



# Report card on sustainable natural resource use in agriculture

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

Supporting your success

Conclusion

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**Cover photo:** Harvesting the wheat crop at Mingenew.

### 3. Concluding discussion

The global demand for food and fibre brings many opportunities, but also challenges for the agri-food sector. One of these challenges is our need to achieve agricultural productivity growth while ensuring our natural resources are healthy and resilient.

Key principles to be considered in this challenge are:

#### Stewardship of natural resources is critical

Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. 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 impact.

Therefore, 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.

As part of climate-smart agriculture, recent initiatives of the Department of Agriculture and Food (DAFWA) have included installing a major climate station network across the South-west Land Division, seasonal

forecasting of rainfall and soil moisture, building production and business resilience towards long-term sustainability and improving water use efficiency.

#### Relevant resource information is important

Understanding the current state and trend in natural resource condition is important for optimising production as well as the long-term productivity of both soil and water.

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.

DAFWA is developing a revised natural resource use monitoring program to improve its ability to report on condition and trend.

#### 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.

When changes to land management are considered to address particular issues, they need to be within the context and understanding of climate and land characteristics otherwise unexpected and unwanted consequences may result.

## **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.

The benefit of sustainability indicators is that they can provide clear benchmarks for land managers, catchment group and communities, and policy and decision makers regarding the health of the natural resources, and possible economic and social resources.

## **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.

**Table 3.1** Summary of the key messages

Theme	Livestock industry	Grains industry	Irrigated agriculture industry
<b>Soil acidity</b>	Soil acidity is a major constraint to pasture production, and needs more investigation by this industry.	Soil acidity is a major constraint and there is significant opportunity to increase lime use to bring pH within target levels.	Managing soil acidity is usually a minor input cost and the issue is generally well managed.
<b>Wind erosion</b>	The critical issue for the livestock and grains industries is maintaining sufficient, stable soil cover throughout the year. This may be difficult in a variable and generally drying climate.		Wind erosion is generally not an issue and cover levels are generally maintained at satisfactory levels. Sandblasting of seedlings can be an issue on the Swan Coastal Plain.
<b>Water erosion</b>	Water erosion hazard, during the growing season, has diminished due to declining winter rains and more sustainable management practices. Water erosion events are mainly caused by intense, localised summer storms, and these are likely to increase with changing climate. Maintaining sufficient soil cover to prevent water erosion is not always possible in grazing systems.		Water erosion may be an issue where soil management practices fail to keep run-off volumes and velocity at safe levels.
<b>Soil organic carbon</b>	A warming and generally drying climate associated with lower organic matter inputs could limit future sequestration of organic carbon in soils used for livestock and grains production. Farming systems that increase biomass production and minimise processes such as wind and water erosion are required to maintain and improve soil carbon levels.		Management that increases biomass production and conserves and applies organic material should improve soil organic carbon levels and productivity.
<b>Soil compaction</b>	Soil compaction is likely to be a major, but unquantified, constraint for all the agricultural industries. Land management that limits, prevents or treats soil compaction is likely to improve productivity. Further work is required to quantify the extent and severity of this constraint.		
<b>Water repellence</b>	The average annual opportunity cost of lost agricultural production in the south-west of WA from water repellence is estimated at \$251 million. Water repellence also increases the risk of wind and water erosion, off-site nutrient transport and possibly soil acidification through increased nitrate leaching. The extent and severity of water repellence appears to be increasing as cropping increases together with early sowing, minimum tillage and reduced break of season rainfall. More baseline data is needed to carry out a quantitative assessment.		
<b>Dryland salinity</b>	Dryland salinity has expanded in most regions since 1998, especially following episodic floods, such as occurred in 1999/2000, 2005 and 2006/07. In some areas, salinity continues to expand despite lower than average rainfall since 1975 and particularly since 2000. No evidence of a reduction in the area of salt-affected land has been observed. Dryland salinity is a major cause of land degradation and remains a threat to 2.8–4.5 million hectares of highly productive, low-lying or valley soils.		Dryland salinity, by definition, is not an issue of irrigated agriculture. However, irrigated agriculture may cause rising saline watertables leading to salinity. This needs to be an important consideration in any irrigated enterprise.

**Table 3.1** Summary of the key messages (cont.)

Theme	Livestock industry	Grains industry	Irrigated agriculture industry
<b>Nutrient status (P)</b>	On average, pasture soils and arable soils contained 1.3 times and 1.6 times respectively as much phosphorus (P) as is required for optimum production. Regular monitoring of soil nutrients at a paddock scale will provide the information to optimise fertiliser application and profitable yields, and minimise off-site impacts.		
<b>Nutrient export (P)</b>	Agricultural industries are major contributors to off-site nutrient impacts in a number of coastal catchments. Similar off-site impacts are likely to be significant in other areas also. Managing fertiliser use should be aimed at reducing off-site impact, and based on regular monitoring.		
<b>Acidification of inland waterways</b>	Surface waters in some inland areas of the south-west of WA are becoming acidified. Off-site impacts may affect the livestock and grains industries. The Policy framework for inland drainage (2012) provides a pathway for improved practice to reduce off-site impacts of inland drainage.	Not an issue for this industry; however, groundwater abstraction for irrigation and water supply can lead to acidity through acid sulfate soils being dewatered.	