



FACT SHEET | MAY 2024

# Building resilience to climate extremes

## Part 4: Environmental risk and resilience

### About the Building Resilience Series

The five-part series from the Soil Wealth ICP project presents a risk-based approach to assessing resilience to climate extremes and impacts for vegetable and melon businesses. The series encourages growers to complete their own risk assessment and action plan for improving resilience as required. It presents a model of farm resilience that focuses on four interlinked areas of a business:

- Overview: Getting ready for changing conditions
- Part 1: Financial risk and resilience
- Part 2: Farm management risk and resilience
- Part 3: Personal and social risk and resilience
- Part 4: Environmental risk and resilience

Links to additional resources are provided in each fact sheet.

The Building Resilience Series has been produced to help Australian vegetable and melon growers to:

- Look at risk and resilience across multiple connected areas of the business
- Create a useful action plan for addressing individual risks and improving overall adaptability to climate extremes

- Find other helpful sources of information and support on the areas of risk and resilience.

This Part 4 of the Building Resilience Series focuses on the environmental risk and resilience of a vegetable or melon business.

### KEY MESSAGES

- Resilience means being prepared and able to cope and adapt when unexpected and extreme events happen.
- Environmental risk and resilience are closely tied to all other areas of a farm business. Supporting soil health, waterway health, biodiversity and native vegetation on-farm can provide a host of ecosystem services that boost agricultural productivity and support business resilience.
- The guide provides resources and suggestions on assessing and improving business resilience through risk-based planning and actions.



## What is climate resilience and why does it matter?

**Resilience measures the ability of a system, such as a business, to absorb, respond to and recover from shocks<sup>1</sup>.**

In agriculture, this is influenced by the degree of a farm's overall risk, the ability to reduce risks and to adapt to change in the medium to long-term.

## Environmental risks and resilience

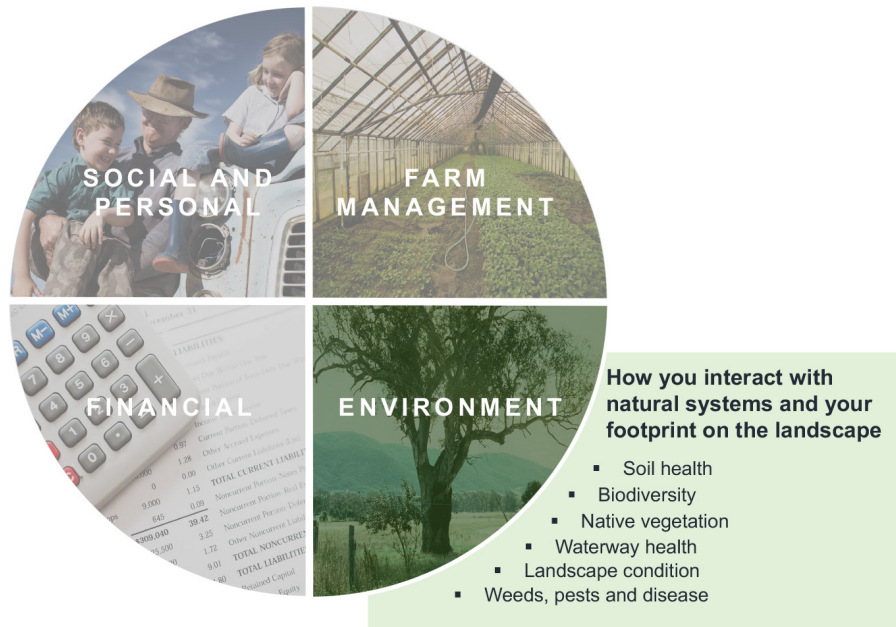
Key resilience and risk factors regarding soil health include erosion control, soil structure improvement or maintenance to increase infiltration, water holding capacity, and drainage as well as root distribution to access nutrients. Soil health is an important factor for reducing the risk of pests, weeds and diseases. There

are many ways to improve soil health, most of which are covered in other Soil Wealth ICP resources, listed at the end of this section.

Waterways vegetated with native plants can act as buffers against weed invasion, slow down wind speed, increase land value and enhance biological pest control and crop pollination<sup>2</sup>.

Native vegetation belts can act as wind breaks, reducing soil moisture loss. They can help to control erosion, improve water quality, and provide habitat for beneficial insects<sup>3</sup>.

Native vegetation, rocky outcrops, dead trees and even lone paddock trees enhance farm biodiversity which can provide a host of ecosystem services including pollination, pest control, soil moisture and salinity control, and long-term carbon storage<sup>4</sup>.



1 Hughes, N, Burns, K, Ying Soh, W and Lawson, K 2020, Measuring drought risk: the exposure and sensitivity of Australian farms to drought, Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), Department of Agriculture, Water and the Environment

2 Department of Land, Water, Environment and Planning Victoria 2019, Managing riparian land: benefits to croppers, Victorian State Government, accessed via: [water.vic.gov.au/waterways/riparian-land/benefits-of-riparian-land-to-landholders](http://water.vic.gov.au/waterways/riparian-land/benefits-of-riparian-land-to-landholders)

3 Department for Environment and Water South Australia 2018, Wind-proof your farm: Increasing farm productivity with shelterbelts factsheet, accessed via [cdn.environment.sa.gov.au/landscape/docs/ki/2018ifact3-shelterbelt-2018-web.pdf](http://cdn.environment.sa.gov.au/landscape/docs/ki/2018ifact3-shelterbelt-2018-web.pdf)

4 Sustainable Farms 2022, Managing Natural Assets on Farms: Scattered paddock trees, Australian National University, accessed via [sustainablefarms.org.au/wp-content/uploads/2022/07/Scattered-Paddock-Trees-brochure-9.1.pdf](http://sustainablefarms.org.au/wp-content/uploads/2022/07/Scattered-Paddock-Trees-brochure-9.1.pdf)



**Table 1:** Example questions and strategies to consider when assessing environmental risk resilience.

Potential areas of risk	Key questions to ask	Possible actions
Soil health	<ul style="list-style-type: none"> <li>• Is soil erosion an issue on the farm? When/where is the worst erosion observed?</li> <li>• How good is the infiltration and soil water holding capacity?</li> <li>• What is the rooting depth? Do compacted layers reduce root and water penetration?</li> <li>• What are the soil carbon levels compared to levels in undisturbed soils of the same type?</li> <li>• Have soil carbon levels declined or increased over the past 5-10 years?</li> <li>• Are there new/increasing pests, weeds and diseases affecting crops?</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct regular soil testing (texture, pH, electric conductivity, nutrient levels, organic carbon, cation exchange capacity, etc.) to monitor soil health</li> <li>• Install soil moisture sensors and use an irrigation tool like IrriSAT to schedule and monitor irrigation</li> <li>• Avoid soil compaction through reducing vehicle or machinery traffic, use controlled traffic where possible and/or strip tillage</li> <li>• Investigate and use ways of building soil organic carbon</li> <li>• Investigate and use efficient nutrient input and use options</li> <li>• Trial cover cropping to minimise soil erosion and water loss</li> <li>• Address the effects of saline or dispersive, sodic soils e.g. via careful tillage, avoiding irrigation with saline water, good drainage, increasing organic matter levels, adjusting the nutrition program</li> </ul>
Waterway health	<ul style="list-style-type: none"> <li>• Are the waterways on/adjacent to the farm healthy?</li> <li>• Can waterway health be improved through weed control or riparian revegetation?</li> <li>• Does nutrient rich water leave the rootzone and potentially end up in groundwater?</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct riparian restoration works</li> <li>• Manage nutrient inputs well to reduce the risk of nutrient runoff or leaching into waterways</li> <li>• Assess water clarity and colour for indications of erosion and sedimentation</li> <li>• Assess diversity of aquatic vegetation and presence of weeds and algae</li> <li>• Protect stream banks to improve their stability, e.g. through fencing</li> </ul>
Native vegetation	<ul style="list-style-type: none"> <li>• Does the farm have strategically planted shelterbelts to help reduce wind speed, evaporation and erosion and help with pest and disease control?</li> <li>• Are weeds an issue on the farm?</li> <li>• Is weed pressure increasing, especially of difficult to control weeds?</li> </ul>	<ul style="list-style-type: none"> <li>• Use shelterbelts to benefit adjacent cropping land</li> <li>• Assess weed problems on the farm and develop a weed management plan to ensure follow up</li> <li>• Ensure good farm hygiene</li> </ul>



Potential areas of risk	Key questions to ask	Possible actions
Biodiversity	<ul style="list-style-type: none"><li>Does the farm support local biodiversity, which in turn supports landscape functions and services?</li></ul>	<ul style="list-style-type: none"><li>Retain and protect paddock trees and remnant native vegetation, dead trees and rocky outcrops</li><li>Consider enhancing farm dams through protection and establishment of native vegetation</li></ul>

## CASE STUDY: COMPOST FIELD TRIALS REDUCE NUTRIENT INPUTS AND IMPROVE SOIL HEALTH

Two growers in South Australia trialled compost use in commercial vegetable crops and saw multiple benefits for soil health and reduced fertiliser and irrigation inputs. The aim of the trial was to show how organic amendments can help to limit overuse of farm inputs and associated off-site environmental effects, e.g., nutrient leaching and run-off.

In his field grown kale crop, grower Anthony De Ieso trialled composting to try to address issues such as salinity and loss of soil productivity through years of continuous cropping.

The trial performed well, with strong improvements in root growth, plant size, crop evenness, visual quality and marketable yield, as well as harvest efficiency in the compost treatment plots.

Other benefits included heavily reduced fertiliser use and irrigation needs, reduced irrigation costs because of improved soil water holding capacity, time savings from reduced need to apply fertiliser and a longer harvesting period due to improved crop longevity. Further information on the trial can be found in this [Soil Wealth ICP case study](#).





## Further resources

**Table 2:** Further resources for environmental risk and resilience

Source	Resource
Agriculture Victoria	Shelterbelt design – <a href="https://agriculture.vic.gov.au/farm-management/soil/erosion/effective-shelterbelt-design">agriculture.vic.gov.au/farm-management/soil/erosion/effective-shelterbelt-design</a>
AUSVEG	Cover cropping resources for growers – <a href="https://ausveg.com.au/articles/cover-cropping-resources-available-for-growers/">ausveg.com.au/articles/cover-cropping-resources-available-for-growers/</a>
AUSVEG	<a href="#">Healthy soils for sustainable vegetable farming</a>
Sustainable Farms	Guide to enhancing farm dams – <a href="https://sustainablefarms.org.au/wp-content/uploads/2023/05/Enhancing-Farm-Dams-guide.pdf">sustainablefarms.org.au/wp-content/uploads/2023/05/Enhancing-Farm-Dams-guide.pdf</a>
Sustainable Farms	Guide to managing shelterbelts – <a href="https://sustainablefarms.org.au/wp-content/uploads/2022/09/Shelterbelts-Brochure-FINAL_Feb-2023_online.pdf">sustainablefarms.org.au/wp-content/uploads/2022/09/Shelterbelts-Brochure-FINAL_Feb-2023_online.pdf</a>
Sustainable Farms	Tips for waterway restoration – <a href="https://sustainablefarms.org.au/wp-content/uploads/2021/01/Riparian-restoration-brochure-v2-LR.pdf">sustainablefarms.org.au/wp-content/uploads/2021/01/Riparian-restoration-brochure-v2-LR.pdf</a>
VegNET Victoria	Native vegetation insectaries fact sheet – <a href="https://soilwealth.com.au/wp-content/uploads/2023/08/NativeVegInsectaryFactSheet_Aug_2021.pdf">soilwealth.com.au/wp-content/uploads/2023/08/NativeVegInsectaryFactSheet_Aug_2021.pdf</a>
Soil Wealth ICP	Soil erosion fact sheet – <a href="https://soilwealth.com.au/wp-content/uploads/2023/08/SW_SoilErosionv3.pdf">soilwealth.com.au/wp-content/uploads/2023/08/SW_SoilErosionv3.pdf</a>
Soil Wealth ICP	Soil health fact sheet – <a href="https://soilwealth.com.au/wp-content/uploads/2023/12/Soilhealthfactsheet20201222.pdf">soilwealth.com.au/wp-content/uploads/2023/12/Soilhealthfactsheet20201222.pdf</a>
Soil Wealth ICP	Soil moisture and the IrriSAT tool – <a href="https://soilwealth.com.au/wp-content/uploads/2023/08/PotatoirrigationcasestudyPart01_HIGH-RES021.pdf">soilwealth.com.au/wp-content/uploads/2023/08/PotatoirrigationcasestudyPart01_HIGH-RES021.pdf</a>
Soil Wealth ICP	The Carbon Series – <a href="https://soilwealth.com.au/2022/01/the-carbon-series-part-1-carbon-farming-and-its-relevance-to-australian-vegetable-growers/">soilwealth.com.au/2022/01/the-carbon-series-part-1-carbon-farming-and-its-relevance-to-australian-vegetable-growers/</a>

