**Trace elements & land use: Why the Kaingaroa Forest isn’t grassland**

**Levels:** 6-8  
**NoS achievement aims:** Understanding about science   
**Contextual strands:** Living world   
**Topic:** Applied biological principles

**Rationale**

Cobalt deficiency in soil has a dramatic effect on animal health, giving rise to ‘bush sickness’. Years of painstaking research led to an understanding of the role cobalt plays in Vitamin B12 synthesis. In this activity students investigate the importance of persistence and creativity in scientific research.

**What you need**

* A copy of [*Why the Kaingaroa Forest isn’t grassland*](https://scienceonline.tki.org.nz/Nature-of-science/Nature-of-science-teaching-activities/Trace-elements-and-land-use-Why-the-Kaingaroa-Forest-isn-t-grassland#Forest) , Miles Baker. Story about how a problem was tracked down and finally solved.
* Materials to make a wall chart of questions raised (for further investigation).

**Focus**

* What is bush sickness? What effect does it have on animals feeding from deficient soil?
* How can animals be affected, yet grass grows without apparent problems?
* Why is this problem more significant on the volcanic plateau?
* Why are many New Zealand scientists agricultural scientists?

**Exploration**

1. Explain that the story the students are about to read is like a detective story – it’s about how a problem was tracked down and finally solved. It is also about the nature of the problem (science) and the detectives who tracked it down and solved it (scientists) – these will be the focus of the discussion that follows.
2. Read to students or give them a copy of *Why the Kaingaroa Forest isn’t grassland*.
3. What does this story tell you about scientists? For example, scientists:
   * were solving a problem
   * were motivated, because it was a problem that affected the New Zealand economy (dairy and sheep farming)
   * based their ideas on what they already knew (for example, that iron deficiency causes anaemia)
   * had to keep thinking and try things out in different ways
   * checked out what other scientists had already done
   * changed their ideas as they went along (for example, at the start no-one had heard of the B12 vitamin).
4. What does it tell you about the nature of science? For example:
   * Getting anywhere (scientific progress) takes time – and can be frustrating.
   * Science is a whole range of different ideas and methods.
   * Some ideas get rejected (scientific knowledge can change).
   * People from all different parts of the world contribute to scientific understanding.
5. Now get students to share any questions that the story raised for them, about scientists and the nature of science. Sample or starter questions might be:
   * How do scientists know where or how to start looking for a solution, or a new discovery?
   * How do they know what counts as a clue (evidence)? Do they sometimes keep going, even though they might be on the wrong track?
   * Why do they tell other scientists what they’re doing? Wouldn’t it be better to keep ideas to themselves so no-one steals their ideas?
   * Who pays scientists to do their work? Does this affect how they do it? Do they get paid more if they solve a problem or make a new discovery?
6. Get students to make a wall chart of their questions and, over a period of time, research the topics to come up with answers (some may have no simple answers) or further information.

**Reflection**

* How important is it for a scientist to be creative as well as painstaking in their investigations?
* Can you name some scientists who are still revered as great thinkers, even though their ideas have been superseded?
* Will we ever get to the ‘end’ of science (so we know everything there is to know) or will it keep changing?
* Will some of the things we know now be out-of-date in the future?
* What are some other trace elements where deficiency might be an issue in New Zealand for animal (including human) health?