Lesson 2 – Climate change adaptation in action

Learning intentions	Students will: - Further understand the cause and impacts of climate change - Understand the impacts climate change has on farmers - Know different ways that farmers adapt to climate change
Materials	- Computer with projector - Students will need access to computers and the internet - Printed worksheets (one per student)
Resources	- Lesson 2 PowerPoint - Lesson 2 teacher notes - Lesson 2 worksheet - Vic Climate Projections 2019 Regional Report - Gippsland.pdf - Extension activity survey link

Notes on extension activity:

For students in higher years or with an interest in maths and science, this lesson has an extension activity. Print a copy of *'Vic Climate Projections 2019 Regional Report - Gippsland.pdf'* for each student and ask them to read the report and complete this quiz: https://www.surveymonkey.com/r/QTHDNDM

Students can also use this QR code to access the survey →

Lesson preparation:

- Print worksheets for students

Lesson plan:

1) Present PowerPoint to the class
    - Slides 2-4 reintroduce the themes from Lesson 1
    - Watch video on slide 5. You may need to check students understanding of farming terms, such as tillage, erosion and grid sampling. Please see Glossary at the end of this sheet for further descriptions.
    - Discussion points for slide 7:
        i. Why was the issue put into the category/categories?
        ii. What would be the flow on impacts of this scenario? For example, issues that impact crop production (e.g. change in growing season, reduced irrigation, lower crop yields) can jeopardise food security, both locally and globally, with economic impacts for consumers and farmers. Increased fertiliser has economic implications for production, thus increasing costs for farmers and consumers, whilst greater fertiliser application can be susceptible to being washed off soil surfaces (run-off) or leaking out of soils (leaching) into waterways, polluting the water's aquatic life and water quality for further applications e.g. drinking, irrigation. Biodiversity loss resulting in lower bees affects agricultural production (e.g. less food produced because plants can't reproduce) as well as impacts on wildlife (animals, birds) who rely on pollinated plants for survival, and

ecosystem, where each plant supports life in general. More frequent extreme weather events affect society e.g. safety of people, damage to buildings, roads, vehicles etc as well as agricultural production, e.g. crop/animal damage resulting in economic issues as well as food security and animal welfare concerns.

iii. Can you think of ways a farmer could mitigate (reduce) the impact or adapt (change to avoid the problem)?

This may be challenging for some students to think of suggestions, especially those with little or no knowledge of agricultural production. The examples shown in the video on slide 5 can be used to prompt discussion – what was the farmer doing differently now than previously? For example, no till farming systems limit soil disturbance and hence erosion so he is not losing his topsoil whilst also maintaining soil nutrients and microorganisms. Similarly, he had implemented grass drains to avoid erosion during heavy rainfall events and only applying fertilizer when it was needed. These are examples of climate mitigation. He also gave an example of adaptation by changing their planting season, which used to be spread over 8 weeks and is now only 10-14 days.

- Examples of issues Adam might encounter (slide 15):

iv. Vegetable farmers are particularly susceptible to damage from heat waves and other weather events

v. Adam has invested in the packed shed making his produce quicker to process, this could be important if food security is an issue

vi. With such regular planting, Adam would need accurate weather forecasts – this is getting harder with weather patterns becoming harder to predict

vii. Vegetables require lots of irrigation and fertilizer, Adam needs to monitor and manage these resources optimally to avoid high input costs (and therefore increasing costs for consumers) as well as sustaining the environment

- Notes on slide 16:

viii. Guide students to think about the innovations they researched in Lesson 1, would any of these apply to Adam's farm? (Gene-silencing technology, Crop computer-modelling systems, locally developed feed additives, localised crop varieties developed for regional weather, Specialised greenhouses, On-farm green energy generators (wind turbines, biogas reactors).

- Notes on slides 18 and 19:

ix. These slides are aimed to generate class discussion, pause here and allow students to consider the question before you move on to the answers on the next slide.

Glossary of terms

Drainage: The removal of excess surface water or excess water from within the soil by means of surface or sub-surface drains

Erosion: The wearing away of the land surface, usually by running water or wind.

Fertiliser: A compound containing nutrients such as Nitrogen, Phosphorous, and Potassium to support plant growth

Grid sampling: The systematic sampling of soils in an area to determine characteristics such as description, classification, nutrient content and mapping.

Nutrient: A chemical element or compound that is essential for normal growth and production for humans, plants and animals.

Sediment: Solid material that is moved and deposited in a new location. Sediment can consist of rocks and minerals, as well as the remains of plants and animals. It can be as small as a grain of sand or as large as a boulder. Sediment moves from one place to another through the process of erosion.

Tillage: The preparation of soil by mechanical agitation of various types, such as digging, stirring, and overturning.