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# 3

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Mana Tohu Mātauranga o Aotearoa  
New Zealand Qualifications Authority

## Level 3 Agricultural and Horticultural Science 2025

### 91532 Analyse a New Zealand primary production environmental issue

Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Analyse a New Zealand primary production environmental issue.	Critically analyse a New Zealand primary production environmental issue.	Comprehensively analyse a New Zealand primary production environmental issue.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

**You should attempt ALL the questions in this booklet.**

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–10 in the correct order and that none of these pages is blank.

Do not write in the margins (//////). This area will be cut off when the booklet is marked.

**YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.**

Merit

TOTAL **5**

**INSTRUCTIONS**

Carefully read ALL the instructions AND parts of the task before answering.

Answer the different parts using one primary production system.

Name your specific primary production system.

Primary production system: Dairy farming

**PLANNING**

Fertilization 62% of N use in NZ is from dairy farmers

- Using too much fert, applying fert right before rain, or from cattle urine can increase N fert leaching and lead to eutrophication.
- A build up of N and P fert in waterways increases algae bloom.
- algae bloom blocks sun, and when it dies, all the dead organic matter used the dissolved oxygen leading to anoxic conditions.
- This increases turbidity of water and ruins water quality making it murky.
- Decreases biodiversity as aquatic plants can't photosynthesise and suffocates ~~with~~ wildlife or organisms that don't have enough dissolved oxygen.

**Cultivation**

- Tilling is a mechanical process of agitating soil before crop growth to loosen the soil and ~~de~~ aerate it.
- ~~This makes~~ This makes the loose soil vulnerable to wind/water
- Rainfall causes soil erosion and sediment loss. sediment is carried into our waterways.
- Sediment in streams reduces clarity of the water meaning aquatic plants can't get sufficient sunlight.
- Sediment also falls into the gaps of organisms habitats, causing the organisms to have to space to hide. from predators
- ~~water~~ food availability is compromised

Riparian = shade = more dissolved oxygen  
 vegetation absorbs excess nutrients and sediment.

### TASK: The impact of management practices on biodiversity

Primary producers carry out management practices to produce their products. Some of these management practices have negative impacts on the biodiversity of the environment.

- (a) For your chosen primary production system, explain the **negative** impact its production can have on biodiversity. In your answer consider the management practices used, and how biodiversity is impacted.

Use data from within the past five years and other evidence to support your answer.

Dairy farmers use fertilizer, specifically Nitrogen and phosphorus rich fertilizers to help grow their crops. ~~On hills from farms~~ however in some cases like if too much fertilizer was applied or if it was applied right before rainfall, this can lead to eutrophication. In dairy farms it can also ~~be~~ be caused by cattle urine which is high in Nitrogen levels, and in farm lands that have lots of hills, this can increase the amount of nutrient leaching. It's said that 62% of nitrogen use in NZ is from dairy farms, making dairy farms a ~~major~~ large contributor to the unhealthiness of our waterways. When an increased amount of nutrients is leaching into our waterways, it can cause algae blooms. This is when algae grows so large due to the excess nutrients that it can cause harm to the biodiversity of the waterways. Firstly, the bigger it gets, the ~~more~~ less sunlight can come in, sunlight is unable to penetrate through the water meaning aquatic plants can't photosynthesise and they therefore die. Algae bloom also dies very fast, when it dies, all the dead organic matter decomposes (lack of biodelet)

Many farmers understand that their production can have a negative impact on biodiversity and are using courses of action to mitigate the negative impacts or improve biodiversity.

- (b) Explain how TWO courses of action, when used correctly, will **mitigate** the negative impacts or **improve** biodiversity for your chosen production system.

Use recent data from within the past five years and other evidence to support your answer.

Course of action (1): Riparian planting

Riparian planting is the process of planting vegetation on the edges of waterways. This is to mitigate against a decrease in the water and environment's biodiversity. Vegetation is able to filter out a large amount of pollutants and sediment that have been leached, it is able to absorb good nutrients for the health of the soil while protecting the water from excess nutrients. It acts as a barrier towards sediment, not allowing as many sediment particles in and therefore allowing various forms of wildlife to survive. As the vegetation grows into ~~larger~~ larger trees and shrubs, it can produce shade over the waterway. This is ~~optimal~~<sup>optimal</sup> as shade allows for cooler water, cooler water holds more dissolved oxygen, preventing the waterway from reaching an anoxic condition, therefore helping aquatic plants and wildlife to survive and create diversity. Cooler water temperatures also minimize ~~they~~ the growth of aquatic weeds and unwanted algae bloom that decreases water quality and overall biodiversity.

## Course of action (2): Direct drilling

Direct drilling is a method of sowing seeds into soil that doesn't change ~~the~~ <sup>the</sup> ~~soil's~~ structure. When direct drilling, the crop residue will be left on top as a layer of protection against the wind and water and the erosion of soil they cause. Direct drilling is when you make a narrow slot in the soil for the seed to go into. This ~~process~~ process directly minimizes sediment loss as less soil erosion is occurring. This is a good mitigation strategy to use as it directly confronts the problem, instead of ~~to~~ trying to stop the run-off in a later stage, like when it's already at the ~~waterway~~ <sup>waterway</sup>. This strategy is able to minimize the amount of sediment ~~to~~ loss and therefore keep the waterways healthy with clear water and plenty of habitats for all the wildlife, this increases biodiversity in the waterway.



Source: <https://www.eeec.org.au/wp-content/uploads/2023/05/enviro-1024x1024.jpg>

- (c) Justify which of your two courses of action has the greatest positive impact on biodiversity, while ensuring the environmental, economic, and social sustainability of your production system.

Use recent data from within the past five years and other evidence to support your answer.

I think riparian planting is the best mitigation method to stop both nutrient leaching and sediment loss in our waterways. This is because the vegetation is able to act as a barrier, it protects the water by absorbing any ~~excess~~ excess nutrients or filtering sediment particles out.

~~This means that the water~~  
 The vegetation also allows for more dissolved oxygen in the waterways, ~~improving~~ giving the wildlife better living conditions. Riparian planting covers a whole bunch of problems and is able to improve water quality and biodiversity. Direct drilling is still a good strategy but only focuses on one issue ~~without~~ meaning paying all that money to only solve one problem ~~problem~~ probably isn't a good financial decision, instead, planting vegetation and letting it grow over the years will fix many more problems ~~at~~ and is more of a one time thing that won't need to be upkeep or need any more purchasing for. Overall I think that riparian planting is the best strategy to mitigate more problems for less money, therefore increasing biodiversity and not making dairy farmers financially down.

Extra space if required.  
Write the question number(s) if applicable.

QUESTION  
NUMBER

Which takes up vast quantities of dissolved oxygen in the water. This means the water loses oxygen and comes to an anoxic condition which inevitably suffocates wildlife living in the water. This obviously decreases the water's biodiversity as organisms are dying or being harmed and therefore less and less organisms are able to survive. This creates an unhealthy waterway, whether it's a stream, a river, or a lake. ~~and~~  
This is the negative impact that comes from mis-use of fertilizer, our waterways biodiversity declines.

Another management practice that has a negative impact on biodiversity in waterways is cultivation. A cultivation technique commonly used is tilling. Tilling is the process of mechanically ~~and~~ agitating soil to loosen it up and aerate the soil. However, this can lead to sediment loss, the loosened soil is ~~is~~ vulnerable to water/wind, as it can be easily dislodged due to its loosened structure. When a rain event occurs, it can cause soil erosion, this runoff carries sediment particles directly into our waterways. Sediment in our waterways ~~is~~ negatively ~~and~~ affects the biodiversity, the sediment particles make the water ~~lose~~ lose its clarity making it ~~harder~~ harder for sunlight to reach the aquatic plants for ~~and~~ photosynthesis, this cause them to die

Extra space if required.

Write the question number(s) if applicable.

QUESTION  
NUMBER

Which harms the water's biodiversity. Sediment also falls into the gaps in the streambed, ~~the~~ these are important habitats ~~to~~ for organisms that keep them safe from predators. Without this protection they are less likely to survive and further damage is done to the biodiversity. Sediment can also limit food availability, ~~making~~ making it harder for wildlife organisms to survive. With wildlife dying and/or being harmed, it means that certain things that they do to keep the quality of the water healthy can no longer be done. Overall these management practices used on dairy farms negatively impact the biodiversity of our waterways.

## Merit

**Subject:** Agricultural and Horticultural Science

**Standard:** 91532

**Total score:** 5

Q	Grade score	Marker commentary
One	M5	<p>The candidate has explained in detail the impacts of dairy farming on biodiversity with a specific focus on fertiliser usage leading to eutrophication. They have also explained the impact that sediment can have on the habitat for aquatic organisms. They have explained in detail how riparian zones can reduce the amount of nutrients and sediment entering the waterway, as well as shading the water and have linked this to more dissolved oxygen in the water. For a higher merit, the candidate could have explained with specific details how direct drilling will help mitigate the negative impacts of sediment loss through cultivation.</p>