



FACT SHEET | MAY 2024

Building resilience to climate extremes

Part 2: Farm management risks 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.

Part 2 of the Building Resilience Series focuses on the farm management risk and resilience.

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 shocks¹.

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.

Farm management 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 can enhance biological pest control and crop pollination².

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 insects³.

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 storage⁴.



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

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

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



Table 1: Example questions and strategies to consider when assessing farm management risks resilience.

Potential areas of risk	Key questions to ask	Possible actions
Water resources	<ul style="list-style-type: none"> • How efficient is the irrigation system? • Is water infrastructure efficient and well-maintained? • How vulnerable are water resources to drought? • Is the soil compacted so that it dries out quickly? • Do water or soil salinity increase during dry years? 	<ul style="list-style-type: none"> • Explore options to optimise irrigation through scheduling automation and soil moisture monitoring • Regularly check and maintain water infrastructure • Good soil structure and soil health allow for optimum infiltration and water storage in the rootzone
Drainage	<ul style="list-style-type: none"> • Does water infiltrate the soil quickly or does it run off? • Is the soil compacted so that it cannot hold much water? • In the event of a flood, can floodwater drain quickly? • If near a river or stream, are levy banks high enough and stable? 	<ul style="list-style-type: none"> • Good soil structure and soil health allow for optimum infiltration (preventing erosion) and water drainage of the rootzone • A drainage management plan can help identify options
Energy sources	<ul style="list-style-type: none"> • Could energy use be more efficient e.g., irrigation pumps, sheds and cool rooms, tractors and machinery? • What back-up energy sources are available? • Is energy efficiency loss occurring through poorly insulated buildings/infrastructure? • Are heating/cooling systems efficient? • Could renewable energy sources replace fossil fuels? • Is energy storage an option, e.g., batteries? • Are grants or incentives available to facilitate the switch to renewable energy? 	<ul style="list-style-type: none"> • Take time to understand energy usage and bills and identify potential cost reductions • Take energy use into account when investing in new equipment and infrastructure • Insulate buildings, stores and devices well • Switch to energy-efficient lighting, heating and cooling systems • An emission audit can identify 'leaking systems' and areas for improvement • Consider installing renewable energy sources • Investigate grants and incentives such as the State Government energy programs and the Small Scale Renewable Energy Schemes



Potential areas of risk	Key questions to ask	Possible actions
Nutrient inputs	<ul style="list-style-type: none"> • Can fertiliser use efficiency be improved? • Could soil health be improved to increase nutrient holding capacity? • Could runoff and drainage management be improved, to reduce potential nutrient losses from the rootzone and to nearby waterways? 	<ul style="list-style-type: none"> • Follow the four Rs principle: Right product, right rate, right time, right place. Talk to your agronomist for more guidance • Use plant or soil testing to assess plant nutrient needs and supply and determine the right rates and balances via a nutrient budget • Improve soil health to maximise plant access to nutrients • Avoid drainage from the rootzone and runoff on the farm • Use cover crops to keep leftover nutrients in circulation
Technology and innovation	<ul style="list-style-type: none"> • What are the new developments in technology and innovation in vegetable farming? • Could precision agriculture help to improve resource use and productivity? • Could early warning systems for extreme climate events or pest and disease pressures help with preparedness? 	<ul style="list-style-type: none"> • Connect with agtech news resources like agtechfinder to stay up to date • Investigate technology for weed control or yield prediction • Sign up for emergency warnings through state emergency management organisations (australianwarningsystem.com.au/)
Biosecurity and farm hygiene	<ul style="list-style-type: none"> • Does the farm have a biosecurity plan, effective biosecurity measures, and record keeping of who visits? • Is regular crop health monitoring data kept? 	<ul style="list-style-type: none"> • Develop and update the farm biosecurity plan • Know who comes on the property and make sure they have clean vehicles and footwear; clothes can carry bacterial and virus diseases • Ensure crop monitoring records are kept
Planning and recovery for extreme events	<ul style="list-style-type: none"> • What is the local bushfire and flood risk? • How prepared is the farm business for these risks and other locally relevant threats? • Does the farm have a plan for disaster recovery? • What are some sources of assistance and how can they be accessed? 	<ul style="list-style-type: none"> • Learn about fire risk reduction on farms • Develop a fire plan for safely responding to bushfires • Explore local disaster resilience through the Australian Disaster Resilience Index – adri.bnhcrc.com.au • Assess flood risk • Develop a wet weather response plan • Prepare response plans for any other locally relevant threats • Develop a disaster recovery plan • Be informed on where to go for assistance in both the immediate phase and aftermath of a potential disaster



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

A processing potato grower in Billimari, NSW, used IrriSAT satellite images to monitor their potato crop throughout a growing season. IrriSAT provides Normalised Difference Vegetation Index (NDVI) satellite images of a crop every 5-7 days. The images can help to differentiate between areas of good, medium and poor crop growth.

The IrriSAT images helped to identify an issue with poor sprinkler performance, leading to water stress during the tuber bulking period. The estimated cost of this issue was between \$4,800 – \$6,800, due to reduction in productivity of 17 tonnes. As this issue was identified two months before harvest, the sprinkler problem could be resolved.

The IrriSAT images also showed an area of lower productivity where topsoil loss had occurred through laser levelling. Soil remediation works could be targeted to this area, which could increase the value of production by an estimated \$2,800 - \$4,000 for each crop. Further details on this case study can be found on the Soil Wealth ICP website (soilwealth.com.au/wp-content/uploads/2023/08/PotatocasestudyPart2_HIGH-RES02.pdf).



Figure 2: Comparison of potato crop in the 'good' and 'poor' growing areas identified through IrriSat





Further resources

Table 2: Further resources for environmental risk and resilience

Source	Resource
Agriculture and Food WA	Soil moisture monitoring guide – agric.wa.gov.au/horticulture/soil-moisture-monitoring-selection-guide
Agriculture Victoria	Energy – agriculture.vic.gov.au/climate-and-weather/understanding-carbon-and-emissions/energy-use-on-farms
Agriculture Victoria	Farm flood preparedness – agriculture.vic.gov.au/farm-management/emergency-management/floods/how-to-prepare-for-flood
Agriculture Victoria	Guide to farm recovery after fire – agriculture.vic.gov.au/data/assets/pdf_file/0007/613519/Recovery-After-Fire-Guide.pdf
Agriculture Victoria	Information on agtech for farmers – agriculture.vic.gov.au/farm-management/agtech
Agriculture Victoria	Nitrogen fertilisers: improving efficiency and saving money – agriculture.vic.gov.au/climate-and-weather/understanding-carbon-and-emissions/nitrogen-fertilisers-improving-efficiency-and-saving-money
Australian Institute for Disaster Resilience	Australian Disaster Resilience Knowledge Hub – knowledge.aidr.org.au/collections/
Australian Institute for Disaster Resilience	Information on the Australian Warning System – knowledge.aidr.org.au/resources/australian-warning-system/
AUSVEG	Biosecurity and crop protection resources – ausveg.com.au/biosecurity-agrichemical/biosecurity/
AUSVEG	Precision agriculture in vegetable production – ausvegvic.com.au/wp-content/uploads/2019/04/Precision-agriculture-in-vegetable-production_V2.pdf
Clean Energy Council	Information on government programs for renewable energy – cleanenergycouncil.org.au/consumers/buying-solar/government-programs
Soil Wealth ICP	Making the most of your nitrogen factsheet – soilwealth.com.au/wp-content/uploads/2023/08/SW_MakingthemostofNitrogen_FINAL.pdf
Soil Wealth ICP	Soil health and water use efficiency factsheet – soilwealth.com.au/wp-content/uploads/2023/08/SoilUseWUE20181205v5.pdf
Soil Wealth ICP	Soil testing and interpretation for vegetable crops – ausveg.com.au/app/uploads/2021/10/SW_SoilTestInterpretation_FINAL.pdf
Soil Wealth ICP	Technology for controlling weeds – soilwealth.com.au/wp-content/uploads/2023/12/AHR_TechnologyforcontrollingWeeds05022019.pdf