THE MATHEMATICAL
ASSOCIATION OF VICTORIA

MATHS TREATS

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THE POSSUM

MODELLING GLOBAL ACCESS TO WATER AND FOOD

Clean water and food are essential for human life. Around a quarter of the world's population (over 2 billion people) don't have access to safe drinking water. Unclean water can contain bacteria, viruses, metals, or other contaminants which can cause abdominal cramps, nausea, diarrhoea, vomiting, and some serious illnesses. Almost 10% (over 700 million) of the world's population went hungry in 2020 and are chronically undernourished, despite there being enough food produced in the world to feed everyone.

FOOD NETWORKS

Food security depends on reliable primary production of food ingredients (e.g., no droughts), followed by distribution through food supply chains (e.g., manufacturers) and transport networks. Food miles is the distance food that food travels from its original production through to the consumer.

ACTIVITY

Look at where food items in your home or shop come from (e.g., local, interstate, overseas). List all the ingredients of a food item. Create a network graph – with nodes (vertices) and edges (links) – illustrating the steps taken for each item to reach your home. Start by drawing a node representing your home and any key places along the supply chain (e.g., supermarket, vegetable garden). Then, create nodes for each of the ingredients and record where it might come from. For example, most Australian sugar is grown in Queensland. Create nodes and edges illustrating how the ingredients come together to produce your food item and reach your home.

WATER GEOMETRY

Only 3% of the water on earth is fresh water (not salt water). People need to drink 2-3 litres of potable (drinkable) water a day to stay healthy.

ACTIVITY

Consider the people in your family, school, region, state, or country. How much drinking water do these people need in a year? What other uses of water are there for people's daily life? What are the main sources of water for the group of people you have chosen to analyse? Estimate the amount of rainwater that could be collected monthly or annually (e.g., from the roof of your home or school). Would this rainwater provide sufficient drinking water for the group of people at all times of the year? What other sources of water might be needed to provide sufficient water for drinking and other household uses? (Note, to convert volume to capacity: 1 m^3 = 1 kL.)

REFERENCES AND FURTHER READING

Wikipedia: water resources, water resource management, water scarcity, water footprint, food miles

Water action decade: https://youtu.be/2rQ0TNhx_YQ

The state of the world's land and water resources for food and agriculture: https://youtu.be/g2sJTVTi8Lg

www.un.org/en/global-issues

https://sdgs.un.org/goals

www.fao.org/state-of-food-agriculture/en/

www.healthdirect.gov.au/drinking-water-and-your-health

Network mathematics: https://mathinsight.org/network_introduction, http://passyworldofmathematics.com/network-mathematics/

Images: Leadbeater possum - Steve Kuiter, food image from Pixabay.