaboration with stakeholders has led to a greater shared understanding of the cotton industry from a multiple-scale systems perspective (farm, region and industry). This is another important objective of resilience assessment. Working with cotton growers and industry leaders this assessment has collaboratively:

- defined focal scales;
- developed timelines based on past shocks and changes;
- identified key assets, inputs, outputs, drivers, dynamics and critical thresholds;
- understood the status and trend of general resilience attributes; and

- considered cross-scale interactions.

This has developed the industries capacity to understand their industry as a complex adaptive system. This in itself is proven to enhance the resilience of social-ecological systems and is a positive outcome for the future of the cotton industry

Understanding the industry’s capacity to cope with uncertainty and manage critical tipping points - where that capacity is well developed and where it is weakest - will allow the industry to target future research and development, planning, capacity building and extension activities to ensure all facets of the industry are best placed to cope with an uncertain future.

How can I apply the research/what should I do about it?

The process of resilience assessment involves six phases as outlined in Figure 1:



Where do I go for more information?

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Additional resources:

- Resilience Assessment of the Australian Cotton Industry at Multiple Scales (available from CRDC from August 2016)
- Cotton Industry Resilience Workshop (to be held at the Australian Cotton Conference in August 2016).
- Australian Resilience Centre: www.ausresilience.com.au. (Director Paul Ryan is part of the team involved in this research with the cotton industry).
- Resilience Alliance: www.resalliance.org