

# Report card on sustainable natural resource use in agriculture

## Status and trend in the agricultural areas of the south-west of Western Australia

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### Key messages

The situation and outlook for our soil and land resources used in agriculture is mixed. Although there has been progress in some areas, such as managing wind and water erosion, the status and trend in many indicators of resource condition is adverse.

The impact of poor or declining natural resource condition is imposing a significant cost to the agricultural industries – in lost production (current and likely future) and remediation/management.

Although the report card deals with several natural resource themes individually, it is important to note that the processes within these themes are often linked, and any land management response needs to consider the system as a whole, and how this integrated system may respond to a given management action.

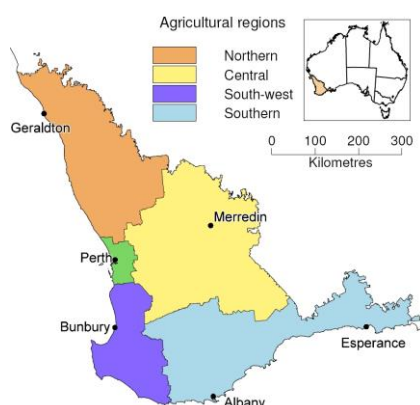
### Introduction

The report card, published by DAFWA in Sept 2013, presents the best available information on the current condition (or risk to condition) and trend in condition of the natural resources that support agriculture.

In particular, it:

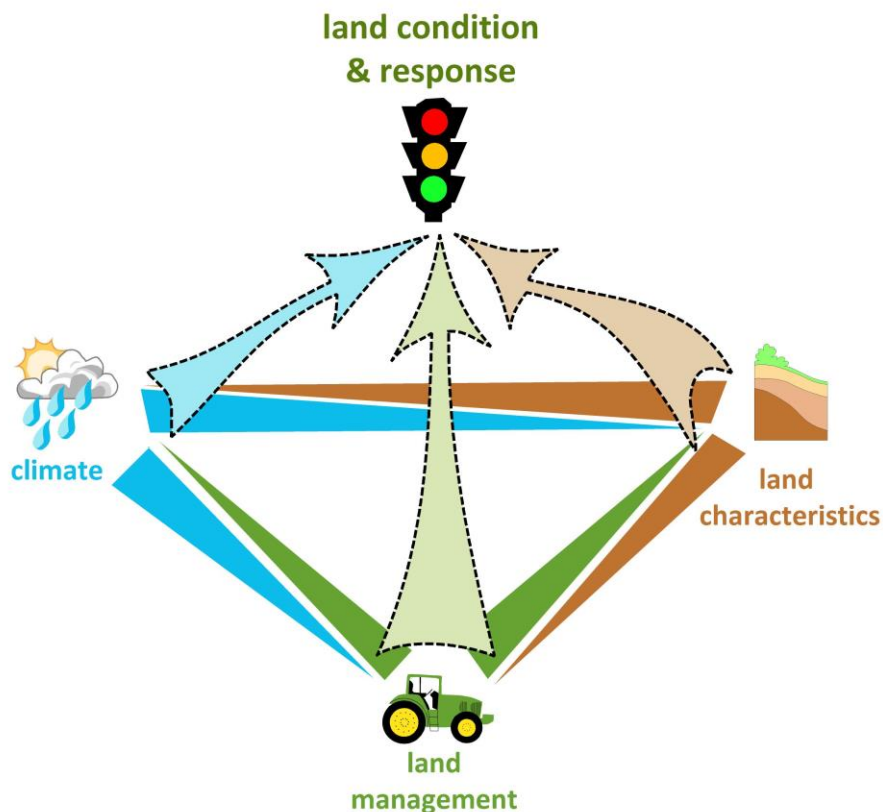
- provides a transparent process explaining how this condition, risk and trend was determined
- highlights any issues which impinge on the sustainable use of this resource
- discusses the implications of these findings on the agricultural industries
- provides recommended actions where appropriate.

The study area covers the agricultural areas of the south-west of WA, other than native vegetation and reserves.



**Figure 1 Study area**

Sustainable natural resource use for agriculture means maintaining (and where possible improving) the productive capability of the land which underpins agriculture, while mitigating off-site impacts.



**Figure 2 The three primary factors that influence the environmental performance of the land.**

The environmental performance of our land is a complex interaction of numerous processes. In simple terms, however, the performance of the land is driven by three primary factors – climate, land characteristics and land management (Figure 2).

Together, these factors will determine the current condition of the land and how the land is performing. An understanding of the trends in land use/land management and climate change will also provide evidence for determining and monitoring trends in land condition.

The climate and land characteristics factors are mostly outside of the influence of land managers, although land characteristics can be modified to a limited degree by management options, such as claying and delving.

Land managers must therefore work within the given climate and land conditions and adopt land management practices that lead to profitable and sustainable outcomes. Land management will need to respond where one of the other factors (e.g. climate) is changing.

There are critical situations where the current land management, even under current conditions, is unsustainable and leading to an unacceptable decline in land condition. Land management will need to change in response to these conditions, otherwise the land use will become unviable.

In discussing specific natural resource degradation issues, the influences of these three factors are considered and commentary is provided on what management is appropriate to ensure a sustainable and profitable agricultural future.

## Method

The report card reports on 10 soil- and water-related themes:

- Soil acidity
- Wind erosion
- Water erosion

- Soil organic carbon
- Soil compaction
- Water repellence
- Dryland salinity
- Nutrient status (phosphorus)
- Nutrient export (phosphorus)
- Acidification of inland waterways

Each theme is divided into two parts:

1. a summary, including resource condition and trend (map and table) and key messages, and
2. the detail of how the assessment was made for that theme, including an overview, assessment method, current condition and trend (results), discussion and implications and recommendation/s.

The method used to assess the theme varied between themes depending on the information available for the theme, and the nature of the theme.

## **Results**

The results for the 10 themes are summarised in Table 1. More detailed spatial analysis, based on broad spatial units (soil and hydrological zones) are provided in each theme chapter.

In summary the situation and outlook for our natural resources is mixed. Although there has been progress in some areas, such as managing wind and water erosion, the status and trend in many indicators of resource condition is adverse.

**Table 1 Resource status and trend summary for the south-west of WA**

Theme	Summary	Condition and trend				Confidence		
		Very poor	Poor	Fair	Good	Very good	In condition	In trend
<b>Soil acidity</b>	Severe and widespread and a major risk to production due to insufficient use of agricultural lime. In most areas, condition of the soil profile is declining.							
<b>Water repellence</b>	Widespread and often severe on sandy soils and can be a major limitation to production under current land management systems.							
		Very deficient	Deficient	Optimal	Excess	Well in excess		
<b>Nutrient status (P)</b>	In most areas, more phosphorus (P) than is required to optimise production is stored in many agricultural soils.							
		Hazard/risk and trend					Confidence	
		Very High	High	Mod.	Low	Very low	In hazard	In trend
<b>Wind erosion</b>	Despite several below average growing seasons, the risk is largely managed through maintaining ground cover. Vigilance is required however, because after an exceptionally dry year, this issue may be significant.							
<b>Water erosion</b>	The risk is largely managed through current land management, although actual levels are mostly unknown.							
<b>Soil compaction</b>	Widespread issue but exact severity and trend is unknown.							
<b>Dryland salinity</b>	Widespread risk with variable spatial and temporal impact. Future extent threatens agricultural land, water resource and biodiversity assets. Containing and adapting to salinity is feasible, though recovery is viable in only a few areas.							

**Themes with insufficient data for resource status and trend summary**

Theme	Summary
<b>Soil organic carbon</b>	Limited data. Possible risk to current levels of soil organic carbon associated with a drying and warming climate. Soil organic carbon levels are highly variable and the trend is unknown.
<b>Nutrient export (P)</b>	Data from several coastal catchments indicates significant input from agricultural activities; however, the off-site impact of nutrients applied to agricultural lands is unknown.
<b>Acidification of inland waterways</b>	Situation variable. Surface expression of acid groundwater is largely static due to a reduction in deep drainage. However, the off-site impact is significant. This theme has localised impacts, the condition is highly variable and the trend is unknown.

**Legend**

How to interpret the graphics in this report:



The colour gradient indicates the range of condition, hazard or risk  
The position of the box on the colour gradient indicates the average value of condition, hazard or risk  
The symbol in the box indicates the trend

**Recent trends**

	Improving		Unclear
	Deteriorating		Variable
	Stable		

**Confidence**

- Adequate high-quality evidence and high level of consensus
- Limited evidence or limited consensus
- Evidence and consensus too low to make an assessment

## Discussion

With increasing global demand for food and fibre there are many opportunities and challenges for the agri-food sector. The report card provides a snap-shot of some of the biophysical challenges the sector is facing. Our challenge is to balance our need to achieve agricultural productivity growth while ensuring our natural resources are healthy and resilient. The report card provides an evidence base to help meet this challenge.

Key principles to be considered in this challenge are:

### Stewardship of natural resources

The maintenance or enhancement of this vital resource base for the long term – is of prime importance. Those who directly manage the land need to be provided with the information, resources and support to carry out this critical role.

### Changing Climate – variability and trends

Ensuring sustainable natural resource use with extreme events, such as long-term below average rainfall, short-term extreme events such as flooding or drought is difficult. Climate-smart agriculture is now being used to bring together actions that achieve a more resilient and climate aware agri-food sector to meet both trends in climate and extreme events.

### Relevant resource information is important

Knowledge and information systems are the basis for sound adaptive management. That is, we need to understand the state and trends in our natural resources, the impacts of the pressures on our environment and the impacts of our management strategies, so that we can progressively adapt and improve those strategies. Long-term collections of data in many aspects of our natural resources is currently limited, which severely constrains our ability to develop and enact evidence-based responses – from policy to on-ground action.

### Understanding of process essential

Many soil and water processes are linked, and efficient solutions to problems must consider the system as a whole, rather than the issue in isolation. An understanding of how the system operates, and how the three primary factors – climate, land characteristics and land management – interact is required when changes to land management are considered to address individual issues.

### Economics driving sustainability

To ensure the sustainable use of our natural resources for agriculture requires a viable rural economy. It is difficult to look at the long-term viability of soil and water resources if it is hard to maintain a viable farm business.

### Sustainability Indicators

Sustainability indicators could focus on natural resource condition and off-site environmental impacts, or could incorporate long-term farm income, managerial skills, and social and economic aspects of agriculture.

### Innovation to support sustainable agriculture

Innovation has been, and will be, a key contributor to solving the problems faced by the agri-food sector. For example, we already know the great benefits realised by precision irrigation, minimum tillage, and improved seed varieties. The challenge is to ensure that innovation keeps flowing. That means getting the conditions right so that both private and public research and development can provide the solutions needed to achieve sustainable use of our natural resources.

### Our natural resources are essential and require action at all levels

Achieving sustainable agriculture is the responsibility of all participants in the system, including land managers, farm businesses, policymakers, researchers, retailers, and consumers. Each group has its own part to play and its own unique contribution to make to strengthen the sustainability of our agriculture.

## **Next steps**

The report card was launched at a Sustainability Forum in Perth in Sept 2013 where the report card findings were introduced to a wide cross-section of the agricultural community – including land managers, agri-business, government and academia.

A follow up workshop was held in Dec 2013 with a smaller group representing the agricultural sector to discuss the way forward – what does the report card tell us, and what actions do we need to undertake?

Four critical areas for action were identified in this workshop:

### **Natural resource use themes:**

More detail information is required about the existing themes, and several key themes which were not in the report card should be added. There was also a need to better understand the interaction/interdependencies between themes.

### **Sharing of information**

The workshop identified the need for ready access to, and sharing, of natural resource information. This included standards for collection and storage of data and the easy ability to access, add and interrogate the information.

### **Assessment of management options**

Economic analysis of management options, including an understanding of the economic understanding of the interactions and interdependencies between themes is required leading to better decision support tools.

### **Monitoring and assessment**

The workshop agreed there is a need to track our performance in meeting sustainable outcomes through cost-effective methods of monitoring and assessment.

The Department of Agriculture and Food is currently working through the workshop discussion and recommendations, and will work with the agricultural community to plan and coordinate actions to achieve better natural resource condition outcomes.

## **Key words**

Soil, land, sustainable use

## **Reference**

DAFWA (2013) Report card on the sustainable natural resource use in agriculture. Department of Agriculture and Food, Western Australia. Available online at [www.agric.wa.gov.au](http://www.agric.wa.gov.au)