



Episode 1: What is Climate Change?

Is there more to climate change than just a change in the weather? Join Jo, the Singapore freshwater crab (scientific name: *Johora singaporensis*), to find out about greenhouse gases, why and when they started becoming a problem, and how too much of it can disrupt the balance, leading to drastic impacts on the planet and ultimately, all of us.

Resources:

- Suggested discussion for video
- How to use the activity sheet with your students
- Sample answer key

Additional resources:

- Appendix 1: Greenhouse gases and their heat-trapping potential
- Further readings

Suggested discussion for video

Recall

- Who is Jo?
- What do you know about her from the video?
- What is climate change?
- Name 3 greenhouse gases.

Explain

- How do greenhouse gases contribute to global warming and ultimately, climate change?
- Why is climate change a global concern?
- Why is climate change a concern for you?

Infer

- Why is Jo so concerned about climate change?
- What is Jo trying to say when she mentions “In the meantime, don’t shrug your shoulders and start scrolling and taking selfies”?
- Who is responsible for climate change?

How to use the activity sheet with your students



Learning outcome:

To realise that accelerated climate change is real and the impacts are seen all around us.



Guiding questions:

1. Where do we see the effects of climate change in Singapore?
 - What do you notice about the weather in Singapore? Is it hotter or colder as compared to your parents’ or grandparents’ time as kids?
 - Do you think the weather will affect the price of products in supermarkets? Why?
2. Why does climate change matter to Jo?
 - Explain that Jo can only live in very specific conditions such as natural, fast-flowing freshwater streams found in tropical forests unlike us who can live anywhere [such as in other countries].
 - How will drying up of freshwater streams affect Jo?
 - How will this affect Jo’s food supply?



CLIMATE CHANGE

We all know that climate change isn't just a bit of bad weather. It's serious and it is happening faster than we expected. News reports around the world are increasingly highlighting **unpredictable and extreme weather events** (even in Singapore), **natural disasters** and **animals driven to extinction!**

Look around you. Where do you see the effects of climate change in Singapore?

- Rising temperatures/hotter weather [2019 was the hottest year on record for Singapore]
- Fluctuations in weather might affect the way trees photosynthesize and absorb carbon.
- Heavier rain in Singapore [2 Jan 2021 had the highest amount of rainfall collected]
- Rising sea levels in Singapore
- More mosquito-borne diseases (like dengue) with warmer environments
- Coral bleaching with warmer oceans



Watch the video. Why does climate change matter to Jo, the Singapore freshwater crab?

- Freshwater streams dry up, causing Jo to lose her home
- Jo may go extinct



Reflect: Imagine what life was like back when your grandparents were your age. What would they be wearing on a normal day in Singapore? Would they have spent most of their time indoors or outdoors? Speak to your parents or grandparents to find out more!



Appendix 1: Greenhouse gases and their heat trapping potential

Since the beginning of the Industrial Revolution in the 18th century, humans have been polluting the environment by releasing huge amounts of carbon dioxide and other greenhouse gases like methane, nitrous oxide and fluorinated gases into the atmosphere. These greenhouse gases trap heat on our planet, resulting in global warming.

But not all greenhouse gases are equal. Some trap more heat than others depending on how much of the gas is produced, how long it stays in the atmosphere, and its ability to absorb heat.

Name of gas (and its chemical formula)	Examples of where this gas comes from	Amount produced (%)	Estimated maximum lifespan	Ability to trap heat compared to carbon dioxide
Carbon dioxide (CO₂)	Natural causes: Venting volcanoes, wildfires. Human activities: Using fossil fuels e.g. travelling by cars, flying in planes, using electricity.	76%	1000 years	-
Methane (CH₄)	Natural causes: Wetlands where this is produced by bacteria during decomposition. Human activities: Belching from farm animals, especially cattle, reared for human food needs.	16%	10 years	Traps heat 12 times stronger
Nitrous oxide (N₂O)	Natural causes: Produced by bacteria to break down nitrogen in soils and oceans. Human activities: When using agricultural fertilisers that leach into soils and water bodies.	6%	100 years	Traps heat 300 times stronger
Fluorinated gases	Natural causes: None. Human activities: Industrial production of metal alloys, foams, and electronics.	2%	Between 2600 to 50 000 years	Traps heat 23 000 times stronger

Further readings:

1. Tan, A. (2021, January 13). Fish and vegetable prices up at wet markets in S'pore due to floods in Malaysia. The Straits Times. <https://www.straitstimes.com/singapore/consumer/floods-in-malaysia-drive-up-price-of-fish-and-vegetables-at-wet-markets-in>
2. SINGAPORE IN THE 1960S | NOW! Singapore | Life in the Island City. (2015). Singapore in the 1960s. <http://www.nowSingapore.co.id/singapore-in-the-1960s>
3. Chow, W. (2018, September 7). How vulnerable is Singapore to climate change? The Straits Times. <https://www.straitstimes.com/singapore/how-vulnerable-is-spore-to-climate-change>
4. Paulo, D. & Ang, G. (2019, December 21). Climate change, floods and drought: Here's how badly Singapore could be affected. CNA. <https://www.channelnewsasia.com/news/cnainquirer/how-badly-climate-change-floods-drought-could-affect-singapore-12202206>
5. Impact of climate change in Singapore. (2021). NCCS. <https://www.nccs.gov.sg/singapores-climate-action/impact-of-climate-change-in-singapore/>