*A thermal image overlain on a true-colour image showing heat sources on a farm. © Angela Kross*

# Remote sensing
## *with Dr Angela Kross*

## Talking *points*

### Knowledge & Comprehension

1. What are some of the environmental impacts caused by agriculture?
2. What are the differences between true-colour images, false-colour images and thermal images? How is each produced and what information can each provide?
3. What are spectral vegetation indices, and why are they useful?

### Application

4. How could a farmer use Angela's research to reduce the environmental impacts of their farm?

### Analysis

5. What do you think are the advantages and disadvantages of remote sensing methods compared to ground-based methods for monitoring the environmental impacts of agriculture? Why is it important to combine both?
6. Why is it so important to monitor vegetation health in and around agricultural areas?

### Evaluation

7. Why do you think governments require environmental checks before farming projects begin? How could remote sensing make these checks easier and more accurate?
8. How important do you think the use of remote sensing to support sustainable agriculture will be in responding to climate change, and why?

# Activities

**A. Explore how light interacts with objects**
Light that interacts with objects will be reflected, transmitted or absorbed. In these simple experiments, you can see how the reflectance and absorption of different colours impact what you observe.
You will need:
• Red and green gummy bears (or other translucent candies)
• White and red lights (e.g., laser pointers, bike lights)
• Red filter (e.g., red filter setting on a camera phone, piece of red cellophane)

1. Shine white light on the red and green gummy bears. What happens?
2. Then, shine red light on the red and green gummy bears. What happens? Why does the red light interact differently with the red and green gummy bears?
3. View or take a photo of the red and green gummy bears through a red filter. What do you observe? Why?

**B. Case study – remote sensing of crop health**
Researchers are using satellite images to monitor two corn fields during summer. In true-colour images, Field A and Field B look similar. However, in near-infrared images, Field A appears bright while Field B appears dark.
1. What does the difference in near-infrared brightness suggest about the conditions of the two fields?
2. Give two possible reasons why crops in Field B might reflect less near-infrared light.
Use information from Angela's article and the following sources to help you:
Natural Resources Canada: **natural-resources.canada.ca/science-data/science-research/geomatics/remote-sensing/tutorial-fundamentals-remote-sensing**
Canada Centre for Remote Sensing: **natural-resources.canada.ca/sites/nrcan/files/earthsciences/pdf/resource/tutor/fundam/pdf/fundamentals_e.pdf**
Science Education through Earth Observation for High Schools: **seos-project.eu/index-en.html**

Visit Angela's Futurum webpage (**futurumcareers.com/how-can-remote-sensing-make-agriculture-more-sustainable**) to find more activities, answers and videos of Activities A and C:
**C.** Explore how light interacts with sensors
**D.** Explore how light interacts with plants
**E.** Case study - remote sensing for agricultural monitoring
**F.** Role-play the importance of science communication

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