Volume 56 No2 2024

The Geography Teachers Association of NSW & ACT Inc.

GEOGRAPHY BULLETIN

ANNUAL CONFERENCE REPORT AND RESOURCES

PROJECTS · REPORTS · RESOURCES · ARTICLES · REVIEWS

IN THIS ISSUE:

EXECUTIVE 2024

GEOGRAPHY BULLETIN

Journal Editor

Articles and letters should be sent to the Editor:
Email: editor@gtanswact.org.au

Proof reading - Geoffrey Paterson
Email: gkp@netspace.net.au

Design and layout

Rachel Peddar, Professional Teachers Council NSW
Email: design@ptc.nsw.edu.au

ISSN 0156-9236

The Geography Teachers Association of NSW & ACT Inc.

Office of the Geography Teachers' Association of NSW & ACT

ABN 59 246 850 128

Address: 67-71 St Hilliers Rd, Auburn NSW 2141

Postal Address: PO Box 699 Lidcombe NSW 1825, Australia

Telephone: (02) 9052 6451

Email: admin@gtanswact.org.au

Website: www.gtansw.org.au

Annual Membership

Personal membership $110 (inc GST)

Corporate membership (school, department or business) $324.50 (inc GST)

Concessional membership (retiree, part-time teacher or student) $44 (inc GST)

Primary corporate membership and pre-service teachers FREE

Cover - Heart shape tree on green grass field landscape, Shutterstock 235852834

The Geography Bulletin is a quarterly journal of The Geography Teachers' Association of NSW & ACT Inc. The 'Bulletin' embraces those natural and human phenomena which fashion the character of the Earth's surface. In addition to this it sees Geography as incorporating 'issues' which confront the discipline and its students. The Geography Bulletin is designed to serve teachers and students of Geography. The journal has a specific role in providing material to help meet the requirements of the Geography syllabuses. As an evolving journal the Geography Bulletin attempts to satisfy the requirements of a broad readership and in so doing improve its service to teachers. Those individuals wishing to contribute to the publication are directed to the 'Advice to contributors' at the back of this issue.

Volume 56 No 2 2024

EDITOR: Lorraine Chaffer

Welcome to Edition 2 of the *Geography Bulletin* for 2024.

This edition was created to support the 2024 Annual Conference. The spaces provided for participants to make notes have been populated to provide an overview of the content presented in each session.

The edition also contains some reproduced articles relevant to teaching Geography across 7 - 12 but with particular relevance to Stage 6.

Lorraine Chaffer, Vice President GTANSW & ACT

CONTENTS

Editorial

Diana Gearside

Welcome to Edition 2 2024 of the *Geography Bulletin*. This edition was created to support the 2024 Annual Conference held on Thursday 16 May and Friday 17 May 2024 but is a valuable resource for all 7–12 teachers with additional reproduced articles and teaching and learning activities.

The Conference was incredibly well attended, thank you, and the energetic collegial discussions created a huge buzz. All in all, a couple of informative, innovative and fun days.

Day 1 kicked off with a Keynote from Professor Kurt Iveson from the University of Sydney imploring teachers to make the most of local opportunities for geographical adventure and exploration and invoking the challenge that "if Geography isn't fun, you're doing it wrong".

The Day 1 focus were Stages 4 and 5 and included a variety of workshops on topics such as making fieldwork local and accessible, literacy in Geography, geo skills and water management and security. Others looked at the use of technologies like Google My Maps and AI platforms to not only encourage student engagement but help teachers manage tasks and workloads.

Day 2 focused on Stage 6 with fascinating, if a little alarming, keynotes from Luke Foster (Senior Threatened Species Officer NSW Department of Climate Change, Energy, the Environment and Water) and Professor Michelle Leishman a plant ecologist from Macquarie University on Ecosystems and Biodiversity. The session from Professor Riccardo Paolini on Rural and Urban Places concentrated on urban heat and its impact on cities of the future. The *Bulletin* also has resources on Global Sustainability, reproduced articles on relevant Stage 6 topics, and structured extended response models.

Hope you find this edition a useful addition to your teaching toolkit.

Thank you, again, to all the authors for kindly contributing their articles, resources and activities which will support geography teachers. GTA is grateful for all contributions to the *Geography Bulletin*. If you have an article, resource, activity that you would like published please submit your contribution to the GTA NSW & ACT office by email editor@gtanswact.org.au. The Guidelines for Contributors can be found on page 91.

Diana Gearside
Executive Officer – GTANSW & ACT

2024 Annual Conference

Brock Rowe Awards 2024

The Brock Rowe Award, an award for excellence in teaching geography in schools, is granted jointly by the Councils of the Geography Teachers Association of New South Wales & ACT Inc. (GTA NSW & ACT) and the Geographical Society of New South Wales Inc. (GS NSW), annually to persons who have demonstrated consistently, over a period, excellence in the teaching of Geography in schools.

The nomination is made by a teaching colleague and requires the endorsement of the school principal (or school executive) and is a testament to a teacher's dedication to student outcomes and collegial respect.

Congratulations to Khya Brooks, winner of the Brock Rowe Award for 2024.

Khya possesses a unique ability to inspire a love for geography within her students, fostering a deep appreciation for the subject matter. Through innovative teaching methods, captivating lessons, and hands-on activities, Khya creates an engaging learning environment that ignites curiosity and encourages critical thinking. Each day within the classroom Khya embeds innovative pedagogy to engage and extend diverse learners. An example of this is her development of a geoengineering focus study within the Stage 5 Unit Environmental Change and Management. This focus study immerses students in the scientific decision-making process to determine the most effective geoengineering strategy to address climate change scenarios.

Khya also created a series of geographical skills lessons through the lens of 'zombie geography' differentiated for both Stage 4 and 5. This program was featured on the *Oh, The Humanities* podcast and presented by Khya at the GTA NSW Conference in 2019. Her innovative pedagogical approach is also reflected in her *Creativity and Innovation in Geography* presentation at the 2021 GTA NSW Conference where she shared her expertise on the use of accessible spatial technologies for public schools.

As the Head Teacher of the Elizabeth Macarthur High School faculty (2019–present) and Head Teacher Early Careers Teachers (2018), Khya has demonstrated her highly-skilled capacity to mentor colleagues and pre-service teachers within the teaching area of Geography.

Through Khya's active promotion of Senior Geography at Elizabeth Macarthur High School, the subject has continued to grow in its enrolment since 2018, with the current cohort of 75 Preliminary Geography students (3 classes) and 40 HSC Geography students (2 classes) for 2024. She has led the development of interstate field trips for Senior Geography students which has allowed over 200 students to complete fieldwork on the Great Barrier Reef and Daintree Rainforest.

The results of Khya's dedication and hard work are evident in the remarkable academic achievements of her students. Each year, the Senior Geography HSC results continue to grow with a large number of students gaining Band 5s and 6s. Not only do her students excel academically, but they also develop a deep understanding of global issues and geographical concepts that extends beyond the classroom.

Khya has written for the Geography Teachers Association, presented numerous times at the Geography Teachers Association Conference, and been published in the Centre for Professional Learning journal on building confidence and success in Stage 6. She is currently in the process of writing materials for Matilda Publishing and is one of the collaborators and author of the Powerful Geography textbook.

Khya is not just a teacher but also a mentor, role model, and source of inspiration to both students and colleagues alike. Her passion for Geography and dedication to student outcomes make her truly deserving of the Brock Rowe Award for 2024.

Brock Rowe Awards 2024

Congratulations to the nominees for the Brock Rowe Award for 2024 Kathryn Fairbanks, Doug Gardiner and Jade Dowling.

It was very difficult for the selection panel to choose a winner as Kate, Doug and Jade are also tireless devotees of Geography. Their innovation and enthusiasm make them worthy nominees.

Kathryn Fairbanks

Kate is a "beacon of inspiration" in the field of Geography education at Mercy Catholic College as she has advanced and enriched the curriculum for students across years 7–12. Her dedication has resulted in a surge of enrolments for Stage 6 and elevated performance in the HSC examination. She has led the implementation of a skills continuum, with the systematic teaching and assessment of skills across Stages 4 and 5, effectively preparing students for Stage 6 and improvements in RAP data is evident. Kate not only inspires her students but also her peers, sharing expertise, support and contributing to a culture of collaboration and the resounding success of Geography as a subject.

Doug Gardiner

Doug is a geographical expert. He is Head Teacher HSIE at Alstonville High School and has a wealth of experience having taught both junior and senior classes. Doug uses student teamwork to organise fun, laughter-filled and memorable fieldwork and skills activities and creatively differentiates assessment tasks so that all students can achieve outcomes. Doug is an innovator and a mentor and uses his knowledge as an HSC Geography writer and marker to assist colleagues to establish marking benchmarks for senior students.

Jade Dowling

Jade is a committed teacher at Rooty Hill High School in western Sydney and has a fierce passion for her subject and community. She has brought the joy back to Geography with her focus on literacy, fieldwork and hands-on learning and her refusal to consider it a prosaic and theoretical subject. Jade inspires her colleagues with the integration of achievable and meaningful embedding of geographic tools into all units of work. Jade also coordinates programs within the school for students from Pacific Island backgrounds and has managed to make strong cultural connections within her geography teaching and programming that supports Pacifika knowledge, case studies, and learning styles. She even led the Rooty Hill High School Haka Warrior group which won the Haka 2023 competition!

BROCK ROWE AWARD

The Brock Rowe Award, an award for excellence in teaching geography in schools, is granted jointly by the Councils of the Geography Teachers' Association of New South Wales & ACT Inc. and the Geographical Society of New South Wales Inc. annually to persons who have demonstrated consistently, over a period, excellence in the teaching of geography in schools.

The nomination is made by a teaching colleague and requires the endorsement of the school principal (or school executive).

Visit www.gtansw.org.au/brock-rowe/ for more details.

Geography 7 – 10: Conference Resources & Workshop Summaries

Summary of Key Points in Workshops – only of those sessions that were video recorded.

Keynote Professor Kurt Iveson, University Of Sydney

Australia's Urban Future (Not determined yet)

Concerns

- Mitigation and adaptation to climate change
- Reckoning with the legacy of colonisation (engaging with Country, land rights, First Nations justice)
- Widening inequality (globalisation of capitalism)
- Racism and patriarchy
- Automisation and Artificial Intelligence.

We are teaching those who will shape our cities in the future for the better.

Geography is great, why don't geographers do some of it? William Bunge (Detroit Geographical Expedition and Institute, 1971).

Embrace the idea of exploration and expedition.

Treat cities as uncharted and explore local neighbourhoods.

Carry out investigations and fieldwork and then connect to curriculum concepts. Investigate geographical processes that shape cities, interpret, reflect and communicate findings using geographic tools.

Importance of student-led, publicly available projects at the University of Sydney incorporating the idea of exploration and enabling students to make a difference to the liveability of Sydney.

1. High Street Census Study
    a. Students map change using street surveys
    b. Compare data using Google Streetview
    c. Try and understand changes observed in last five years (since COVID)
    d. Information is publicly available on interactive maps on the web.
2. Public Transport Infrastructure
    a. Partnered with the Sweltering Cities organisation to collect data on shade and shelter on bus routes
    b. 2,500 bus stops mapped
    c. Connect to curriculum concepts
    d. Produce "narrative" maps
    e. Contributing to cities future (seeking audience with Transport Minister).
3. Railway Corridors
    a. Transport, ecology and cultural factors (e.g., graffiti)
    b. Aerial photos show that a lot of Sydney's green space is in railway corridors
    c. Legislative requirements to manage invasive and endangered species but surveys found 80% of vegetation is "spontaneous" and not weeds or plants on the endangered list
    d. Management questions: Lantana is invasive, however native birds use as shelter from feral cats. What is the right management strategy?

Take away

- Urban geography is an exploration
- Neighbourhoods are interesting places to investigate
- Students can be field guides with their local knowledge
- Brings geographical concepts alive
- Collaboration makes a difference to a city's future.

If geography isn't fun, you're doing it wrong.

Balmain Foreshore Project, Led by Louise Swanson

For information about this project please see Feature Article in GTA Bulletin 1.

Louise Swanson and James Heafey

GTA NSW & ACT Support for Teachers and Students

Professional Learning & Events

- Annual Conference in May
- Webinars throughout the year
- Regional events and connections
- Awards for teachers and competitions for students

Online Social Media Support

- Ask a question via the website or via email
- Social media GTA Facebook page, GTA HSC Teachers Group, Instagram, Twitter
- Emails to members about upcoming events and opportunities

Resources

- *Geography Bulletin* 4 volumes
- Online packages such as the HSC video package for student revision
- Online learning courses
- Resources such as posters, Powerful Geography resource, AGTA skills books
- Scoop.it curated media resources

Keep up to date with upcoming events.
Visit the GTA website HERE

Artificial Intelligence (AI) in Geography Teaching, Louise Swanson and Khya Brooks

Ethical Concerns (discuss with school executive and other stakeholders)

- Threats to academic integrity
- Misinformation/reliability/robustness/bias
- Assessment policy and AI (have warning to students on assessment tasks)
- Data privacy
- Copyright
- Contextual understanding
- Equitable access
- What teacher tasks can you use AI for?
- Creation of harmful/offensive output.

Note: DET are trialling AI – NSWEduChat (for accessing policy, PD etc on website)

Examples of AI Programs

ChatGPT	Craiyon
QuestionWell	ResearchRabbit
Eduaide Ai	Almanack
QuillBot	ZipGrade
Quizgecko	Microsoft Copilot (Bing)

Use in Classrooms: lots of ways

Examples

- Create data tables to practise relevant graphing activities
- Generate inquiry questions for geographical Investigations
- Writing Activities– AI can evaluate student responses/students can evaluate AI responses.

Tips

- Prompts used to generate output are critical – refer to Conference Vimeo for specific AI prompts
- Give approximate age of students
- Tell ChatGPT to act as an expert Geographer
- If you want an HSC-style question, provide verbs you want to use
- Use syllabus outcomes and concepts to improve the specificity of activities.

Eduaide.Ai

- "Does everything for you" e.g., can generate custom jeopardy game questions in seconds
- Useful for differentiation: enter text and it will modify to different literacy and numeracy proficiencies (different versions of the same text).

Context Setting through Stories and Scenarios

Global Citizenship: example of using AI to create a Sim City style game based around a town profile and characters to explore citizenship issues. Super fun, engaging and bonding for students (links to lessons detailed on Vimeo).

Environmental Change and Management: another example of using an AI-created fictional town to explore environmental, social and economic issues and then applying to real world.

Assessing Learning

- Creating multiple choice, short answer and essay questions (see example of careful prompt on video to create good outcome)
- QuestionWell: paste in text and it will create questions that you can export to Kahoot!, Blooket etc.
- ZipGrade: creates and marks multiple choice forms and gives a distribution of responses across questions to identify weaknesses.

Feedback

- AI can give customised feedback on student work based on criteria
- Students can use this before seeking teacher's feedback.

Reporting

- Ethical minefield but can be useful for creating report comments
- Always needs teacher modification/editing.

Using Google My Maps To Measure Liveability, Laura Bradford
(Can be used for both History and Geography)

Advantages of Using Google My Maps:

- Customisable (personalised markers)
- Incorporate lines and shapes
- Take measurements
- Access Google database (kept current)
- Saves automatically.

Place and Liveability (syllabus dot point)

- Can be difficult for some students to access the concept
- Practical demonstrations can assist.

Lesson Steps

1. Prepare a Google sheet of pre-filled data (Top 10 cities from Liveability Index 2023)

City	Country	Latitude	Longitude	Liveability Rank	Reasons for Rank

   - Students use Atlas or Internet to find latitude and longitude of each city
   - Research reasons for ranking (can add this later)
2. Open My Maps → Create New Map
3. Autosaves to Google Drive
4. Add Map Title "Top 10 Liveable Cities"
5. Add description "A ranking of the most liveable cities 2023"
6. Import Google sheet of data from Drive
7. Necessary to only tick latitude and longitude
8. Click on Edit
9. Search for images to represent reasons for rank
10. Share with teacher
11. Develop discussion questions (could use AI) e.g., "What factors contribute to the ranking of cities as the most liveable in the world?"

Time Frame: Depends on students' capability but one or two 60-minute lessons.

Geographical Skills 7-12, Drew Collins

- Never miss an opportunity to incorporate geographical skills into a lesson
- Practice, practice, practice builds capability over time.

PART A: Graphs and Statistics (Skills covered with worked examples in Vimeo)

1. Calculating the Rate of Change (increase/decrease)
2. Calculating Proportion or percentage Change
3. Ternary graphs
4. Semi-logarithmic graphs – NOT in new syllabus
5. Composite graphs.

PART B: Maps (Skills covered with worked examples in Vimeo)

1. Scale
    a. Scale as a Ratio (l:100,000) 1centimetre represents…
    b. Large Scale vs Small Scale
        i. Large scale map shows small areas in large detail (ZOOM IN)
        ii. Small scale map (NO ZOOM).
    c. Scale and Area
        i. Regular shape – measure
        ii. Irregular shape – approximate.
2. Local Relief and Sight Lines
3. Gradient (Geography way NOT Maths way)
4. Aspect
5. Cross Section and Vertical Exaggeration.

Water in the World, Interactive landscape Model Demonstration 'Patterns and Processes of the Water Cycle'. Laura Fisher, (Mulloon Institute)

https://themullooninstitute.org

About Mulloon:

- Not for profit
- Holistic approach to water
- Started on a farm on Mulloon Creek, near Bungendore/ Braidwood, bequeathed to the organisation for research, education and advocacy in 2011
- Interactive GIS that demonstrates changes to the creek and landscape over time
    - The original farm showed effects of land clearing, intensive agriculture and the gradual draining of the landscape
    - Experimental work uses engineering and hydrology to restore the floodplain of the Mulloon Creek into a revegetated "chain of ponds" landscape
- Farmers seek advice on how to restore their properties from the effects of erosion, flooding and low fertility, subsoil
- Current farming practices on the Mulloon Creek farm follow a low stock regime and use good land-management.

Engineering structures are built to allow water to flow through, around or over (leaky weirs) slowing down flow and improving infiltration. Allows plant communities to establish, retains soil fertility.

"Landscape rehydration is the process of restoring the movement, storage and cycling of water through the landscape."

Types of Classroom materials available on the website:

- Animations
    - Solar Energy
    - Water Cycle
    - Surface Roughness
    - Soil Infiltration
    - Erosion and Deposition
- Programs (e.g., The Water Story)
- Models
    - Creating physical models as part of learning using readily available 'craft' materials

Lovely catchment map of Australia: https://www.grasshoppergeography.com/products/river-basin-map-of-australia-with-black-background-fine-art-print

Research links to urban environments too:

- Modification of hard surfaces
- "Renaturalising" areas
- Vegetation mitigating heat.

Mulloon Institute

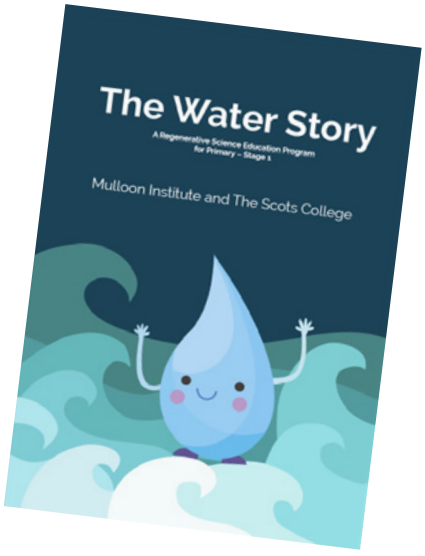
For environment, farming and society.

The Mulloon Institute is dedicated to supporting all Australians understand the science and practice of land restoration and nature-based solutions that mitigate the impacts of climate change. We specialise in improving the movement, storage and cycling of water in our landscapes. The Institute has developed a number of resources for school use, including:

- A vibrant watercolour water cycle poster, available in A1 format.
- The Water Story a free, 94 page, comprehensive 10-week program for teachers co-created by the Mulloon Institute and The Scots College. It looks at all aspects of the water cycle that interlink soil, plant, waterway, atmosphere and climate. It also features up-to-date content about First Nations stewardship of Country, climate change and holistic approaches to agriculture.
- A series of 5 short animations on 'water in healthy landscapes': solar energy, the small water cycle, erosion & deposition, surface roughness and soil infiltration.

For links and further info visit: https://themullooninstitute.org/education-community

To purchase a high quality poster ($20 + postage) email laura@themullooninstitute.org



The Mulloon Institute is a not-for-profit research, education and advocacy organisation. Find us at: **themullooninstitute.org**

The Geography Teachers Association of NSW & ACT Inc.

GEOGRAPHY POSTERS FOR SALE

GTA NSW & ACT HAS PRINTED A NUMBER OF INFOGRAPHIC POSTERS FOR CLASSROOM USE

Posters are linked to topics studied in Geography K–12 for the Australian Curriculum and NSW Syllabuses.

- A **bank of questions** for individual and groupwork will be accessible via Google Drive to all schools /teachers purchasing posters.
- Posters can be purchased in **pre-packaged sets** or as **individual posters**.
- **New posters** will be added to the website throughout the year.

SOURCES AND PRICING

Posters have been sourced from organisations including the Geological Society (UK), Visual Capitalist and Graphic News. GTA NSW & ACT has also commissioned some posters.

Posters are being sold in sets of 4 or 5 to make postage viable. Affordability was a key consideration when determining pricing.

Administration, printing and distribution, licensing and design costs where relevant are incorporated into the cost of each pack.

Postage includes the cost of cylinders. A maximum of 5 posters will be packaged in any postage cylinder.

ABOUT THE POSTER SIZES

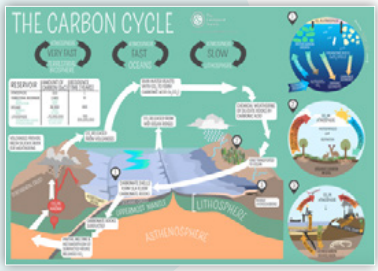
A1 = 594mm x 841mm
A2 = 420mm x 594mm
A3 = 297mm x 420mm
Square = 60cm

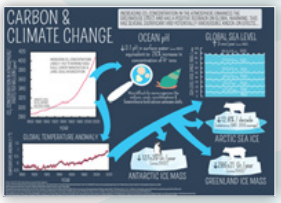
PACK 1: THE CARBON CYCLE — $70 INCLUDES P/H

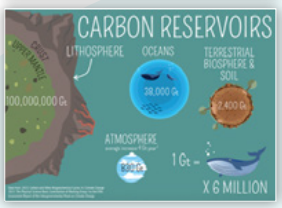
1 x A1 poster: The Carbon Cycle
4 x A2 posters: Carbon Set

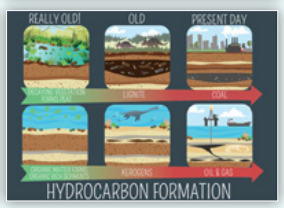
– Carbon & the Greenhouse Effect
– Carbon Reservoirs
– Hydrocarbon Formation
– Carbon & Climate Change

CLICK HERE TO ORDER PACK 1









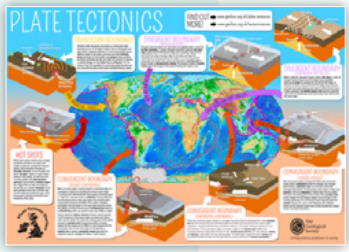
GEOGRAPHY POSTERS FOR SALE

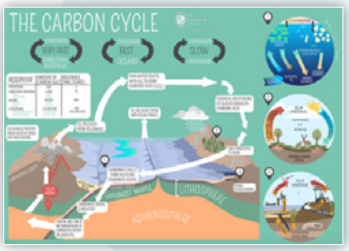
PACK 2: GEOGRAPHY CONTENT — $81 INCLUDES P/H

4 x A1 posters

- Plate tectonics
- Minerals in a smartphone
- The Carbon Cycle
- On the Brink: The biggest threats to Earth's biodiversity

CLICK HERE TO ORDER PACK 2





PACK 3: A1 CAREERS POSTER — 3 FOR $50 INCLUDES P/H

Where will GEOGRAPHY take you?

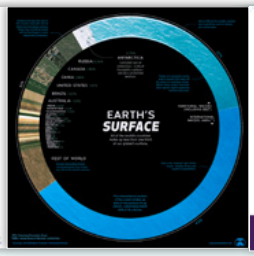
CLICK HERE TO ORDER PACK 3

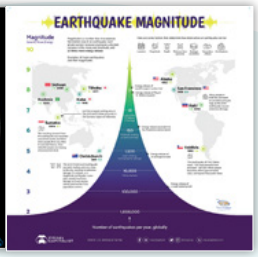
PACK 4: Three square posters — $55 INCLUDES P/H

3 x 60cm Square Posters

- UN sustainable development goals
- Earth's surface
- Earthquakes

CLICK HERE TO ORDER PACK 4





GEOGRAPHY POSTERS FOR SALE

INDIVIDUAL SELECTION: A1 & 60cm square posters **$15 EACH**

One type per order
1 to 5 posters $15 postage (1 cylinder)
6 to 10 posters $30 postage (2 cylinders) etc.

A1 POSTER SELECTION:

- Plate tectonics
- Minerals in a smartphone
- The Carbon Cycle
- On the Brink: The biggest threats to Earth's biodiversity
- Where will GEOGRAPHY take you?
- Biomes and Ecosystem

SQUARE POSTER SELECTION:

- UN sustainable development goals
- Earth's surface
- Earthquakes

CLICK HERE TO ORDER INDIVIDUAL POSTERS

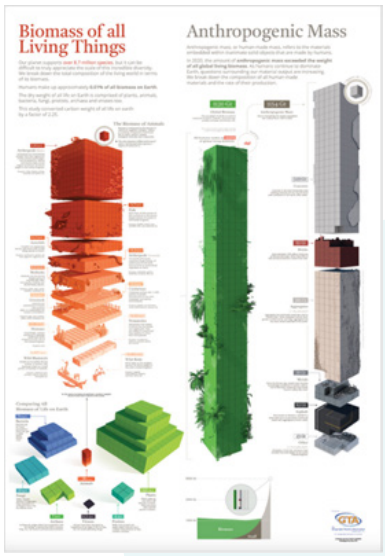
PACK 5: Geography careers **$35 INCLUDES P/H**

Set of 6 x A3 Careers Using Geography flyers
* Note: Pack 5 will be mailed as a flat pack

CLICK HERE TO ORDER PACK 5

GEOGRAPHY POSTERS FOR SALE

A1 BIOMASS POSTER **$30** INCLUDES P/H



Redesigned from licensed materials for GTANSW & ACT (2024)

Targeted at Stage 6 Human Environment Interactions and Ecosystems and Global Biodiversity.

(Cost recovery – licensing + design + printing)

***** Add On the Brink to make a neat package on biodiversity for just $10 extra.**

CLICK HERE TO ORDER BIOMASS POSTER

A1 POSTER SET: BIOMASS PLUS ON THE BRINK **$40** INCLUDES P/H

CLICK HERE TO ORDER A1 POSTER SET

FLOODS POSTER (100 cm x 40 cm) **$25** INCLUDES P/H

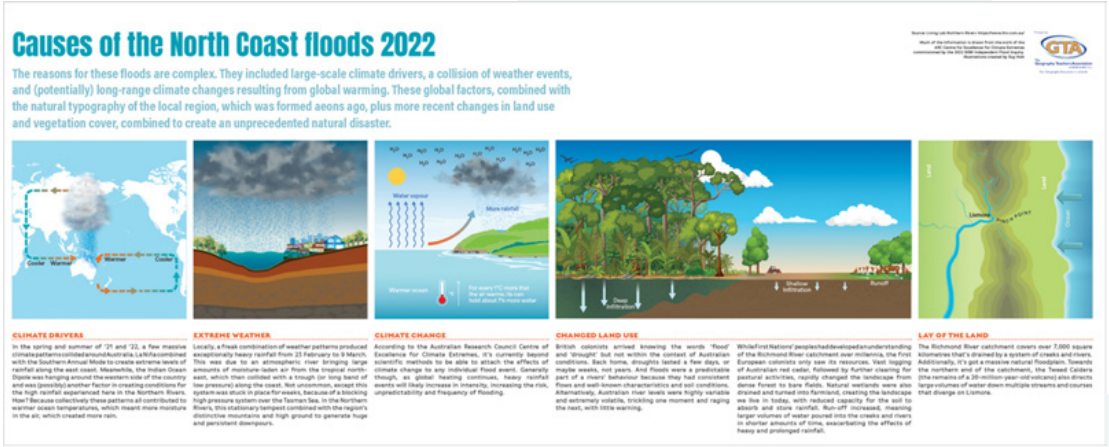
Commissioned artwork for GTANSW & ACT (2024)

Suited to stage 4 and Stage 6 Natural hazards.

Designed for classroom walls or student groupwork.

(Cost recovery – design and printing)

CLICK HERE TO ORDER FLOODS POSTER



NOTE: Order multiple copies for groupwork or combine with other individual posters to save on P & H. Max 5 posters per cylinder. Each cylinder is additional P & H

For more details and to order go to: www.gtansw.org.au/order-resources

POWER OF THE PYRAMIDS

EARTH matters
Studies For Our Global Future

introduction

Many of the vast differences we see in societies across the globe can be related to the composition of their respective populations. This is true on the local, state, and national level. So when exploring variations among countries, a good place to start is with their **population pyramids** – graphs that display the age and sex distribution of the country's population.

To help make population projections for different countries, **demographers** look at the profile of the countries' residents. What are the ages of the people? How many are men? How many are women? Taking this information, they construct population pyramids that depict the configuration of a country's population as impacted by over 80 years of economic, political, and natural events.

Vocabulary: cohort, demographers, population pyramids, zero population growth

materials

Part 1
- None

Part 2
- Student Worksheet (provided)
- Power of the Pyramids Graph Paper (provided)
- Colored pencils
- Calculators (optional)

Part 1: What is a Population Pyramid?

procedure

1. Display the world population pyramid and explain that this is a type of graph used by demographers to study the distribution of people across sex and age categories.

2. Explain to the students that the graph represents the entire world population, sorted by age and sex – with the youngest at the bottom and the oldest at the top and males on the left, females on the right. Each age level/sex grouping is called a **cohort**. A cohort represents the *percentage* of people within

Find additional Population Education resources HERE
https://populationeducation.org/teacher-resources/

concept

The age and sex distribution of a population affects its growth rate and provides information on its past, present, and future growth patterns.

objectives

Students will be able to:

- Describe the three general shapes of population pyramids and their meanings.
- Construct a population pyramid for one of six different countries.
- Make correlations between the shape of a country's pyramid and its growth pattern.
- Analyze countries' population pyramids to make inferences about past events, current trends, and future growth.

subjects

AP Human Geography, Geography, Environmental Science (General and AP), Mathematics

skills

Calculating percentages, graphing and analyzing data, interpreting bar graphs, comparing and evaluating, writing

method

Students use real-world data to construct and interpret population pyramids and discuss differences in population growth rates among several different countries.

Assessment

Provide students with a population pyramid.

Students write a paragraph or two analyzing the pyramid.
They should describe the pyramid's shape, explain what that shape means, and hypothesise what sort of growth patterns the country might expect in the future.

that sex and age range within the population. So on the world population pyramid, we can see that 4.5 percent of the global population is made up of males aged 0-4.

3. Ask the students the following comprehension questions and allow them time to ask their own questions.

    a. What is the largest age cohort and how can you tell?
    Answer: 0-4 year old males; that bar extends furthest from the center axis.

    b. What cohort makes up 4 percent of the global population?
    Answer: 15-19 year old males.

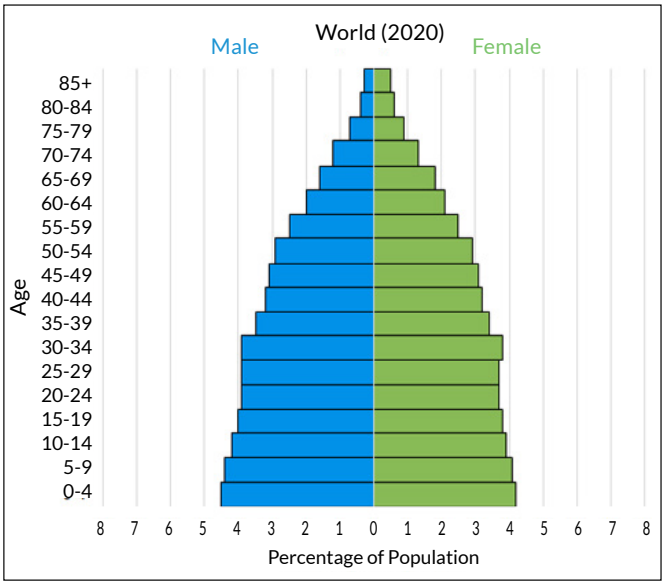
    c. Where are you represented on the pyramid? What percentage does your cohort represent?
    Answers will vary.

    d. Are there currently more old people or young people living on the planet? How can you tell?
    Answer: More young people. The cohorts for young ages extend out further than the cohort bars for elderly people.

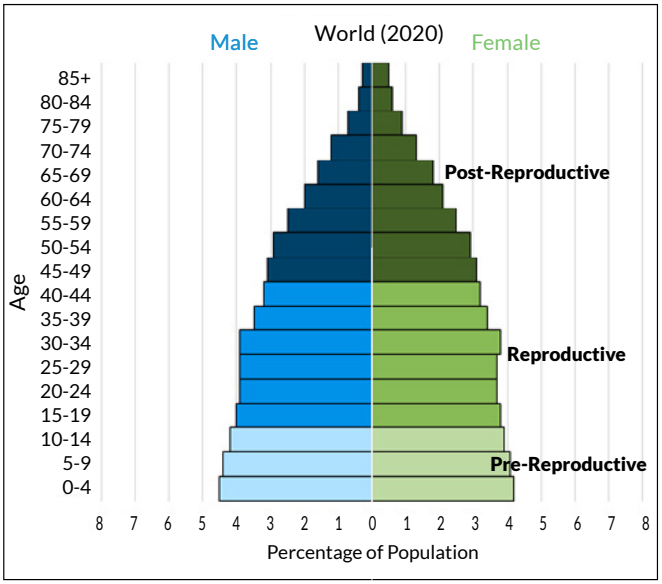
4. Discuss the shape of the world population pyramid and ask students if they think the graph represents a population that is growing or shrinking and their reasoning.

5. Now display the world population pyramid showing the age intervals grouped into reproductive categories.

    Explain that the percentage of a population that falls within each reproductive category provides clues to the population's future growth. As such, the shape of a population pyramid reveals a lot about how a population is growing.



Source: United States Census Bureau, International Database

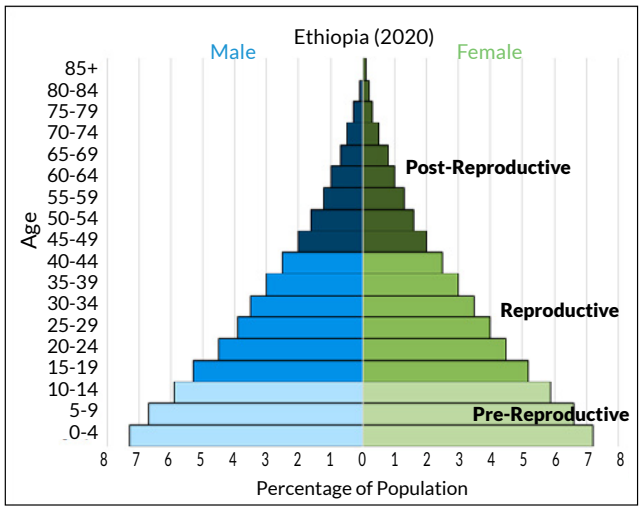


Source: United States Census Bureau, International Database

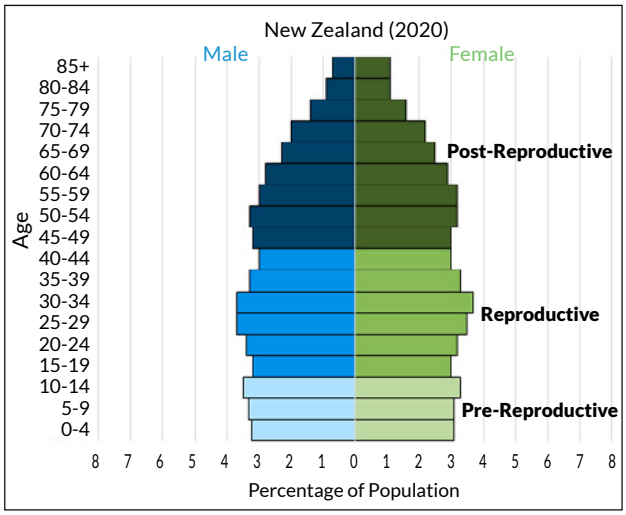
6. Display the three sample population pyramids below.

- **Graph 1: Expanding – Ethiopia.** The triangular shape reflects a growing population. A significant percentage of people are in the pre-reproductive age groups. As those children age and enter their reproductive years and start having children of their own, the population will almost surely grow.
- **Graph 2: Stable – New Zealand.** The rectangular shape shows a stable population. There is a fairly even distribution of people across each age group. Generations are replacing each other so the population will not grow or shrink.
- **Graph 3: Diminishing – Japan.** The cup shape shows a shrinking population. The largest percentage of people are in their post-reproductive years and no longer having children. As fewer and fewer people reach reproductive age, the size of the population will decrease.

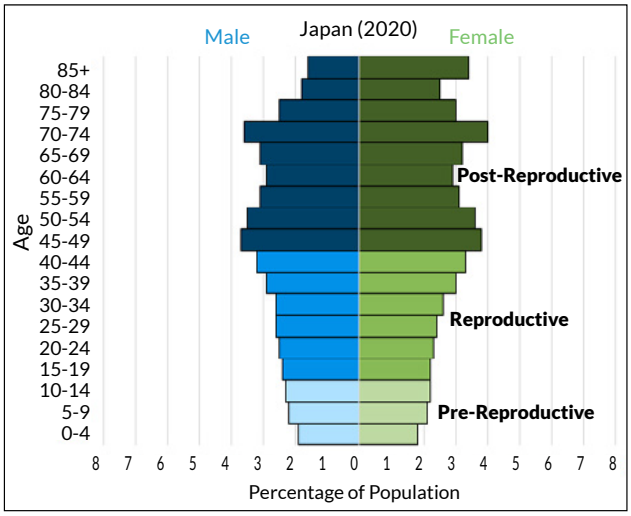
Graph 1



Graph 2



Graph 3



Source: United States Census Bureau, International Database

Part 2: Exploring Pyramids from Across the Globe

procedure

1. Distribute the Student Worksheet and the Pyramid Graph Paper to each student and assign them one of the six countries. If you'd prefer, students can work in pairs.

2. The figures on the Worksheet are the population of each age group within each sex for each particular country. In order to construct the country's pyramid, students must first calculate the percentage of the population of each sex in each age group.

   Example: According to the Worksheet, the total population of the United States in 2020 was 332,639,102. The population of U.S. males aged 0-4 was 10,445,659.

   $$\frac{10{,}445{,}659}{332{,}639{,}102} = .031 \text{ or } 3.1\%$$

   Students should complete these calculations for each cohort.

3. Model how to construct a population pyramid. You may want to project a blank sheet of Pyramid Graph Paper with a data sheet on the board using a document camera or Smartboard.

4. Students construct a population pyramid for their assigned country by graphing the percentage data onto the Pyramid Graph Paper.

5. Choose one completed pyramid from each country to display for the class.

Answers to Student Worksheet

See Answer Key for the Population Pyramids and Student Worksheet

discussion questions

1. Can you tell from the data if there are more male or female babies in each country?

   Yes, there are more male babies. There is a slightly greater probability of giving birth to male children. For every 100 girls born, there are about 105 boys born. For most countries, this 5 percent difference is reflected in the numbers on the data sheet. There are two countries in this set (India and China) where the sex difference is more pronounced. In India, there are nearly 11 percent more boys than girls ages 0-4 and in China there are 11.5 percent more boys than girls in that age group. This is due to sex selection based on a preference for sons.

2. Can you tell from the graphs which country has the most people?

   No. The graphs represent 100 percent of the population of each country broken down by age groups.

Demographers typically use the percentage data instead of the raw data so that each pyramid fits on the same size grid and can be compared to other population pyramids.

3. Are there more elderly females or males? Why might that be the case?

   There are more elderly females. Throughout the world, life expectancy for females is higher than for males. This is due to a number of genetic and social factors. In general, males are more predisposed to certain health risks than females. Also, males make up the majority of the military and are more likely to die during wars.

4. If you had a business and wanted to capitalize on your information about the population age distribution for the United States, what would you sell and why? What about a business in Nigeria? A business in Germany?

   United States – Answers should include any products for people between 25-34 or 55-64 because they make up the largest percentages of people. Nigeria – Answers should include any products for children and infants. Germany – Answers should include any products for older people.

5. Which of the six countries is growing the fastest? How do you know? Can you think of any other information we can infer from the pyramid shape?

   Nigeria is growing the fastest. It has the widest base, and the largest percentage of the population in pre-reproductive and reproductive years. Population growth occurs when the segment of the population currently in its childbearing years (ages 15-44; bars 4-9 on the graphs) has produced a generation larger than itself (bars 1-3). The triangular pyramid shape also indicates that a relatively small proportion of the population is elderly – the bars at the top of the graph are very small – and could mean that life expectancy is low.

6. Looking at the pyramids, which countries appear to have the slowest rates of population growth? How can you tell?

   Germany has the slowest population growth with over half of the country's population in their post-reproductive years. The pyramid is inverted with a wide top and thin base showing that 53 percent of the population is over the age of 45 (bars 10-18 on the graphs). The United States is also growing slowly. The graph is closer to a rectangle than a pyramid, showing more uniform population size across the age groups and therefore a more stable population.

7. Which country would you suspect is closest to **zero population growth**?

   Zero population growth (ZPG) occurs when a country's birth rate and death rate are roughly equal. If there is significant migration in or out of the country, that must be taken into account as well. Though the graphs do not display birth and death rates, we can reason by their shapes, that Germany and the U.S. are closest to reaching ZPG.

8. What factors would change the shape of the pyramids in the future?

   A decrease in the birth rate. The people in their childbearing years would be having fewer children, and therefore, be producing a generation more similar in size to itself. This would change the shape of the graph over time from a pyramid to more of a rectangle, indicating a more stable population. Additionally, as life expectancy increases and the proportion of older people increases, the top bars will expand.

9. There are two noticeable "bumps" on the U.S. population pyramid. What do these larger cohorts correspond to?

   The "bump" closer to the top of the pyramid reflects the baby boom generation – children born following World War II. (The baby boom generation includes those born between 1946 and 1964.) The "bump" lower down the pyramid is an echo boom – the children of baby boomers.

10. China's population pyramid is the most varied of the six. Can you think of any historic events from the past 85 years that helped shape the Chinese pyramid?

    In the early 1950s, Chinese women were having an average of six children. Then the Great Leap Forward (1958-1962), a national campaign that moved many agricultural workers into industries, created widespread famine and an estimated 20-40 million people died of starvation. The years of the Great Leap Forward are the only time in modern Chinese history that more people died than were born, as both fewer babies were born and the death rate rapidly increased. These years, included in the 55-64 age cohorts on the graph, are disproportionately smaller compared to other generations. Older cohorts were once larger than those born during the famine. As the Chinese population has aged, more members of the older cohorts have died of other causes, and the older cohorts have correspondingly shrunk.

    The Chinese population continued to grow in the 1960s and 1970s and in 1980, the one-child policy was put in place. The birth rate dropped as many people were allowed only one child, and this is reflected in the cohorts for ages 40-44. The one-child policy remained until 2016. The larger percentages for the 25-34 year old cohorts are an "echo boom," the children of those in the 45-54 age cohorts.

11. Which of the three general pyramid shapes would you use to describe India's population pyramid? What does this mean for India's future growth?

    The top portion of India's pyramid is triangular while the bottom portion is rectangular. This shows that in years past, India was growing significantly with each younger cohort larger than its predecessor. In more recent years, India's growth has slowed and we see that the bottom four cohorts are more evenly balanced.

    It is important to note that India's population is still increasing and will do so until the birth rate (currently 20) and death rate (currently 6) are equal.

12. Compare and contrast the population pyramids of Nigeria and Guatemala. How are they similar/different and what does this mean for each countries' future growth?

    The pyramids for both Nigeria and Guatemala are generally a triangle shape – the base of each is much wider than its top, and every younger cohort is larger than its predecessor. So we know that both countries are growing.

    However, we can see in the pyramid for Guatemala that younger cohorts are showing less variation. For instance, compare the male 0-4 cohort with the male 15-19 cohort within each pyramid. There is a small difference between these two cohorts on the Guatemala pyramid of only 0.4 percent (5.9 vs. 5.5), while on the Nigerian pyramid the difference is 1.5 percent (7.9 vs. 6.4). Less variation between the younger cohorts shows the pyramid of Guatemala is starting to become more rectangular and, as such, the population will most likely grow at a slower rate.

ANSWERS TO THESE ACTIVITIES CAN BE FOUND AT POPULATON EDUCATION HERE ***https://populationeducation.org/teacher-resources/*** *and will be included in the digital version of this bulletin that goes on the GTA NSW & ACT website*

POWER OF THE PYRAMIDS | student worksheet

Name: _____ **Date:** _____

UNITED STATES (2020)					CHINA (2020)					NIGERIA (2020)				
AGE GROUP	MALES	MALES %	FEMALES	FEMALES %	AGE GROUP	MALES	MALES %	FEMALES	FEMALES %	AGE GROUP	MALES	MALES %	FEMALES	FEMALES %
0-4	10,445,659		9,992,880		0-4	43,933,770		38,898,766		0-4	16,813,967		16,053,449	
5-9	10,325,131		9,875,278		5-9	43,303,522		37,227,422		5-9	15,044,440		14,423,094	
10-14	10,603,765		10,166,213		10-14	42,059,047		35,656,239		10-14	13,713,331		13,198,226	
15-19	10,732,423		10,305,932		15-19	40,312,118		34,191,682		15-19	12,130,595		11,720,651	
20-24	11,198,945		10,700,531		20-24	45,817,723		39,684,466		20-24	9,892,065		9,638,102	
25-29	12,029,149		11,482,838		25-29	53,218,977		48,128,777		25-29	7,850,577		7,734,216	
30-34	11,649,087		11,330,329		30-34	64,173,087		62,018,343		30-34	6,751,995		6,718,188	
35-39	10,990,413		10,931,596		35-39	50,883,009		48,596,175		35-39	5,944,240		5,948,352	
40-44	10,168,231		10,261,555		40-44	47,096,321		45,387,943		40-44	5,013,838		5,014,734	
45-49	9,947,289		10,157,342		45-49	58,099,063		56,128,753		45-49	4,044,321		4,037,313	
50-54	10,109,501		10,400,905		50-54	60,319,274		58,451,566		50-54	3,203,942		3,233,671	
55-59	10,598,811		11,172,941		55-59	48,010,856		47,409,493		55-59	2,475,859		2,552,575	
60-64	10,091,925		10,918,867		60-64	36,816,789		36,148,014		60-64	1,851,988		1,961,689	
65-69	8,491,889		9,538,282		65-69	34,411,322		35,544,771		65-69	1,374,968		1,501,109	
70-74	6,836,985		7,922,281		70-74	22,080,119		23,360,749		70-74	979,963		1,085,776	
75-79	4,502,437		5,550,601		75-79	13,084,854		14,835,509		75-79	593,642		672,316	
80-84	2,764,750		3,743,461		80-84	7,738,618		9,800,033		80-84	274,821		331,556	
85+	2,418,086		4,282,794		85+	4,271,577		6,917,230		85+	105,689		143,044	
Total	332,639,102				Total	1,394,015,977				Total	214,028,302			

POWER OF THE PYRAMIDS | student worksheet page 2

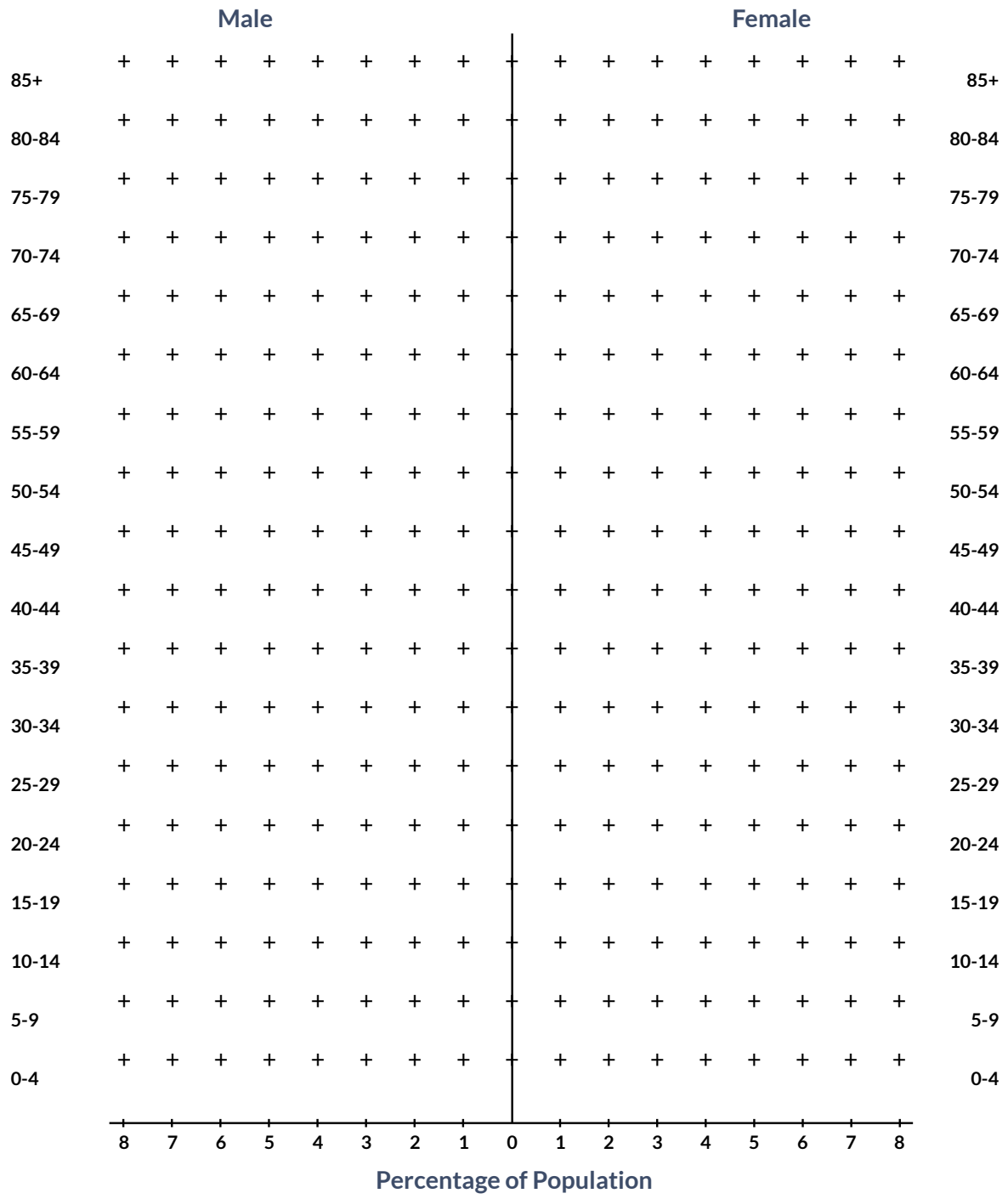
Name: _____ **Date:** _____

GUATEMALA (2020)					GERMANY (2020)					INDIA (2020)				
AGE GROUP	MALES	MALES %	FEMALES	FEMALES %	AGE GROUP	MALES	MALES %	FEMALES	FEMALES %	AGE GROUP	MALES	MALES %	FEMALES	FEMALES %
0-4	1,010,695		968,598		0-4	1,776,761		1,684,135		0-4	61,476,291		54,844,472	
5-9	996,756		959,055		5-9	1,761,223		1,669,702		5-9	61,662,844		54,471,426	
10-14	936,694		905,779		10-14	1,764,866		1,672,026		10-14	61,877,954		54,528,674	
15-19	869,188		852,395		15-19	1,884,828		1,792,996		15-19	62,153,754		54,704,937	
20-24	836,542		831,151		20-24	2,127,584		2,061,475		20-24	61,269,777		54,034,843	
25-29	762,843		767,087		25-29	2,298,179		2,253,770		25-29	57,794,800		51,429,767	
30-34	647,084		658,754		30-34	2,577,005		2,526,601		30-34	53,489,399		48,939,213	
35-39	537,577		553,941		35-39	2,455,944		2,450,154		35-39	49,987,699		46,481,566	
40-44	458,964		482,619		40-44	2,350,680		2,351,081		40-44	46,115,904		43,539,933	
45-49	378,759		407,606		45-49	2,521,809		2,501,884		45-49	41,980,723		40,396,572	
50-54	280,706		316,809		50-54	3,349,711		3,286,927		50-54	35,907,142		35,055,268	
55-59	238,627		272,111		55-59	3,433,935		3,390,809		55-59	29,320,623		29,052,650	
60-64	192,790		224,632		60-64	2,863,951		2,925,215		60-64	23,124,194		23,394,388	
65-69	149,151		174,219		65-69	2,384,833		2,582,179		65-69	17,324,501		18,037,720	
70-74	104,288		121,664		70-74	1,839,689		2,071,543		70-74	12,027,804		13,112,207	
75-79	63,790		78,431		75-79	1,649,406		2,033,966		75-79	7,415,100		8,646,670	
80-84	30,367		41,330		80-84	1,356,200		1,885,712		80-84	3,676,445		4,727,348	
85+	15,864		26,422		85+	918,745		1,704,138		85+	1,610,609		2,480,030	
Total	17,153,288				Total	80,159,662				Total	1,326,093,247			

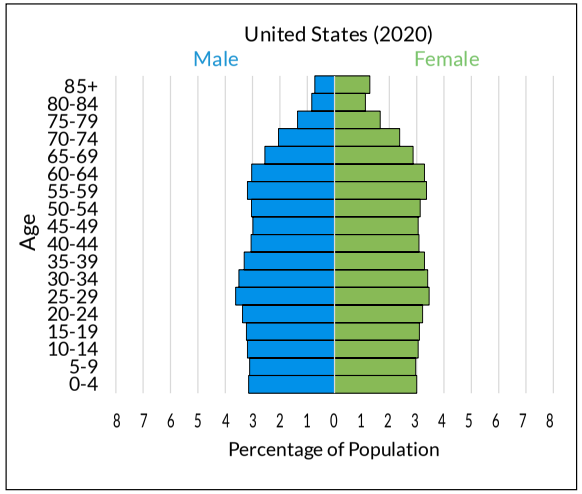
POWER OF THE PYRAMIDS | graph paper

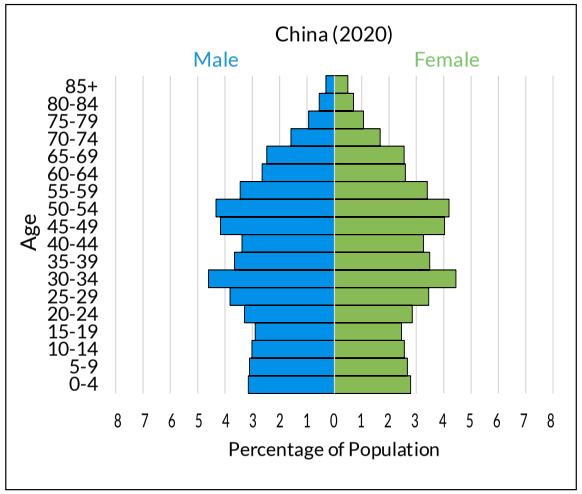
Name: _____ **Date:** _____

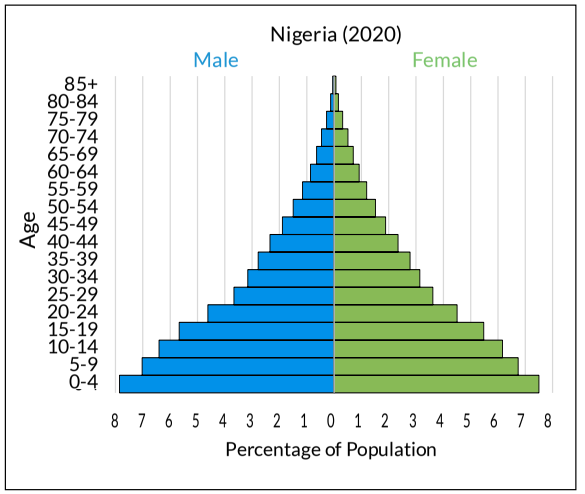
Country _____

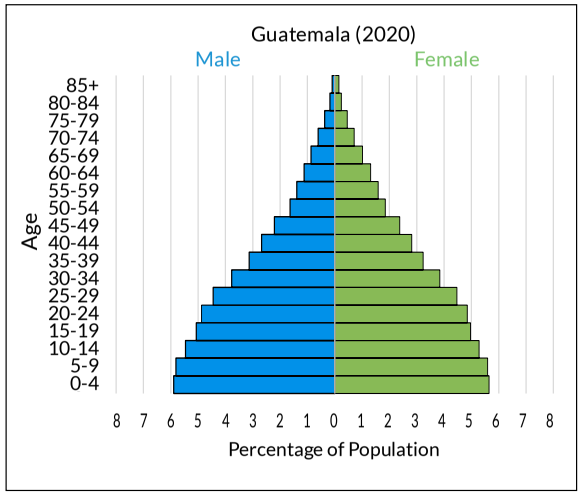


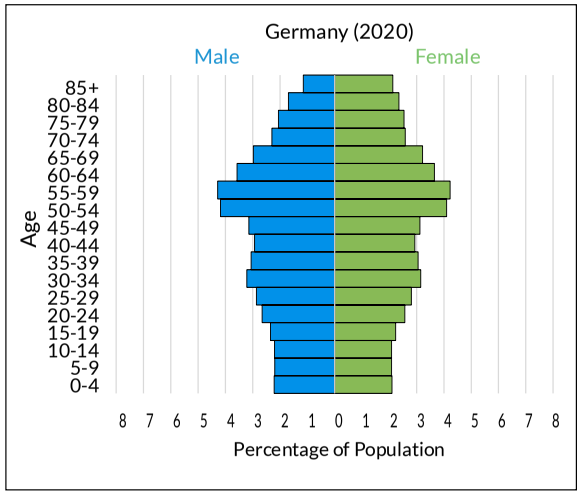
POPULATION PYRAMIDS | answer key

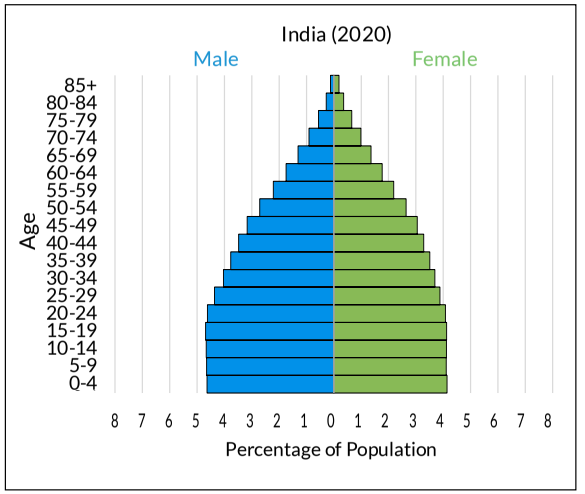












POWER OF THE PYRAMIDS | answer key

UNITED STATES (2020)					CHINA (2020)					NIGERIA (2020)				
AGE GROUP	MALES	MALES %	FEMALES	FEMALES %	AGE GROUP	MALES	MALES %	FEMALES	FEMALES %	AGE GROUP	MALES	MALES %	FEMALES	FEMALES %
0-4	10,445,659	3.1%	9,992,880	3.0%	0-4	43,933,770	3.2%	38,898,766	2.8%	0-4	16,813,967	7.9%	16,053,449	7.5%
5-9	10,325,131	3.1%	9,875,278	3.0%	5-9	43,303,522	3.1%	37,227,422	2.7%	5-9	15,044,440	7.0%	14,423,094	6.7%
10-14	10,603,765	3.2%	10,166,213	3.1%	10-14	42,059,047	3.0%	35,656,239	2.6%	10-14	13,713,331	6.4%	13,198,226	6.2%
15-19	10,732,423	3.2%	10,305,932	3.1%	15-19	40,312,118	2.9%	34,191,682	2.5%	15-19	12,130,595	5.7%	11,720,651	5.5%
20-24	11,198,945	3.4%	10,700,531	3.2%	20-24	45,817,723	3.3%	39,684,466	2.8%	20-24	9,892,065	4.6%	9,638,102	4.5%
25-29	12,029,149	3.6%	11,482,838	3.5%	25-29	53,218,977	3.8%	48,128,777	3.5%	25-29	7,850,577	3.7%	7,734,216	3.6%
30-34	11,649,087	3.5%	11,330,329	3.4%	30-34	64,173,087	4.6%	62,018,343	4.4%	30-34	6,751,995	3.2%	6,718,188	3.1%
35-39	10,990,413	3.3%	10,931,596	3.3%	35-39	50,883,009	3.7%	48,596,175	3.5%	35-39	5,944,240	2.8%	5,948,352	2.8%
40-44	10,168,231	3.1%	10,261,555	3.1%	40-44	47,096,321	3.4%	45,387,943	3.3%	40-44	5,013,838	2.3%	5,014,734	2.3%
45-49	9,947,289	3.0%	10,157,342	3.1%	45-49	58,099,063	4.2%	56,128,753	4.0%	45-49	4,044,321	1.9%	4,037,313	1.9%
50-54	10,109,501	3.0%	10,400,905	3.1%	50-54	60,319,274	4.3%	58,451,566	4.2%	50-54	3,203,942	1.5%	3,233,671	1.5%
55-59	10,598,811	3.2%	11,172,941	3.4%	55-59	48,010,856	3.4%	47,409,493	3.4%	55-59	2,475,859	1.2%	2,552,575	1.2%
60-64	10,091,925	3.0%	10,918,867	3.3%	60-64	36,816,789	2.6%	36,148,014	2.6%	60-64	1,851,988	0.9%	1,961,689	0.9%
65-69	8,491,889	2.6%	9,538,282	2.9%	65-69	34,411,322	2.5%	35,544,771	2.5%	65-69	1,374,968	0.6%	1,501,109	0.7%
70-74	6,836,985	2.1%	7,922,281	2.4%	70-74	22,080,119	1.6%	23,360,749	1.7%	70-74	979,963	0.5%	1,085,776	0.5%
75-79	4,502,437	1.4%	5,550,601	1.7%	75-79	13,084,854	0.9%	14,835,509	1.1%	75-79	593,642	0.3%	672,316	0.3%
80-84	2,764,750	0.8%	3,743,461	1.1%	80-84	7,738,618	0.6%	9,800,033	0.7%	80-84	274,821	0.1%	331,556	0.2%
85+	2,418,086	0.7%	4,282,794	1.3%	85+	4,271,577	0.3%	6,917,230	0.5%	85+	105,689	0.0%	143,044	0.1%
Total	332,639,102				Total	1,394,015,977				Total	214,028,302			

POWER OF THE PYRAMIDS | answer key page 2

GUATEMALA (2020)					GERMANY (2020)					INDIA (2020)				
AGE GROUP	MALES	MALES %	FEMALES	FEMALES %	AGE GROUP	MALES	MALES %	FEMALES	FEMALES %	AGE GROUP	MALES	MALES %	FEMALES	FEMALES %
0-4	1,010,695	5.9%	968,598	5.6%	0-4	1,776,761	2.2%	1,684,135	2.1%	0-4	61,476,291	4.6%	54,844,472	4.1%
5-9	996,756	5.8%	959,055	5.6%	5-9	1,761,223	2.2%	1,669,702	2.1%	5-9	61,662,844	4.6%	54,471,426	4.1%
10-14	936,694	5.5%	905,779	5.3%	10-14	1,764,866	2.2%	1,672,026	2.1%	10-14	61,877,954	4.7%	54,528,674	4.1%
15-19	869,188	5.1%	852,395	5.0%	15-19	1,884,828	2.4%	1,792,996	2.2%	15-19	62,153,754	4.7%	54,704,937	4.1%
20-24	836,542	4.9%	831,151	4.8%	20-24	2,127,584	2.7%	2,061,475	2.6%	20-24	61,269,777	4.6%	54,034,843	4.1%
25-29	762,843	4.4%	767,087	4.5%	25-29	2,298,179	2.9%	2,253,770	2.8%	25-29	57,794,800	4.4%	51,429,767	3.9%
30-34	647,084	3.8%	658,754	3.8%	30-34	2,577,005	3.2%	2,526,601	3.2%	30-34	53,489,399	4.0%	48,939,213	3.7%
35-39	537,577	3.1%	553,941	3.2%	35-39	2,455,944	3.1%	2,450,154	3.1%	35-39	49,987,699	3.8%	46,481,566	3.5%
40-44	458,964	2.7%	482,619	2.8%	40-44	2,350,680	2.9%	2,351,081	2.9%	40-44	46,115,904	3.5%	43,539,933	3.3%
45-49	378,759	2.2%	407,606	2.4%	45-49	2,521,809	3.1%	2,501,884	3.1%	45-49	41,980,723	3.2%	40,396,572	3.0%
50-54	280,706	1.6%	316,809	1.8%	50-54	3,349,711	4.2%	3,286,927	4.1%	50-54	35,907,142	2.7%	35,055,268	2.6%
55-59	238,627	1.4%	272,111	1.6%	55-59	3,433,935	4.3%	3,390,809	4.2%	55-59	29,320,623	2.2%	29,052,650	2.2%
60-64	192,790	1.1%	224,632	1.3%	60-64	2,863,951	3.6%	2,925,215	3.6%	60-64	23,124,194	1.7%	23,394,388	1.8%
65-69	149,151	0.9%	174,219	1.0%	65-69	2,384,833	3.0%	2,582,179	3.2%	65-69	17,324,501	1.3%	18,037,720	1.4%
70-74	104,288	0.6%	121,664	0.7%	70-74	1,839,689	2.3%	2,071,543	2.6%	70-74	12,027,804	0.9%	13,112,207	1.0%
75-79	63,790	0.4%	78,431	0.5%	75-79	1,649,406	2.1%	2,033,966	2.5%	75-79	7,415,100	0.6%	8,646,670	0.7%
80-84	30,367	0.2%	41,330	0.2%	80-84	1,356,200	1.7%	1,885,712	2.4%	80-84	3,676,445	0.3%	4,727,348	0.4%
85+	15,864	0.1%	26,422	0.2%	85+	918,745	1.1%	1,704,138	2.1%	85+	1,610,609	0.1%	2,480,030	0.2%
Total	17,153,288				Total	80,159,662				Total	1,326,093,247			

My guide to writing the IDEAL paragraph

Presented by David Proctor

Adapted from "A Learning and Responding Matrix" (ALARM) concept, originally developed by New South Wales teacher Max Woods.

The idea of an IDEAL paragraph is that it takes you through each stage of a verb ladder like the one shown below.

This is important so that you can show all your knowledge and thinking in your writing. You start with the basics *Identify* and *Describe*, then move through the higher order thinking in the *Explain* and *Analyse* section, and critically think in your *Evaluation*.

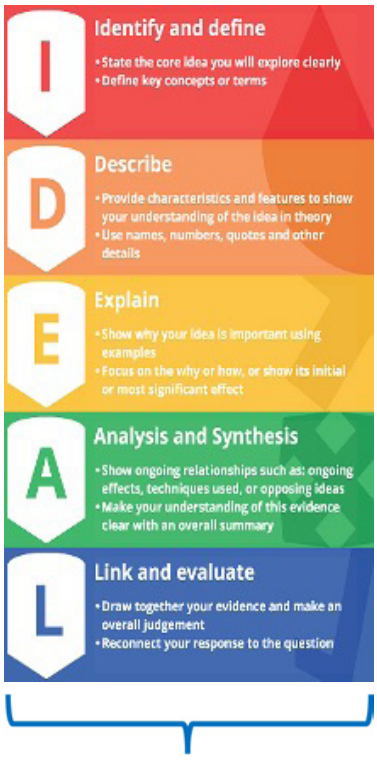
By moving through each step in the correct order you bring the reader along with you and persuade them that your argument is not only correct, but based in fact, backed by evidence, and flows logically.

The Verb Ladder

You initially state and define your idea so that it is clear to the reader.

You then describe facts, examples, and evidence to show your understanding of existing information.

This shows a good understanding of the theory behind your idea.



You can then show the importance of the existing information by explaining why something has occurred or its effect.

You can build on this to show relationships with other ideas or evidence to see if they support your initial idea or have an opposing view. You may look at ongoing effects as well.

This higher-level thinking shows that you can move beyond the theory and build your own knowledge and understanding.

When evaluating, you will make judgements about the evidence and relationships you have discussed earlier. This means you need to be critical to determine if something has been effective, efficient, timely, improves a situation or not.

This level of thinking is often tough but is usually based against criteria to help measure the judgement you are making. This is often reliant on the subject you are writing for, so discuss this with your subject teacher.

My guide to writing the IDEAL paragraph

The steps in the IDEAL paragraph are outlined in the image below with an extended version of each step throughout this booklet. Make sure you talk to your subject teacher to see what variations they may have for that subject.

Identify and define your idea clearly

- Think about the core idea this paragraph is trying to cover and make it obvious to the reader from the start – don't hide it away later in the paragraph.
- Establishing an idea and relate it to the question being asked, much like a topic sentence.
- Use Topic terms related to the content and some words that relate to the verb/NESA key term from the question.

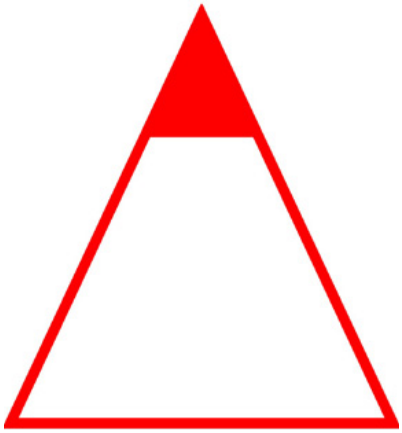
What does my thinking look like in this section?

When you are identifying or defining you are making your idea clear and showing the simplest form of the idea you will present in the paragraph. This is known as a topic sentence.

You might be able to do this in one sentence, but if you define a key term that you will be looking at with a longer discussion using examples, you may wish to spend time to initially show the reader the core idea in more than one sentence.

Think of this step as the peak of a pyramid (short and to the point) which is what gets noticed first but is supported by the bulk of the pyramid (the rest of your paragraphs evidence and arguments).

You want to make the first sentence clear so the reader can see what your paragraph will be about and ensure that it is answering the question.



My guide to writing the IDEAL paragraph

To do this you will often refer to elements of the question which might include the topic, such as a book, event, or person, or it may refer to the verb in the question such as describe, explain, analyse, evaluate.

If you have a higher order verb such as *evaluate* to respond to, you might use some evaluative language from the start of your paragraph and throughout it.

Examples of positive evaluative terms include significant, improved, positive, effective, efficient, and timely.

Examples of negative evaluative terms include degraded, ineffective, underutilised, inefficient, and costly.

> ***For example***, if you are responding to the question below, you would use key terms from the topic (underlined) and terms that show you are meeting the verb (*italicised*).
>
> You should notice that the topic sentence has connections to the question's verb and topic words. This example topic sentence may be part of a longer essay response that has a paragraph about young people, adults, and the elderly, so is narrowing down which part of society is focussed on in this paragraph.
>
> ***Question:*** *Assess* the impact of smoking on society.
>
> ***Possible topic sentence:*** Second hand smoke is *dangerous* and places a *significant impact* on the younger generation.

How do I start writing in this section?

Here are some general suggestions to give you a guide. You should think about tailoring your introductory statements to the question that you are being asked so that the reader sees clear links.

There may also be alternative ways to write depending on your subject. Different subjects and teachers will have their own writing styles, so make sure you seek advice on this too.

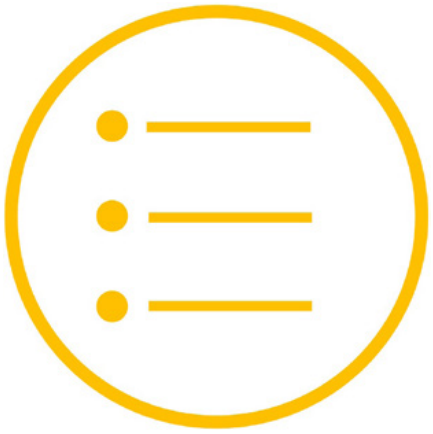
"[key word/topic] can be defined as…"
"The issue raised is [topic]"
"[Issue] has been shown through…"
"[Event/Person] was significant due to…"
"[Composer] illustrates [theme] by…"
"The [event] was primarily caused due to…"

Describe **your idea in general detail / theory**

- Show your knowledge of the idea you raised by giving details about it beyond just a definition.
- This includes features, characteristic, names and numbers, or quotes.
- This shows your depth of knowledge on the theory for the reader and gives your writing authority making it more likely to win over the reader.

My guide to writing the IDEAL paragraph

What does my thinking look like in this section?



When describing you might ask yourself to think about what are the parts or features that make up the issue, event, theme, or other object you are referring to.

You might ask yourself to write as if you were trying to paint a picture in the reader's mind who has never heard of it before.

If you are describing, you might pick out the features that make up the whole and use these to show your theory knowledge or factual understanding, before moving on to some discussion or explanation of what it means beyond this statement of facts. Remember this is not listing facts, but using descriptive language to inform someone of what you understand already.

> ***For example***, if describing an event from history you might include the different people involved, dates and locations and other important information like political perspectives influencing the event. Below is a sample that might be from a history response about the Shogunate Japan.
>
> ***Sample History description***: Shogunate Japan was characterised by a hierarchy in the social status where the Emperor was at the top of the pyramid, but had little power. The Shogun who was next on the hierarchy held most of the political power and controlled the Daimyo (landlords) who kept the country safe with the help of their warrior Samurai. The merchants were at the bottom of the hierarchy and looked down upon.

You might also think about describing for a different type of subject the roles of characters in a book/play, the features of a law or management style.

> ***For example***, if describing the theme of a story or the role of characters in a book you might include some information about who they are and what actions they take in the story to move events along.
>
> ***Sample English description***: Harry Potter is the protagonist who is inexperienced with magic. It is through his eyes we see into the world of magic when he attends a school called Hogwarts. Each new subject he attends and character he meets reveals more of the wizarding world such as his two close friends Hermione and Ron, and his mentor Professor Dumbledore.

How do I start writing in this section?

Here are some general suggestions to give you a guide.

"Characteristics of [topic] include…"

"The most important feature of [topic] is…"

"The initial evidence for this is…"

"[Evidence] demonstrates the events taking place…"

"The [theme/event] can be shown by…."

"During [date/year], the events such as [example/s] showed…"

My guide to writing the IDEAL paragraph

Explain **why your idea is important using examples**

- Explaining usually aims to cover:
  - the initial or most significant effect/impact
  - the why or how of something (as in Why did this happen? or, How was a technique or idea used?).
- By demonstrating this you are starting to apply your theory to show a deeper understanding for the reader and connect to examples of your idea working (if you have not done this yet).

What does my thinking look like in this section?

An explanation can have three different ways of thinking, but they often merge into one when you are writing. It is often easier to think in one of the three ways for a question you are answering if it seems like the others don't seem logical at the start.

Why – Why is something happening/being used/important?

How – How did it occur/How has it had this effect?

Cause and effect – What event occurred which led to this initial or significant effect?

In this cause-and-effect version of Explain, the first circle represents the cause of something such as the throwing away of a match. The second circle represents the effect that happened such as a roaring bushfire.

These ideas or events are disconnected until they are joined cohesively with a connective phrase. The arrow could represent one of these phrases such as "caused", "resulted in", or "was the catalyst for".

If we use these connective phrases to link our ideas together it makes our ideas logical and flow.

For example: "The throwing away of a lit match is *often the catalyst* for bushfires that consume Australia's vegetation".

You can always play around with this and put the effect first in the sentence to change your writing style.

Here are some examples of each of the different ways to think about explanation writing:

Why question: Why is it important to do a pop test?

Why example: The loud sound of a "pop" was heard due to the hydrogen that was trapped inside the container reacting to the lit match. This indicates to the person conducting the test that hydrogen is present even though it is colourless and odourless.

How question: How does too much light exposure impact a photograph?

How example: Extra light exposure to a film in a camera can lead to overexposed areas of a photograph. This appears as areas of very light colour or even white areas on the photograph, as the extra light washes out many of the colours and dark shades.

Cause and effect question: What role does temperature have during baking?

Cause and effect example: Maintaining a steady oven temperature while baking can allow for even cooking. Increasing the oven temperature can result in uneven cooking with outer areas of the product will burn, while inside may undercook.

In each of the examples above you will notice there is always a cause, effect and connecting phrase. However, the question you are asked may challenge the way you initially start responding to the question.

My guide to writing the IDEAL paragraph

How do I start writing in this section?

Here are some general suggestions to give you a guide.

"The effects of [topic] are…"

"[Topic] has been caused by…"

"[Topic] has a strong relationship to…"

"The events leading up to [significant event] demonstrate…"

"The [technique] was used to show…"

"Due to the influence of [person] on [event/group] this allowed for…"

Analyse **to show relationships such as: ongoing effects, techniques, or opposing ideas**

- When analysing, we start to connect our examples together to **demonstrate a relationship** and that our examples added together give strong evidence of our original idea. This will mean you are applying your theory, and the reader will see you as an expert.
- Here you might show:
  - Ongoing or connected effects, building from the initial effect.
  - Positive and negative outcomes.
  - Different perspectives on the idea to show the other side of the argument.

What does my thinking look like in this section?

When you are analysing you are really looking to show the relationship between ideas, techniques, or evidence that you have uncovered in your research and thinking. This means you might be showing how things do go together and work to support each other. Or you might show how things do not go together and work in opposition so do not support the same idea. Both ways of thinking are OK.

There are two main ways of visualising this relationship thinking – **Analysis and Synthesis**.

In each, connective terms to join ideas together provide your writing with cohesiveness. Examples might be "leads to", or "results in", to show a direct connection. Where ideas or evidence might differ you could use terms that show this contrast such as "however", or "on the other hand".

My guide to writing the IDEAL paragraph

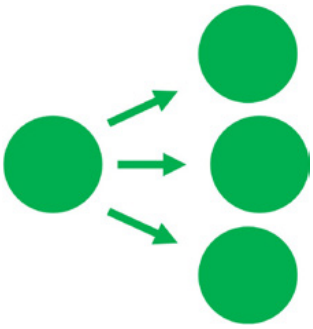
Analysis

This version can lead you to break down events to show their connections.

This can be linear where much like an explanation, one thing leads to another. This shows how one idea or event leads to the next and build from each other as ongoing or secondary effects which may be positive or negative.

> ***For example***, a sports injury could lead to a loss of function, resulting in depression or a loss of job.

Another way to think about an analysis is to break down the components to show a range of relationships that stem from a core.



These may be alternate effects from the one cause.

> ***For example***, a Bushfire can have environmental, economic, and social effects which may not link to each other, but they have a relationship with the same cause.

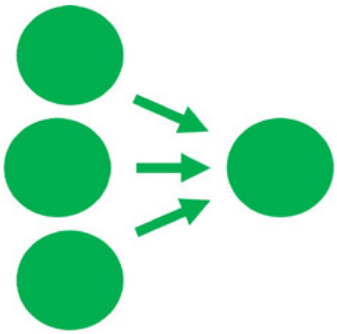
Synthesis

A synthesis is where you might take evidence or information from a range of sources to show their relationship to each other.

It is important to note that this is where we can see relationships where evidence can either support an idea, contrast it, or have a different interpretation altogether that does not discount the other evidence.

> ***For example***, you might find different firsthand accounts of a flooded river where someone's home is destroyed, yet the farmer downstream may have had their field provided extra nutrients to the soil. Here there is a positive and negative interpretation of the event. But there is a relationship evident due to the flood.

The higher order way of thinking in a synthesis is when you bring together different sources of information as evidence and use these to inform your own understanding about an issue or idea. This means that you weigh up the evidence and give your own interpretation.



In the diagram here, the circles on the left show the information you have gathered, while the circle on the right represents your new understanding of this information put together.

> ***For example***, you might conclude from your research on flooding rivers that although they have many negative impacts to homes and people's lives, they can regenerate soils by leaving behind nutrients, so therefore have benefits. Overall, floods should be seen as a hazard to try to avoid and not simply a natural disaster. In this example, all the evidence is considered to make a new understanding of an event.

My guide to writing the IDEAL paragraph

How do I start writing in this section?

Here are some general suggestions to give you a guide.

"The implications of [topic] are…"

"The ongoing effects of [topic] include…"

"[Topic] has a strong relationship to [Topic 2] through…"

"Similarly, [technique 2] was used to…"

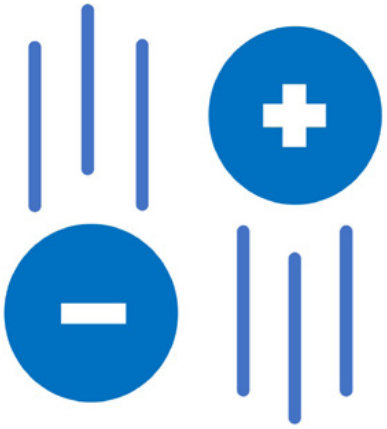
"However, other interpretations include…"

"On the other hand, [person/event], also had an influence on…"

Link and evaluate **your evidence together and evaluate**

- This is like a conclusion to your paragraph and depending on what the question has asked you might simply wrap up your idea, or also make an evaluation of your evidence.
- An evaluation will usually ask you to **measure your evidence** against a criterion such as success, improvement or if a theory has been proven.
- To make your evaluation you should summarise your core point and use positive or negative language in relation to the criteria.

What does my thinking look like in this section?



By this stage you have already done the heavy lifting through your research and summarised this through the previous steps in the IDEAL writing process. Now you need to link this all together in an evaluation.

When you evaluate or make any type of assessment you need to think critically to make a judgement about all the information you have gathered. Does it prove the point you are making; did you find contradicting facts; did you think the way something was performed or written was effective?

Here you need to look at where the evidence falls. Often new learning comes from disproving an idea, set beliefs, or hypothesis, so there is no need to be concerned if you make a negative judgement.

Remember to use positive of negative terms to show your judgement:

Examples of positive evaluative terms could include significant, improved, positive, effective, efficient, timely.

Examples of negative evaluative terms include degraded, ineffective, underutilised, inefficient, costly.

My guide to writing the IDEAL paragraph

However, you should also provide a connection to some criteria as well. Some criteria could be general in nature such as time, cost, efficiency, and improvement. Other criteria might be very specific to your subject area such enforceability (of laws in legal studies), the reliability of a source (to reflect history), the effectiveness of a composer to use a technique (English/Music/Art).

For example, in a Geography response where environmental laws are being evaluated, judgement language (underlined) is being used to show how effective the laws are against criteria (italicised). Here you should see they are often together in a pair. This could use data as evidence to back up the descriptive evaluation.

Sample Geography evaluation: Environmental laws provide a strong guide to people accessing areas such as marine parks by limiting their *catch sizes*. This helps to promote *fish reproduction* and improve their *overall population* numbers. However, environmental laws that protect marine parks are often *unenforceable* due to the large size of a marine park and few fisheries officers to patrol this large of an area means that overfishing can still occur. Overall environmental laws are effective in providing some level of *protection* to endangered species but need to work in collaboration with other protective measures such as education.

How do I start writing in this section?

Here are some general suggestions to give you a guide.

"[Topic] meets the following criteria . . ."

"Success of [topic] in meeting [criteria] is shown by . . ."

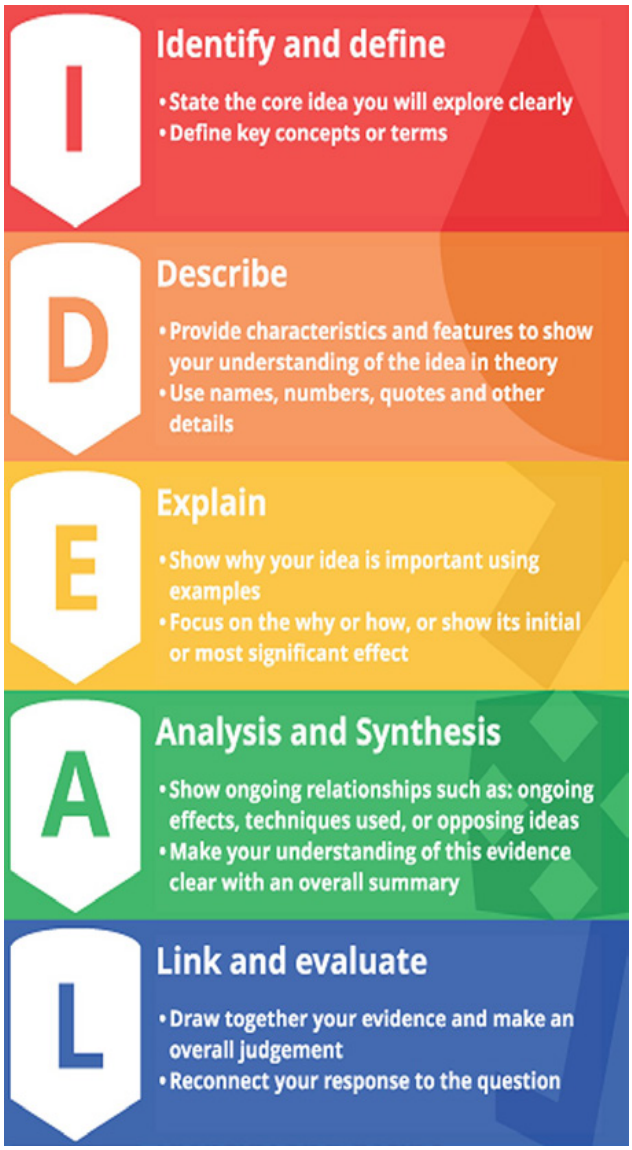
"[Topic] is extremely significant to . . ."

"The influence of [event/person] has had significant impacts on . . ."

"[Composer] has effectively used these techniques to . . ."

"It is therefore more likely that [event/person] had a greater role to play due to . . ."

IDEAL Poster



Using The Economist Educational Foundation's resources in Geography

Stephanie Boden, GTA Councillor, Acting Head Teacher HSIE

Many teachers are already familiar with *The Economist* (https://www.economist.com/), a British newspaper founded in 1843. Of particular interest to geographic education is The Economist Educational Foundation's Topical Talk Programme (https://economistfoundation.org/topicaltalk/) which provides resources and lesson plan ideas on a variety of geography topics. Teachers can register for free (https://talk.economistfoundation.org/account/register/) to gain access to a number of relevant resources. Each resource is linked to the relevant Sustainable Development Goal(s), ensuring that the lessons have international relevance.

Content related to geography is already organised in the Environment and Climate Teaching Resources page (https://talk.economistfoundation.org/resources/collections/environment-climate/?utm_source=gta&utm_campaign=TT2024), or in the Geography Resources Page (https://talk.economistfoundation.org/geography-resources/?utm_source=gta&utm_campaign=TT2024)

For easy reference, I have organised some of the Topical Talks in the relevant NSW 7–10 curriculum topics:

STAGE 4

Place and liveability

- The world's most liveable cities in 2023 (https://talk.economistfoundation.org/resources/the-worlds-most-liveable-cities-in-2023/)

  This one-hour lesson has four key activities that address the categories and weights in the Global Liveability Index and asks students to consider the types of events that would impact a category positively or negatively. Students consider issues that would appear in local newspapers such as the development of a new park, as well as stories on a global scale such as war. A PowerPoint is provided for the lesson and the bonus challenge on the final slide could be used to extend high potential and gifted education (HPGE) students.

Water in the world

- Floods in Pakistan: sustainable solutions (https://talk.economistfoundation.org/resources/floods-in-pakistan-sustainable-solutions/)

  Another one-hour lesson on the 2022 Pakistan floods that can be integrated into the Natural Hazards component of this topic. There are excellent resources provided that encourage students to critically think about how to sustainably manage flooding and to consider different perspectives on this issue. For example, students can consider the view of a young person in a flooded country, a leader in another country or the owner of a global fossil fuel company. Students also have to consider a sustainability vs urgency trade off when considering different management strategies. I highly recommend this one!

Interconnections

- Post-pandemic: the return of tourism (https://talk.economistfoundation.org/resources/post-pandemic-the-return-of-tourism/)

  In this one-hour lesson, students take on different characters (such as someone living in a popular tourist destination, a religious leader who works in a popular tourist site, someone with an illness, a travel agent or a climate activist) and each character needs to consider the concept of revenge tourism.

Using The Economist Educational Foundation's resources in Geography

Students need to address a variety of ideas including whether an increase in tourism is a good or bad thing, and they ultimately consider a variety of perspectives in order to develop a broader understanding of an issue.

- World Cup: the legacy of big events (https://talk.economistfoundation.org/resources/world-cup-the-legacy-of-big-events/)

  Although this one-hour lesson was related to the 2022 World Cup in Qatar, it could be adapted for another international sporting event (e.g., Paris Olympics 2024, FIFA Club World Cup 2025, Women's Rugby World Cup 2025). The focus of the lesson is to consider the legacy of the event for the host city or nation. Students need to think about the environment, employment, local communities and health and safety. Working in groups, students need to negotiate different decisions about hosting a big event that provides global connection with a local legacy.

STAGE 5

Changing Places

- A positive human future (https://talk.economistfoundation.org/resources/a-positive-human-future/)

  This is a four-hour resource, but teachers can pick and choose the activities that suit their class. Activities include "What makes a city?" with students engaging in a class debate and then completing activities related to sound clips and a TED-Ed video on the future of cities. There are also activities on the challenges cities face and how to turn them into opportunities. These activities could be adapted to fit into the HSC Topic "Urban Places" (old syllabus for 2024 teaching) or HSC Topic "Rural and Urban Places" (new syllabus for 2025 teaching).

- Future-proof cities (https://talk.economistfoundation.org/resources/future-proof-cities/)

  In this one-hour lesson, students are introduced to the idea of "future proofing" a city. Students are given newspaper headlines related to a variety of changes (e.g., increased popularity of online shopping). They then consider how a city adapts to these changing economic, environmental and social situations. A map of "Futureville" is provided for students to directly draw on their adaptations. A HPGE extension activity involves how to make buildings adaptable for future use changes e.g. office into residential. Another highly recommended Topical Talk.

Sustainable biomes

- The global food crisis (https://cdn.burnetnewsclub.com/media/documents/Topical_Talk_Festival_Headline_06__The_global_food_crisis.pdf)

  The lesson provided is likely to take about 90 minutes and is based on the concept of scarcity. The lesson involves a group-based game where uneven sized groups (different countries) produce food (using templates provided), with differing levels of resources (e.g., paper and scissors). Each group has to produce a certain amount under timed conditions during four rounds. Changing conditions in each round include dealing with natural disasters, conflict, refugee movements and trade restrictions. There are teacher directions on how to introduce the new conditions to the groups. Summative discussions involve addressing who is responsible for the global food crisis and what students can do to help. This highly engaging game is recommended and could also be used for the **Human Wellbeing** topic- perhaps as a transition lesson between these topics.

  This Global Food Crisis was part of the Topical Talk Festival 2022 and teachers may be interested in the ideas and solutions students designed for this festival: (https://talk.economistfoundation.org/festivals/festival-2022/the-global-food-crisis/)

- Food: greener choices (https://cdn.burnetnewsclub.com/media/documents/Headlines_23_Food_-_Greener_Choices.pdf)

  Many teachers will already address greenhouse gas emission of different food choices and this activity provides an engaging way to address this concept. Students initially work in groups of three to design a meal with the provided shopping list "chat mat" and answer a series of questions about their choices. Students also consider a range of true or false questions given some provided information about emissions and move to different areas of the classroom based on their answer. They also have to design a lower emission meal and consider the taste vs sustainability question. There are also "challenge" exercises that suit HPGE students. Another highly recommended activity.

Using The Economist Educational Foundation's resources in Geography

- Lab-grown meat (https://talk.economistfoundation.org/resources/lab-grown-meat/)

  This one-hour lesson introduces students to the idea of lab-grown meat, with activities designed to challenge their thinking about related environmental and ethical considerations. There is a PowerPoint that provides an overview of how meat is produced in a laboratory, and where it is available to consume. A series of true or false posters will encourage thinking about the sustainability of lab-grown meat. There are audio clips to play to students that offer a variety of perspectives on lab-grown meat. Teachers could further develop this resource by considering the biomes that are most suitable for different types of agriculture, and investigating the places where renewable energy sources provide future potential for lab-grown meat. Students could also be encouraged to consider the sustainability of plant-based protein agriculture by considering insolation, soil type, topography, water availability, access to markets and prices.

Environmental change and management

Overall, there are a variety of different lessons that are suitable for this topic, including a six-lesson unit on the climate emergency (https://talk.economistfoundation.org/resources/climate-emergency/), eco- anxiety (https://talk.economistfoundation.org/resources/eco-anxiety/), plastics and the planets (https://talk.economistfoundation.org/resources/plastics-and-the-planet/), the circular economy (https://talk.economistfoundation.org/resources/the-circular-economy/) and greenwashing (https://cdn.burnetnewsclub.com/media/documents/Headline17-Greenwashing.pdf).

These lessons all include relevant resources and engaging activities. An example of the range of activities provided for this topic is in the Rewilding lesson:

- Rewilding (https://cdn.burnetnewsclub.com/media/documents/Headlines_22_Rewilding.pdf)

  The objective of this lesson is to consider how different countries are using rewilding as a way to protect and manage their environments. The lesson starts with "would you rather" questions before students represent a different perspective based on a provided card (e.g., a fish, a herbivore, a climate change activist) to choose which environmental management strategy would best suit them.

  Strategies include protecting habitats, supporting species, natural solutions or new habitats. Students are presented with a scenario via video link and then have to pitch a recommended strategy. The teacher chooses the best two pitches before students move on to consider a number of questions such as "what could young people like you do to support rewilding?" This excellent activity encourages students to consider the tradeoffs with different management strategies and how to make the highest impact decisions.

Human Wellbeing

- World Hunger in Numbers (https://talk.economistfoundation.org/resources/world-hunger-in-numbers/)

  It would be beneficial to introduce the concept of hunger/access to food as a wellbeing indicator before using this resource. The UN's World Food Programme has an excellent live map of world hunger (https://hungermap.wfp.org/) that students can investigate as a starter activity. Class discussions can address the spatial distribution of hunger, with students suggesting possible reasons. The Food and Agricultural Organization of the United Nations has a choropleth map: https://www.fao.org/interactive/hunger-map-2023-embed-dark/en/ with a timeline that can be adjusted. Students can suggest reasons for changes to hunger levels over time.

  After using these two maps to gain a spatial understanding of hunger, this one-hour "World Hunger in Numbers" lesson investigates the causes and effects of hunger on human wellbeing. There are three activities that are clearly explained. The "COVID-19" activity could be updated to investigate whether food shortages caused by COVID-19 have been resolved, and how this was managed.

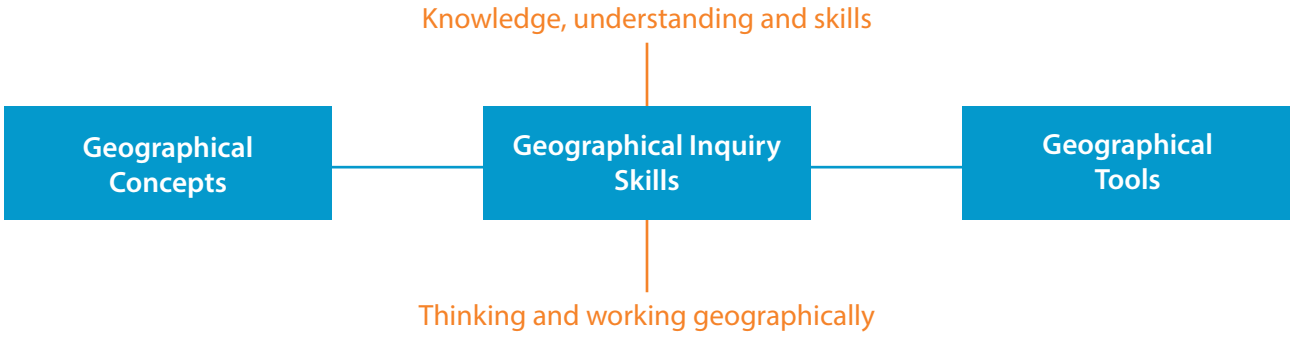
In addition to these resources, there are other ones that are suitable for other HSIE subjects including Commerce, History, Economics, Business Studies, Society and Culture, and Legal Studies.

The GTA NSW & ACT thanks The Economist Educational Foundation for their support in writing this article and for producing these excellent teaching and learning materials.

STAGE 6

Geography 11–12: Syllabus Structure

FOCUS AREAS	INDICATIVE HOURS
YEAR 11 – 2024 implementation	**120 hours**
Earth's natural systems	40
People, patterns and processes	40
Human–environment interactions	20
Geographical Investigation	20 (Note: Extended hours)
Fieldwork	*12 hours to be delivered across 3 topics – not the Geographical Investigation*
YEAR 12 2025 implementation	**120 hours**
Focus areas	Indicative hours
Global sustainability	30
Rural and urban places	45
Ecosystems and global biodiversity	45
Fieldwork	*12 hours to be delivered across 3 topics*



*Source: NESA Geography 11–12 Syllabus – **https://curriculum.nsw.edu.au/learning-areas/hsie/geography-11-12-2022?tab=aim***

Geography 11–12: Conference Resources & Workshop Summaries

GLOBAL SUSTAINABILITY - CONTENT ANALYSIS

Sustainability in the contemporary world

- Sustainability and sustainable development, including pillars of sustainability - social, economic, environmental, and cultural
- Principles of ecologically sustainable development - precautionary principle, intergenerational equity, conservation of biological diversity and ecological integrity
- Opportunities and challenges in planning for and achieving global sustainability - including
  - the role of global forums, agreements and cooperation
  - levels of action at a range of scales, from the United Nations Sustainable Development Goals to practices in local communities, including actions by governments, intergovernmental organisations (IGOs), non-government organisations (NGOs), corporations, community organisations and individuals
  - Indigenous Peoples' practices and benefit sharing
  - political, economic, technological, social, cultural and environmental influences

Evaluating sustainability

- The reasons for evaluating and monitoring global sustainability
- A range of criteria for evaluating the sustainability of economic activities

Investigation of a global economic activity

Students study ONE global economic activity

Students investigate:

- The nature and spatial patterns of the global economic activity
- Influences on the global economic activity including biophysical, economic, technological, political/organisational
- Current trends and future directions

For the global economic activity studied, students:

- evaluate the sustainability of the activity, using one or more criteria
- examine a range of strategies for sustainability
- critically analyse ONE strategy.

30 Hours

There are a range of concepts in this focus area.

To unpack and apply where appropriate.

Editorial comment:

If a business, farm etc is studied during fieldwork (as an example of the economic activity), particularly in relation to sustainability - it must be seen in the global context and represent what is also happening in other countries. Use specific examples from those other countries.

NESA Teaching Advice:

Teachers selecting a global economic activity should consider the need to examine a range of strategies implemented at a global scale, evaluate sustainability using one or more criteria and critically analyse one strategy. In this context, the critical analysis of one strategy would include evaluation.

Published case studies

Pearson textbook

- Tourism
- Viticulture
- Energy

Powerful Geography

- Banana Industry
- Salmon aquaculture
- Fashion industry

ECOSYSTEMS and GLOBAL BIODIVERSITY - CONTENT ANALYSIS

Ecosystems and biodiversity

- The nature and complexity of ecosystem functioning and global biodiversity

Including:

  - energy flows and nutrient cycles
  - dynamic equilibrium and feedback loops
  - relationships between natural systems

- The value of ecosystems and biodiversity
- The relationship between ecological and human stresses, and the vulnerability and resilience of ecosystems, including ecological integrity and biocapacity
- The global state of ecosystems and biodiversity

Including:

- current and future trends, and reasons for the trends
- shifting baselines and tipping points
- Strategies for the sustainable management of ecosystems at a range of scales, including at least one successful conservation program
- The role played by Indigenous Peoples in contemporary management practices

Investigation: Ecosystems

- The characteristics of the ecosystem, including its spatial pattern and the nature of its biodiversity
- The dynamics of ecosystem functioning, including vulnerability, resilience and ecological disturbance
- Human-induced modifications to the ecosystem
- Responses and strategies, including for maintaining ecosystem functioning and actions for sustainability
- Differences in ecosystem management, compared with at least one other location, due to economic, political and sociocultural factors
- The role of contemporary research and innovation in the sustainable management of the ecosystem

45 Hours

There are a range of concepts in this focus area.

It is important to unpack each concept and apply it where appropriate including the ecosystems being investigated.

Editorial comment:

FOR EACH ECOSYSTEM INVESTIGATED BELOW, try to link to this section

TWO DIFFERENT TYPES OF ECOSYSTEMS

- **One in Australia**
- **One Overseas**

FOR EACH ECOSYSTEM SELECT A COMPARATIVE MANAGEMENT STUDY and make sure any DIFFERENCES CAN BE EXPLAINED.

Editorial comment:

Editorial comment: These comparative management studies could be in Australia or overseas.

Editorial comment:

When selecting two ecosystems to study, take into account the availability of contemporary information on research and innovation.

Published case studies

Pearson textbook

- Great Barrier Reef
- NZ Fiord lands

Powerful Geography 2

- Kelp forests of the Great Southern Reef
- The coral triangle
- Florida everglades
- Australian Alpine ecosystem

RURAL and URBAN PLACES - CONTENT ANALYSIS

Rural and urban settlement

- The size, pattern and spatial distribution of settlements including
  - different types of settlements - remote settlement, village, suburb, regional centre, city, megacity and urban mega-region
  - settlement patterns
  - influences on size and spatial distribution - location, climate, topography, natural resources, population and economic development
- National and global urban hierarchies of settlements, based on population and urban function, and spheres of influence
- The nature of urbanisation and urban growth at a global scale

including

  - challenges facing rural and urban places
  - the interdependence of rural and urban places
- Settlements in the world today that have maintained a small ecological footprint and a high level of wellbeing
- Strategies for the sustainable management of rural and urban places, including at least one successful initiative or project

Investigation of a rural and an urban place

Students study ONE place in a rural setting and ONE place within a larger urban settlement, to investigate:

- The location and character of the place
- Geographical processes, both physical and human, that have shaped the identity of the place
- Links to other places
- The nature of changes affecting the place, including social, economic and environmental
- Responses and strategies, including for sustainability

Investigation of a large city outside Australia

Students study ONE large city of 5 million people or more, outside Australia, to investigate:

- The character and spatial dimensions of the large city
- Geographical processes shaping the large city and change over time relating to demographic trends; social and economic patterns; political and economic roles; and regional and global linkages
- Challenges of living in the large city
- Responses to these challenges and opportunities for enhancing sustainability, including strategies to improve people's quality of life and reduce spatial inequality

Published case studies

Pearson textbook
- New York City
- Mumbai
- Tamworth
- Harbour Precinct Sydney

Powerful Geography
- Signapore
- Bellingen
- Green Square

45 Hours

Global perspective

One successful initiative or project - sustainable management

It is recommended the rural place and the place within a larger urban settlement chosen as a study are conveniently located to facilitate fieldwork.

FOR EACH PLACE
Integration of natural and human influences
Interconnections
Change
Reponses and strategies
Sustainability

Editorial comment:

Similar wording - greater depth for the city

Outside Australia
Integration of natural and human influences
Interconnections
Change
Challenges & opportunities
Responses and strategies
Sustainability, QOL, Inequality

GLOSSARY - NEW CONCEPTS IN YEAR 12

Benefit sharing - Formal and mutually agreed terms for the ongoing, equitable distribution of benefits, arising from the application or commercial utilisation of knowledge, practices and/or resources. Benefit sharing agreements with Indigenous Peoples may relate to Indigenous cultural and intellectual property (ICIP), such as knowledges and practices associated with sustainable management of land and resources.

Biocapacity - The capacity of nature/ecosystems to produce and renew the resources that people use and to absorb and filter the waste generated by human activities, within a limited period of time.

Dynamic equilibrium - In the context of Geography 11-12, when an ecosystem is able to maintain its natural balance and remain relatively stable, subject to gradual changes through natural succession. An ecosystem that is in a state of dynamic equilibrium is able to return to its balanced state in response to natural and/or human stresses.

Ecological disturbance - Temporary changes or events in an ecosystem that cause disturbance to its functioning, eg increased mortality of organisms, changes in spatial patterning. Ecosystems are typically resilient to ecological disturbance.

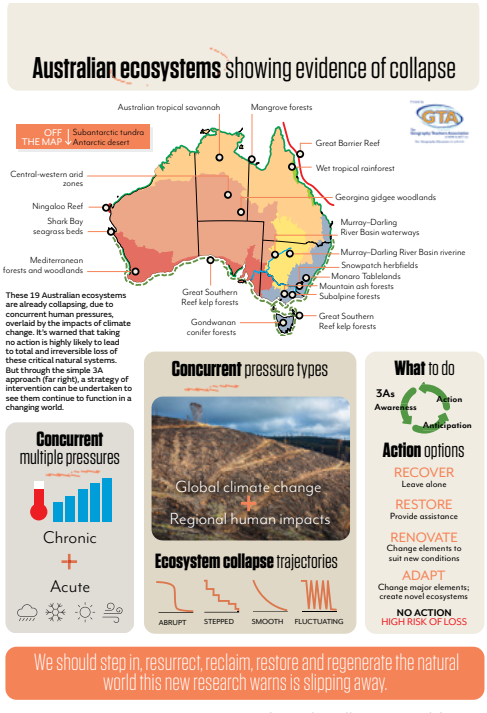
Ecological integrity - The ability of an ecosystem to support and naturally maintain ecological processes, species, a diverse community of organisms, and other important characteristics, with minimal or no intervention through human management.

Feedback loops - Feedback loops are reactions in response to environmental change. Positive feedback loops cause one or more components to increase overall, creating a negative impact on the ecosystem. A negative feedback loop has a positive impact on the ecosystem because it decreases the impact of change, bringing it closer to dynamic equilibrium.

Shifting baselines - A theory that describes the way changes to an ecosystem are measured against previous reference points or baselines, which themselves may represent changes from an even earlier state of the ecosystem. It reflects the perception of each new generation that current conditions are the same as past conditions. An ecosystem may therefore be degraded successively over time, so that the extent of change from its original state, is greater than perceived. Shifting baselines describes the situation where knowledge is lost about the original state of the natural world.

Spheres of influence - The geographical area over which the services and functions of an urban settlement extend. Larger settlements typically have a greater sphere of influence than smaller settlements and attract people from a wider geographical area.

Tipping point - A critical point (often called a threshold) where a series of smaller changes become significant enough, collectively, to trigger a larger-scale change. The change is often abrupt and irreversible, permanently altering the state of the original system, leading to flow-on effects that have more widespread consequences for other natural systems, and for people.



GTA are excited to share with you a print copy of this poster from Australian Geographic. Access the PDF for classroom use here: Link to original article Has Australia reached its environmental tipping point? ***https://www.australiangeographic.com.au/topics/science-environment/2022/07/has-australia-reached-its-environmental-tipping-point/***

SESSION 1 ECOSYSTEMS and GLOBAL BIODIVERSITY

Introductory Comments on Ecosystems and Biodiversity, Lorraine Chaffer

In this focus area, the section on sustainability is new and to be taught in addition to your two case studies.

The two presentations by our guest presenters look at different components of the global biodiversity content particularly

- the global state of biodiversity (current and future trends and reasons for the trends). Professor Michelle Leishman presented wonderfully scaffolded information and data for this section
- strategies for sustainable management including the role played by Indigenous Peoples in contemporary management practices. Luke Foster, a Senior Threatened Species Officer with the NSW Department of Planning and Environment showcased changing approaches to management and engagement with local Indigenous communities on Country.

Remember: you need to study TWO TYPES of ecosystems, one of which must be outside Australia. Technically they could both be outside Australia, however our approach as one in Australia is best practice for engaging in local and affordable fieldwork.

Keynote 1: Luke Foster

(Senior Threatened Species Officer NSW Department of Climate Change, Energy, the Environment and Water)

Grow, Harvest, Heal: Saving our Species through Traditional food stories

- Reawakening knowledge
- Generating knowledge
- Sharing knowledge

. . . all while eating threatened species.

Prior management approach

Saving Our Species Program (2016)

- 1000 threatened species in NSW (species at risk of extinction without intervention due to reduced population size, restricted distribution, not many mature individuals)
- $175 million to conserve species in the wild for the next 100years
- Seems like a lot of funding but spread over 1000 species across NSW
- Implementation is hard as all species have different needs and exist at different scales
- Categorised threatened species into management streams based on the ecology, threats and response to management
  - Iconic (e.g., koalas, Wollemi Pine)
  - Site-managed (e.g., geographically restricted chids)
  - Landscape-managed (e.g., most fauna in this category)
  - Threatened ecological communities (e.g., vegetation)
  - Data-deficient (don't know enough yet)
  - Threatened populations (e.g., particularly threatened in a location – koalas at Port Stephens)
  - Key threatening processes (e.g., invasion by exotic or feral species)
  - Partnership (e.g., species that are across NSW borders and managed by other entities)
  - Keep Watch (think we know enough to manage w/o spending more).

Grow, Harvest, Heal: Saving our Species through Traditional Food Stories

Barrington Tops – plateau,100km North of Newcastle

- Diverse range of ecosystems, including sub-alpine woodland, grassland and sphagnum moss and heritage-listed Gondwana rainforest
- Endangered species: new and known
- Evidence of First Nations history (e.g., cultural artefacts, markers and middens)
- Colonisation: timber-getters, grazing and goldmining
- Gazetted as a National Park 1969 – despite this, increasing degradation
- Threats from introduced species (e.g., feral pigs and horses, Scotch Broom estimated ax`t10,000–15,000ha).

Became apparent that "business as usual" monitoring and management practices were not effective.

Developed a systematic grid using satellite imagery of topographic maps and conducted surveys at each grid intersection (100m apart).

Helped to:

- Cover a lot of ground
- Removed bias by forcing research surveys at areas previously not visited
- Made discoveries that changed practices
    - Discovered new locations for target species
    - Knew where threats were occurring
    - Could strategically manage threats.

Endangered Magenta Lillypilly on the South Coast

- During fieldtrip to verify previously collected data Luke and his colleagues partnered with Indigenous people (Aunty Michelle) to discover 150 metre x 30 metre tall Lillypilly – a bountiful and delicious food source
- Clear that Indigenous people have used and managed this species for a very long time – evidence of culturally-significant artifacts were everywhere
- Changed Luke's approach to management: What actions will lead to meaningful, long-term, conservation outcomes?
    - Restore endangered species through sustainable harvesting
    - Form partnerships with government, community and country to share traditional management practices and knowledge
    - Get Indigenous people back on country
    - Connect food stories to sustainable conservation.

Endangered Orchid in the Barrington Tops

- Applied same partnership concept– Grow Harvest Heal project was born
- Discovered the role of fire to the survival of this species during 2019 bushfires (200 plants prior to fire; 4,000 post fire next season on the same ground)
- Staged a gathering in September 2023 for an Aboriginal-led community burn
- Idea was to use fire to promote a "bumper" crop of the edible orchid.

Outcomes:

- Use of cross-cultural lens to holistically manage ecosystems at scale
- Combined knowledge for the benefit of all.

Keynote 2: Professor Michelle Leishman (Macquarie University)

Ecosystems and Biodiversity

Adapt NSW Forum

https://www.climatechange.environment.nsw.gov.au/adaptnsw-forum-home-page

Independent Review of Biodiversity Conservation Act (2016), released in 2023 had serious concerns about its effectiveness in achieving its purpose.

Australia is one of the world's 17 megadiverse countries (10% of the earth's surface but 70% of global diversity).

Australia

- >600,00 species
- 84% of our plants are endemic
- 83% of our animals are endemic
- 45% of our birds are endemic
- 89% of our reptiles are endemic
- 15 biodiversity hotspots within Australia (over-represented in Western Australia but all over the continent).

Threats to Ecosystems Globally:

Habitat Destruction

- Much of the world's grasslands has been converted to agriculture
- 80% of the world's forests has been cleared or degraded
- 40% of the world's rainforest has been cleared
- If current rates of deforestation continue, the world's biodiverse tropical rainforests will disappear within 100 years.

Climate Change

- Currently Australia is 1.46°C above baseline
- All NSW bioregions will have 25% of their original capacity to retain biodiversity under projected rate of climate change
- Increase in extreme heat days
- Canopy die-off
- Extreme fires (hotter, more frequent, more extensive and in regions that "normally" don't burn.
- Australian ecosystems are largely adapted to fire, but some regions are not (tipping points where they don't bounce back).

Invasive Species (plants, animals, pathogens etc)

- 650 pest animals have been introduced into Australia
- Pests and weeds threaten 70% of vulnerable species
- Only 8% of freshwater environments don't have introduced fish species
- Feral cats and foxes kill 7 million native animals every year.

Environmental Protection and Biodiversity Act 1999

https://www.dcceew.gov.au/environment/epbc/our-role/approved-lists#species

Australia	Plant Species	Animal Species
Extinct	36	67 (39 mammals)
Critically Endangered	260	136
Endangered	577	228
Vulnerable	579	214

New South Wales

- 954 threatened species
- 11 threatened ecological communities
- 72 species extinct (25 mammals)
- 50% of threatened species expected to survive in 100 years.

Solutions: "Nature Positive" approach both Federal and State

Nature-positive architecture whereby biodiversity is protected, restored and improved thereby ensuring the integrity of ecosystem services and cultural values, preserving opportunities for future generations.

- Proactively address
  - climate change
  - cumulative impact of loss of biodiversity
  - loss of ecosystem connectivity
- Shift focus from threatened entities to strategic planning and management of biodiversity
- Embed processes for incorporating Aboriginal culture and knowledge into all biodiversity policies and programs
- Guide and promote public and private investment in conservation and restoration.

Landscape Scale and Species Level Strategies (All with a climate change ready focus)

Protection

- Global Biodiversity Framework Target 3 – 30% of land, waters and sea protected by 2030 https://www.cbd.int/gbf/targets
- Australia – currently 22.1%
- NSW currently way behind on targets (public reserves 9.6%; private land conservation 4%; marine protected areas 6.4%).

Connection

- Partner with organisations and private landholders
- Climate Refugia (identify geographic shifts in suitable habitat for threatened species (e.g., Wollemi Pine) https://nswclimaterefugia.net/

Restoration

- (e.g., Landcare, Bushcare)
- Must consider climate change-ready strategies in decision-making (what species will survive where in future climates)
- Target of 30% of degraded land undergoing restoration by 2030.

Managing threats

- Impact of invasion under climate change www.weedfutures.net
- Embed strategies for targeted eradication following extreme climate events
- Manage exotic pathogens (e.g., target susceptible species, germplasm collection, seed bioresearch, population genomic research, seed orcharding, in-situ and ex-situ management of populations)
- Threatened species management (e.g., augmenting declining populations, restoring extinct populations, establishing new populations in and beyond historic ranges, securing populations such as Botanic gardens programs; ex-situ management such as seed banks, breed and release programs such as orange-bellied parrot).

SESSION 2 RURAL and URBAN PLACES

Keynote 3: Rural and Urban Places: Urban Heat, Professor Riccardo Paolini University of New South Wales

Collecting data on urban heat is a challenge because:

Multiple dynamics and multiple scales

- Land-use, land-cover changes
- Different balances and physical phenomena
- Different sources of moisture and heat
- Different layers within urban boundary.

Measurement Approaches

- Scientific campaigns – mesoscale (e.g., satellites, drones) to microscale
- What can be done with students without compromising scientific integrity?
- Metadata, interpretation and what to do with acquired skill.

Measuring data on urban heat is a challenge because:

- Not a lot of long-term data available from urban weather stations (most data have been collected at places like the Sydney Airport (coastal) and racecourses (open areas)
- There are more urban weather stations now but no consistency, therefore, imply more and use averages
- Site-induced measurement uncertainty
- Can use crowd-sourced and amatorial weather stations but don't know the parameters
- Weather station location and data depend on the purpose for the weather station – no consistency.

Field campaigns – variety of techniques

- Short-term installations (e.g., light poles)
- Mobile installations (e.g., backpacks, trolleys).

Heatwaves – variability between Sydney and continental Europe

- Sydney has an advantage as temperatures drop overnight
- Continental Europe temperatures stay high for 24 hours
- Climate models show that western Sydney may be more like continental Europe in 10-15years' time – implications for health.

Lots of variability in heat distribution

Cooling effects of wind is slowed down by urban obstacles – 25-33% less wind speed than over the canopy

Anthropogenic sources of heat – produced by human activities (e.g. air conditioning outlets).

Fieldwork for Stage 6 Curriculum

https://citizenscienceproject.org.au

This project made available

- Equipment – portable sensors to measure wind speed, air temperature, surface temperature at different locations across site; heat mitigation tool; online visualisation tool
- Data collection spreadsheets.

Student teams can put together a package of data by taking measurements along transects across a large site (e.g., school). Map the surface temperature, for example, and compare data to the Universal Comfort Index.

Mitigation

Calculation of the surface energy balance of a city.

Helpful Technologies:

- Cool material roofs, walls – reflective
- Street shading – prevents radiation getting to the ground
- Trees – evapotranspiration mitigates effects of solar radiation (need irrigation as dry soil and plants with signs of stress do not have a positive impact)
- Green roofs.

Bad Designs (e.g., concave, reflective building surfaces concentrate solar radiation).

Collaborations and further help:

- Field of Mars Environmental Education Centre https://fieldofmar-e.schools.nsw.gov.au/
- UNSW Faculty of Architecture https://unsw.to/too-hot-too-play
- Science Week at UNSW – fieldwork demonstration Friday 16 August 2024
- Roadshow in Parramatta https://unsw.to/hpa
- Visit the University of New South Wales for a one-day workshop and lab visit
- Connect with other researchers
- Resources on the University of New South Wales website

Grant Kleeman: Challenges Facing New York City (NYC)

- Different from other large cities in the United States of America (USA)
- Neighborhoods
- Not car focused
- Centre of economic and cultural authority
- Densely populated (8 million +)
- Socially progressive
- Racially diverse with spatial variation across city
- NYC is more than Manhattan
    - 5 boroughs: Bronx (Latino), Brooklyn, Queens, Manhattan (mixed), Staten Island (white)
    - There are 250 neighborhoods (54 on Manhattan), each with its own character.

Population:

- declined in the 1970s – flight to the suburbs
- 1980s people moved back
- Low birth rates
- Influx of 25–30 years age group for work and education
- Density of Manhattan is 29,000 people/km^2 (compared to Sydney Metropolitan 441/km^2 and City of Sydney 8,660/km^2).

Note: NYC Authority collects large amounts of data (e.g., incarceration and life expectancy by borough).

Challenges

Poverty and inequality (17.3% of New Yorkers live in poverty and 45% near poverty)

Access to affordable housing

- Shortages, high rents, high rates of homelessness
- 67.2% of residents are renters (31% in Australia)

Congestion

Ageing transport infrastructure

Waste disposal

Climate Change.

Responses

Access to affordable housing:

- Rent controls
- Mandate a component of affordable housing in new developments
- Relax zoning legislation
- Unlock vacant sites
- Remediate brownfield sites
- Eliminate tax breaks for luxury apartments

Congestion:

- Plans to implement congestion tax
- Promotion of car sharing
- Investment in public transport

Ageing Transport Infrastructure:

- Subway has been in operation since 1904 with most of the infrastructure dating from 1930s
- Urgent upgrade $US9billion

Waste Disposal:

- 10,00 metric tonnes daily
- Historically: 1930s dumped in ocean, 1990s incinerated, since 2001 transported out of the city

Climate Change: (NYC only produces 1% of the nation's greenhouse gas emissions)

- Wind and solar projects
- Energy efficient measures in municipal buildings
- Vehicle replacement strategies (EVs)
- Complete energy refits of existing buildings
- Property tax incentives for renewables.

Liveability Index (housing, neighborhoods, transport, environment, health, engagement, opportunity)

- NYC scores above the nation's average on most indicators

Challenges Facing Singapore City, Lorraine Chaffer

- Singapore could be a good choice for the Rural and Urban Places topic *"Large city outside of Australia"* as it faces unique challenges
- Smaller city than most mega cities
- Island
- City State
- 5–6 million people
- Innovative design promotes liveability through the inclusion of green spaces, services and facilities during planning.
- Cultural tolerance and liveable suburbs that promote inclusivity
- Migration and familiy based incentives
- Import 90% of their food (target to produce 30% of own food by 2023)
- Innovative job creation and training
- Need to import trained STEM graduates to maintain competitiveness with China and India.
- Lack of land - land reclamation and below ground infrastructure.
- Water shortages - importing water, recycling and catchment management
- Climate change - greening, natural air flow between high rise buildings.
- Garden city - greening and liveability are high priorities
- Singapore is renowned as a green and innovative city and develops ground breaking solutions to the contemporary challenges it faces.
- There are many fascinating video clips and podcasts that show the innovative culture and growth of Singapore that focus on creating solutions to urban challenges and sustainability.
- Singapore is the large city case study in Powerful Geography 2.

Podcast

Singapore's future challenges

https://www.bfm.my/podcast/bigger-picture/live-and-learn/michael-vatikiotis-singapores-future-challenges

Sustainable Singapore

https://www.podbean.com/media/share/dir-333uf-159caed8?utm_campaign=i_share_ep&utm_medium=dlink&utm_source=i_share

Urban Policy and Planning in Singapore

https://www.youtube.com/watch?v=3lOIlTZozzk

YouTube

How Singapore Got So Crazy Rich

https://www.youtube.com/watch?v=YSMWN8VpY6A

City of the Future: Singapore

https://www.youtube.com/watch?v=xi6r3hZe5Tg

What lies deep beneath Singapore? | Going Underground | Full Episode

https://www.youtube.com/watch?v=ZuhcUEhwDwc

Singapore Green Plan 2030

https://www.youtube.com/watch?v=oNFeOl7pW9s

Designing a Megacity in Harmony with Nature

https://www.youtube.com/watch?v=3w3QCcItxTo&t=46s

Urban Policy and Planning; The shift towards sustainability

https://www.youtube.com/watch?v=3lOIlTZozzk

SESSION 3 GLOBAL SUSTAINABILITY

Evaluating Sustainability

Global Sustainability is a new content focus area. The introductory content is an introduction to concepts and actions that underpin the drive to achieving sustainability at a global scale, but with reference to regional and local examples.

The case study of an economic activity must be focused on its sustainability. Look for evidence to show where the industry fits for sustainability on a global scale (an evaluation). To do this evaluation, students need to use a range of criteria. Embedded in the study is the requirement to study strategies being used to achieve sustainability within the selected activity and to critically analyse one of these strategies . . . again, keep the emphasis at a global scale. Use illustrative examples. If you use a local study, compare it to other examples elsewhere in the world.

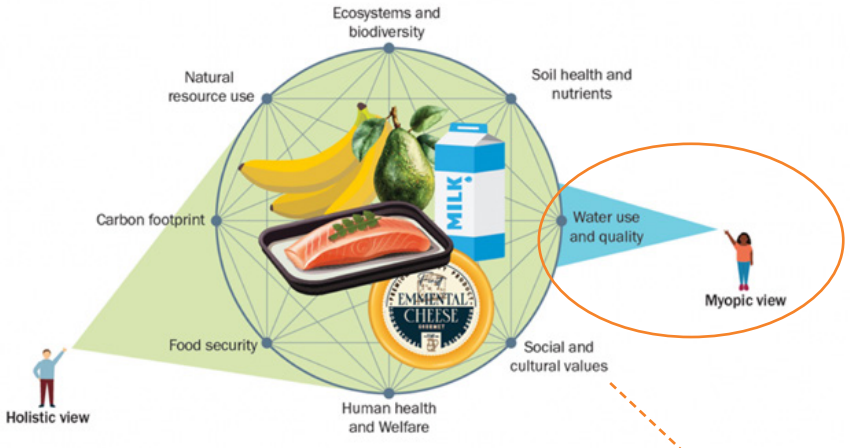
EVALUATION CRITERIA

Source Visualise This 1: Powerful Geography 2

CRITERIA	Brief Description	Guiding questions
Pillars of Sustainability	Four components of society that interact together to determine the health of a society and / or the activity (SEEC). • Social • Economic • Environmental • Cultural	*Does the activity support meet the social, economic, environmental and needs of a society and to what extent?* *What actions have been taken to address environmental or social impacts of the activity?* *What evidence is available?*
Principles of Ecologically Sustainable Development (ESD)	The principles of ESD guide the sustainable use of Earth's resources for current and future generations. 1. Precautionary principle 2. Inter-generational equity 3. Conservation of biological diversity and ecological integrity	*How does the activity address the principles of ecologically sustainable development?* *Does the activity consider future generations in its use of resources?* *Are there examples of actions halted as a precautionary measure?*
UN Sustainable Development Goals (SDGs)	The 17 Goals established by the UN to be achieved by 2030. Each goal has a set of targets to reach. These can be used to evaluate progress on sustainability. Radar charts illustrate SDG progress.	*How does the activity perform on selected SDG goals or targets?* *What goals are most relevant to the activity?* *What metrics support the claim?*
Certification	A formal recognition that certain criteria have been met as judged by independent certifiers. These include: • Industry certification • NGOs and trade organisations.	*What certifications has the activity been granted?* *Who issued those certifications and what criteria and metrics were used?*
A Circular Economy	A model of resource production and consumption that minimises the use of new resources and the creation of waste by reusing, repurposing, recycling and regenerating existing products.	*To what extent does the activity address the four principles of a circular economy. What evidence supports your conclusion?* *Can further improvements be made?*
Supply chain analysis	The tracking of resources used, distance travelled, treatment of workers, or waste generated at different steps along the supply chain of an activity. The metrics could include an analysis of carbon or water footprints.	*What activities constitute the supply chain. What resources are consumed or waste e.g., CO2 emitted at each stage, including travel emissions?* *Are strategies used to minimise resource use and waste generated?*
Water footprint	Water footprint is a consumption based indicator of the water used to produce the goods and services consumed by an industry or business. Recorded as the volume of fresh water (litres /cubic metres) used throughout the entire production chain.	*Is the water footprint high compared to similar products or services?* *Does water use create shortages or reduce the quality of water returned to the environment? How much virtual water is embedded into a product?*
Carbon Footprint	A carbon footprint is a calculated value for the total amount of greenhouse gases (CO2-equivalent) an activity, product, or company adds to the atmosphere. Recorded in tonnes per unit e.g. per year.	*What components of the activity release carbon into the atmosphere? Is carbon embedded into the product? What measures are taken to reduce carbon emissions?*
SWOT Analysis	Considers the Strengths, Weaknesses, Opportunities and Threats of an economic activity in relation to sustainability. A SWOT analysis can embed a other criteria when judging current strengths and weaknesses.	*What evidence suggests the activity is sustainable(Strengths) or unsustainable (Weakness)?* *How can the activity improve its performance? (Opportunities). What barriers are there to being more sustainable? (Threats)*

EVALUATION OF SUSTAINABILITY USING CRITERIA

1. Choose an approach



2. Select criteria

Environmental - Ways to measure:

- **Water Efficiency:** use of alternative water sources like rainwater harvesting, greywater reuse, and innovative water waste technologies
- **Energy and Atmosphere:** use of on-site renewable energy, supply of renewable energy sources, reduction of energy consumption
- **Waste Management:** recycling, source reduction, reuse, and converting waste to energy
- **Air Quality:** indoor and outdoor air pollutants, efforts to reduce greenhouse gas emissions, promote natural air purification processes
- **Biodiversity:** species diversification, wildlife protection, population numbers, keystone species protection, conservation to maintain ecosystem health.

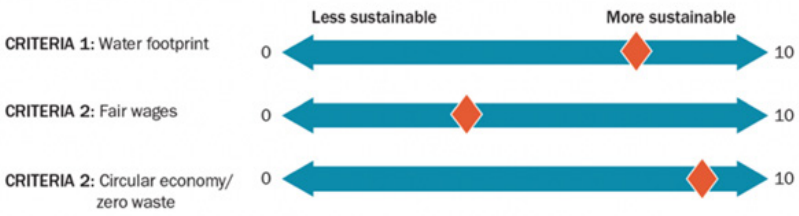
3. Collect evidence

CULTURAL	
Criteria	Evaluation
Cultural Heritage	*Positive*: Salmon farming can impact cultural heritage positively by providing economic opportunities that support and preserve traditional practices of coastal communities. Additionally, responsible farming practices that respect and integrate local cultural values can contribute to the overall cultural sustainability of the area. This is seen in British Columbia where First Nations groups are involved in 75% of fish that are farmed. *Negative:* Concerns may arise if salmon farming practices conflict with or disrupt local cultural heritage. For example, if farming operations affect traditional fishing practices or if there is perceived harm to sacred sites, it could lead to cultural tensions. This has occurred in Kawésqar National Reserve in southern Chile where the salmon farms claim they only occupy 0.06% of the Indigenous reserve, but First Nation Kawesqar communities accuse the farms of violating their land rights and using and polluting their sacred sites. This is especially problematic in Chile, where salmon are not native species. This means escaped salmon can have significant impacts on local ecosystems.

Cultural - Ways to measure:

- **Cultural Heritage Preservation:** protection of historic buildings, significant cultural sites, cultural heritage practices
- **Cultural Infrastructure and Facilities:** facilities and infrastructure that support local heritage and culture
- **Protection of Cultural significance:** including languages, practices, traditions, beliefs
- **Inclusive Policy Making:** has it considered the needs of minorities, genders, youths, and indigenous peoples, ensuring diverse voices contribute to decision-making
- **Integration of Traditional Knowledge:** recognizing and utilizing traditional skills and knowledge to foster sustainability
- **Gender Equality:** assessing the representation and participation of women in production and processes
- **Social behaviours, norms and practices:** positively influencing social norms and practices to ensure long term sustainability.

4. Make a judgement



Possible conclusion: Overall activity X has a satisfactory level of performance on sustainability based on three criteria. This could be improved through action to pay fair wages to workers being exploited for low wages in several countries.

THESE SOURCES WERE CREATED FOR POWERFUL GEOGRAPHY 2.

(Illustrations © Powerful Geography 2)

CRITICAL ANALYSIS OF ONE SUSTAINABILITY STRATEGY incorporating an evaluation.

Example 1: Recirculating Aquaculture Systems (RAS) in Global salmon aquaculture

THESE SOURCES WERE CREATED FOR POWERFUL GEOGRAPHY 2.

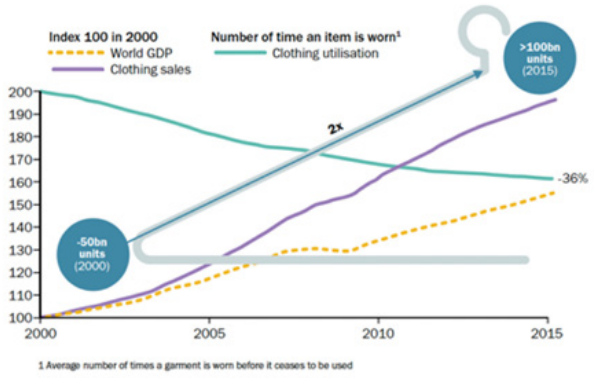
Environmental	
SDG 12: Responsible Consumption and Production	**Reduced Environmental Impact:** RAS systems generally use water more efficiently and minimise environmental impacts compared to traditional open-net salmon farming, aligning with the goal of responsible production. The closer proximity of RAS land farms can also improve consumption of fresh salmon, with reduced transportation distances.
SDG 14: Life Below Water	**Reduced Impact on Wild Fisheries:** RAS salmon farms can potentially reduce the pressure on wild fish stocks by providing an alternative to open-net pen aquaculture, which may reduce cross-breeding, disease and pest spreading and water quality issues.
SDG 15: Life on Land	**Reduced Land Use:** RAS salmon farms can operate in a more controlled environment, potentially optimising conditions for salmon and enabling them to grow faster and healthier. However, potentially increasing the need for extensive land use compared to traditional salmon farming.
Social	
SD2: Zero Hunger	RAS salmon farms can contribute to sustainable food production, providing a reliable source of fish protein to help address global food security. The flexibility of location can also ensure farms can be established in high need areas. Although, this would require high investments that many low income nations may not have the capital to achieve.
Economic	
SDG 8: Decent Work and Economic Growth	**Employment Opportunities:** Establishing and operating RAS salmon farms can create employment opportunities in the aquaculture sector, alongside higher wages, contributing to economic growth. However, these opportunities will be limited to highly trained individuals, possibly reducing employment opportunities for smaller or untrained farmers that traditionally benefitted from the industry. This could specifically impact small coastal communities in traditional salmon farm locations, such as Chile.
Cultural	
SDG 5: Gender Equality	**Cultural Empowerment:** As more technical jobs are required on site for RAS farms, female engineers and scientists have an increased opportunity to be employed. Particularly in comparison to traditional salmon farms that were male dominant due to the cultural perception of it being hard manual labour. Pure Salmon Kaldnes, a Norwegian RAS company, quadrupled its female workers within 2022, from 9% to 34%.
SDG 11: Sustainable Cities and Communities	**Cultural Heritage Conservation:** The increasing integration of First Nations peoples within the decision making, development, functioning and supply chain of salmon farms has enabled it to preserve cultural heritage and empower Indigenous communities. 75% of salmon farmed or fished in British Colombia come through agreements with First Nations communities. First Nations peoples are also involved in 10% of the salmon industry in British Colombia. However, as RAS farms move inland, First Nations salmon farmers are feeling disadvantaged as they often do not have the capital to implement RAS systems. Further, it risks the farms being established near cultural sites and removes important traditions, such as connection to the ocean.

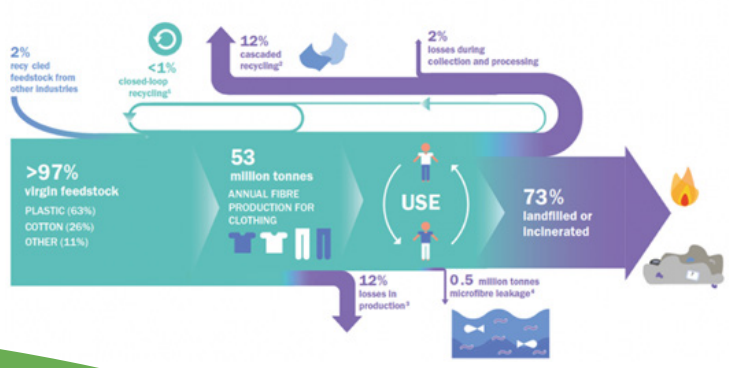
Example 2: Circular Economy in the Global Fashion Industry

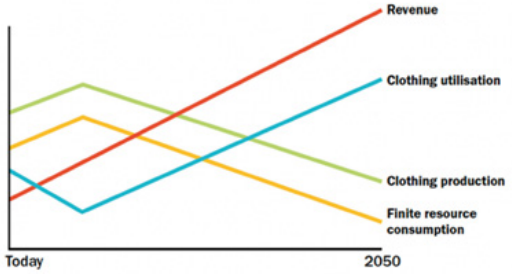
Focus is on environmental sustainability, with economic benefits.

Analysis could include:

- What is unsustainable with the current industry?
- What does the strategy aim to achieve?
- How does it work?
- What barriers exist?
- What is the time frame?
- What will success look like?







(Illustrations © Powerful Geography 2)

ASSESSMENT and EXAMINATION

Types of Questions

1. **Stimulus based short answer OR concepts**
2. **Cross topic short answer question**
3. **Structured extended response**

Geography HSC examination specifications

Section I (15 marks)

- There will be objective response questions to the value of 15 marks.
- Questions may require students to refer to the stimulus booklet and to apply geographical skills and tools.

Section II (45 marks)

- There will be 4-6 short-answer questions.
- Questions may contain parts.
- There will be 10-14 items in total.
- There will be at least one item, worth 5-8 marks, that requires integration of knowledge from more than one focus area.
- Questions may require students to refer to the stimulus booklet and to apply geographical skills and tools.

Section III (20 marks)

- There will be one structured extended-response question on EITHER Rural and urban places OR Ecosystems and global biodiversity.
- The structured extended-response question will have two or three parts.
- The question may require students to refer to the stimulus booklet and to apply geographical skills and tools.

Section IV (20 marks)

- There will be one unstructured extended-response question on EITHER Rural and urban places OR Ecosystems and global biodiversity (whichever focus area is not examined in Section III).
- The question may require students to refer to the stimulus booklet.

The following sample extended response questions have been developed to showcase the potential format of structured and unstructured responses in the HSC exam.

The samples were created by Lorraine Chaffer (Ecosystems) and Rex Cooke (Rural and urban places).

STRUCTURED EXTENDED RESPONSE MODEL 1: 20 MARKS, Lorraine Chaffer

- **EACH SECTION ALLOCATED MARKS**
- **SEPARATE MARKING GUIDELINES**
- **Allow about 35 minutes for this section**
- **NO stimulus**

ECOSYSTEMS and GLOBAL BIODIVERSITY

a. Identify and locate one type of ecosystem at two different locations. 4 marks

b. Describe at least ONE management strategy used at each location. Strategies may be a similar or different at each location. 4 marks

c. Analyse reasons for differences in management with reference to economic, political and sociocultural factors. 12 marks

Syllabus content area: Ecosystems and Global Biodiversity. Outcome: 12-2

Question	Marks	Content	Target bands
20a	4	Type of ecosystem, spatial pattern. Comparison - at least one other location	2-3
20b	4	Differences in ecosystem management compared with at least one other location**	3-5
20c	12	Differences in ecosystem management compared with at least one other location due to economic, political and sociocultural factors.	4-6

** Note: This question infers that to explain differences in management with at least one other location students would need to describe, at least briefly, management strategies used in each location.

MARKING GUIDELINES

CRITERIA Part a	Marks
• Clearly identifies one type of ecosystem at two specific locations. • Presents cohesive response using appropriate geographical location terminology	**4**
• Identifies one type of ecosystem at two locations. • Uses appropriate geographical location terminology	**3**
• Identifies an ecosystem and general location	**2**
• Names an ecosystem and / or a location	**1**

Disclaimer: These are my ideas only and may not be models used by the NESA Examination Committee when setting the HSC. Lorraine Chaffer

CRITERIA Part b	Marks
• Describes one management strategy used at each location OR one strategy used differently at both locations. • Presents cohesive response using appropriate geographical information and / or data.	**4**
• Provides a comparison at least one management strategy used at each location. • Presents a logical response using appropriate geographical information.	**3**
• Briefly describes at least one management strategy used at each location OR shows evidence of some comparison between two locations. • Presents a response using geographical information.	**2**
• Demonstrates a basic understanding of management strategies for the selected ecosystem.	**1**

CRITERIA Part c	Marks
• Provides a detailed analysis of the reasons for differences in management strategies used at each location with reference to economic, political and sociocultural factors. • Presents a logical and cohesive response using appropriate geographical information, ideas, concepts and / or statistical data.	**10 - 12**
• Examines one or more reasons for differences in management strategies used at each location. Refers to economic and / or political and / or sociocultural factors. • Presents a logical response using appropriate geographical information, ideas and concepts.	**7- 9**
• Briefly explains how one factor influences the management in each place. • Presents a structured response using appropriate geographical information.	**4-6**
• Demonstrates a basic understanding of reasons for differences in management.	**1-3**

NOTE: This model for an extended response question may include the requirement to use stimulus material in one or all parts of the question.

STRUCTURED EXTENDED RESPONSE MODEL 2: 20 MARKS, Lorraine Chaffer

NOTE: At publication, NESA has not been confirmed as a potential model for a structured response

- **STRUCTURE PROVIDED TO GUIDE STUDENT RESPONSES**
- **ONE MARKING GUIDELINE - MARKED HOLISTICALLY**
- **Allow about 35 minutes for this section**

ECOSYSTEMS and GLOBAL BIODIVERSITY

Targeted Performance bands 2-6, Outcome 12-2

Question 20

Examine differences in the management of ONE type of ecosystem at two different locations.

Use the following parts to structure your response to this question.

a. Identify one type of ecosystem at two different locations.

b. Describe at least ONE management strategy used at each location.

c. Compare differences in management with reference to economic, political and sociocultural factors.

CRITERIA	Marks
• Clearly identifies one type of ecosystem at two different locations. • Demonstrates a deep knowledge about ONE management strategy at each location. • Provides a depth analysis of factors explaining similarities or differences in ecosystem management at the two identified locations. • Presents a logical and cohesive response using appropriate geographical information, ideas, concepts and / or statistical data.	**17-20**
• Identifies one type of ecosystem and two locations. • Demonstrates a knowledge about ONE management strategy used at each location. • Provides some analysis of factors explaining similarities or differences in ecosystem management at the two identified locations. • Presents a logical response using appropriate geographical information, ideas and concepts.	**13-16**
• Identifies an ecosystem at two locations. • Demonstrates some knowledge about management and / or factors influencing management at different locations. • Presents structured response using appropriate geographical information.	**9-12**
• Identifies an ecosystem at one or two locations. • Outlines a management strategy for the type of ecosystem. • Makes limited reference factors influencing ecosystem management. • Uses some geographical information.	**5-8**
• Demonstrates a basic understanding of ecosystem management in one type of ecosystem.	**1-4**

STRUCTURED EXTENDED RESPONSE MODEL 3: 20 MARKS, Lorraine Chaffer

- **BASED ON STIMULUS MATERIAL**
- **EACH SECTION ALLOCATED MARKS**
- **SEPARATE MARKING GUIDELINES**
- **Allow about 35 minutes for this section**

This model mimics that provided in the NESA Specimen Examination Paper.

RURAL AND URBAN PLACES

Outcomes 12-1, 12-4

Question	Marks	Syllabus content area	Target bands
20a	4	The size, pattern and spatial distribution of settlements - Influences on size.	**2-4**
20b	6	Nature of urbanisation and urban growth at a global scale - Challenges facing rural and urban places. A rural place - The nature of changes affecting the place including social, economic and environmental.	**2-6**
20c	10	A rural place - Responses and strategies, including for sustainability.	**2-6**

Question 20 (20 marks)

For Question 20 you will refer to Sources *A, C, K* and L in the Stimulus Booklet.

a. Using Sources A and L, describe TWO influences on the size of urban and rural settlements in New Zealand. **4 marks**

b. Christchurch is a Regional City in New Zealand, serving the diverse agricultural region of the Canterbury Plains. Refer Using sources C and K, identify and compare one social, economic or environmental change affecting Christchurch with a change in one rural place you have studied. **6 marks**

c. Explain responses and strategies used to address ONE changes facing a rural place you have studied, including strategies for sustainability. In your response comment on the potential use of these strategies in Christchurch. **10 marks**

Marking criteria Part a	Marks
• Describes accurately and in detail TWO influences on the size of settlements in New Zealand. • Makes clear reference to sources in the Stimulus Booklet.	**4**
• Briefly describes TWO influences on the size of settlements in New Zealand.	**3**
• Identifies an influence on the size of settlements in New Zealand.	**2**
• Provides some relevant information to settlement.	**1**

SAMPLE STRUCTURED EXTENDED RESPONSES FOR RURAL and URBAN PLACES, Generously provided by Rex Cook, St Ignatius, Riverview

STRUCTURED EXTENDED RESPONSE 1 (Stimulus based)

Rural and urban places

Your answer will be assessed on how well you:

- apply geographical knowledge and understanding relevant to the question
- communicate ideas and information using geographical terms and concepts appropriately
- use relevant examples, geographical information and the Stimulus Booklet where appropriate to support the response
- present a sustained, logical and cohesive response

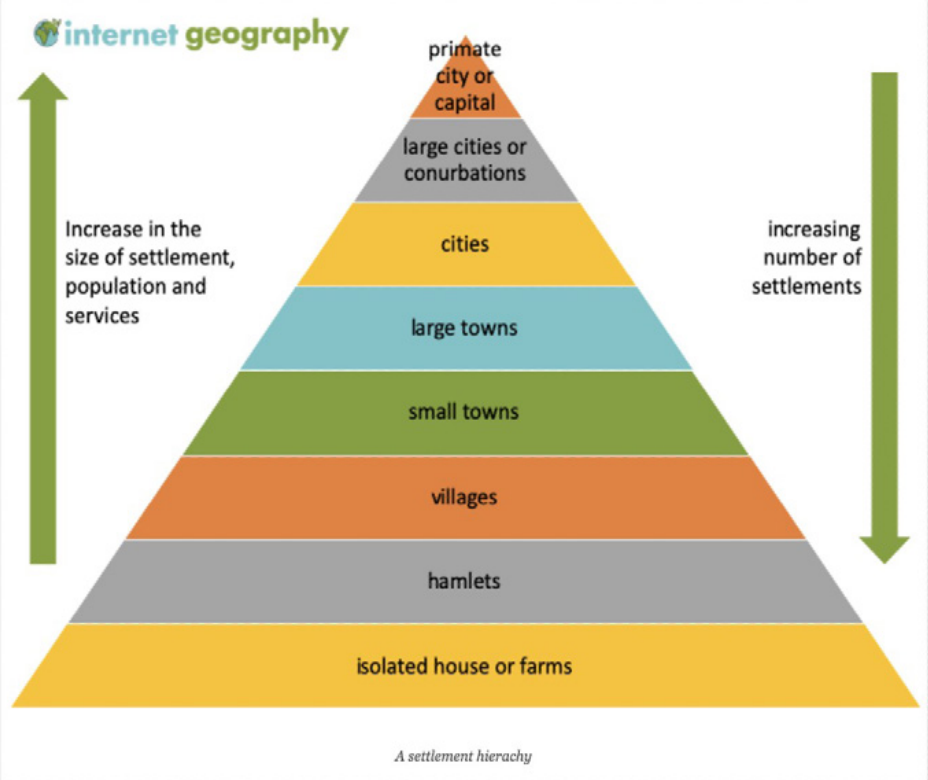
Question 21 (20 marks)

a) Describe the difference in sizes of settlements using Source A (3 marks)

b) With reference to Source B and C, explain the global urban hierarchies of settlements based on urban function, and spheres of influence (7 marks)

c) Analyse the nature of urbanisation and urban growth at a global scale, including challenges facing rural and urban places (10 marks)

SOURCE A SETTLEMENT HIERARCHY



Source: Internet Geography

SOURCE B Global City Metrics 2023

Leading cities across Global Cities Index metrics in 2023

Global City Index leaders by dimensions				
Business activity **New York**	Human capital **New York**	Information exchange **Paris**	Cultural experience **London**	Political engagement **Brussels**
Global Cities Index leaders by metric				
— Fortune 500 **Beijing** — Top global services firms **London** — Capital markets **New York** — Air freight **Hong Kong** — Sea freight **Shanghai** — ICCA conferences **Vienna*** — Unicorn companies **San Francisco**	— Foreign-born population **New York** — Top universities **Boston** — Population with tertiary degree **Tokyo** — International student population **Melbourne** — Number of international schools **Melbourne*** — Medical universities **London**	— Access to TV news **Brussels*** — News agency bureaus **New York** — Broadband subscribers **Paris** — Freedom of expression **Oslo** — Online presence **Singapore**	— Museums **Moscow** — Visual and performing arts **New York*** — Sporting events **London** — International travelers **London*** — Culinary offerings **Tokyo*** — Sister cities **Saint Petersburg**	— Embassies and consulates **Brussels** — Think tanks **Washington, D.C.** — International organizations **Geneva** — Political conferences **Brussels** — Local institutions with global reach **Paris**

* indicates new leaders in 2023
Source: Kearney 2023 Global Cities Report

Source: AT Kearney The 2023 Global Cities Report

SOURCE C Global City Index Top 30 Cities

Top 30 cities in the Global Cities Index

City	2023 rank	2022 rank	2021 rank	2020 rank	2019 rank	2018 rank	Δ '22–'23
New York	1	1	1	1	1	1	0
London	2	2	2	2	2	2	0
Paris	3	3	3	3	3	3	0
Tokyo	4	4	4	4	4	4	0
Beijing	5	5	6	5	9	9	0
Brussels	6	11	16	14	12	10	+5
Singapore	7	9	9	9	6	7	+2
Los Angeles	8	6	5	7	7	6	–2
Melbourne	9	8	12	18	16	17	–1
Hong Kong	10	10	7	6	5	5	0
Chicago	11	7	8	8	8	8	–4
Madrid	12	19	19	16	15	13	+7
Shanghai	13	16	10	12	19	19	+3
Seoul	14	13	17	17	13	12	–1
Toronto	15	18	20	19	17	18	+3
Berlin	16	14	13	15	14	16	–2
San Francisco	17	15	11	13	22	20	–2
Sydney	18	17	15	11	11	15	–1
Washington, D.C.	19	12	14	10	10	11	–7
Amsterdam	20	23	22	23	20	22	+3
Moscow	21	21	18	20	18	14	0
Buenos Aires	22	25	32	25	24	25	+3
Dubai	23	22	23	27	27	28	–1
Barcelona	24	26	28	26	23	23	+2
Istanbul	25	28	27	34	26	26	+3
Boston	26	20	21	21	21	24	–6
Frankfurt	27	24	24	28	28	29	–3
Mexico City	28	31	31	38	40	38	+3
Vienna	29	30	25	22	25	21	+1
Miami	30	32	33	30	31	30	+2

Source: AT Kearney The 2023 Global Cities Report

STRUCTURED EXTEND RESPONSE 2: Investigation of a Rural and an Urban Place, Generously provided by Rex Cook, St Ignatius, Riverview

Your answer will be assessed on how well you:

- apply geographical knowledge and understanding relevant to the question
- communicate ideas and information using geographical terms and concepts appropriately
- use relevant examples, geographical information and the Stimulus Booklet where appropriate to support the response
- present a sustained, logical and cohesive response

Question 21 (20 marks)

a) Compare the location and character of a rural place to an urban place you have studied **(5 marks)**

b) What are the similarities and differences with the links that a rural and urban place you have studied have with other locations **(7 marks)**

c) Assess the social, economic and environmental changes affecting a rural and urban place **(8 marks)**

Structured Extend Response 3: Investigation of a Large City Outside of Australia

Your answer will be assessed on how well you:

- apply geographical knowledge and understanding relevant to the question
- communicate ideas and information using geographical terms and concepts appropriately
- use relevant examples, geographical information and the Stimulus Booklet where appropriate to support the response
- present a sustained, logical and cohesive response

Question 21 (20 marks)

a) Describe the character and spatial dimension of a large city outside of Australia **(4 marks)**

b) Explain TWO challenges of living in a large city outside of Australia **(6 marks)**

c) Analyse how demographic trends and regional and global linkages have shaped the city and changed over time in a large city outside of Australia **(10 marks)**

Marking criteria Part b	Marks
• Identifies one social, economic or environmental change affecting Christchurch. • Makes clear reference to at least one source in the Stimulus Booklet. • Identifies the rural place studied and compares the change in that place to the change in Christchurch. • Draws out similarities and differences between the change affecting each place. • Presents a logical, well-structured response using geographical information and concepts.	**6**
• Identifies one change affecting Christchurch with some reference to the stimulus booklet. • Identifies the rural place studied and briefly compares the change to change in Christchurch. • A well-structured response using some geographical information and concepts.	**4-5**
• Makes a reference to change in Christchurch and another place.	**2-3**
• Identifies a rural place or a change.	**1**

Marking criteria Part c	Marks
• Explains responses and strategies used to address ONE change facing the rural place. • Demonstrates a comprehensive understanding of sustainability. • Clearly draws out the potential to apply responses or strategies used in the rural place to Christchurch with reference to at least one source in the Stimulus Booklet. • Presents a logical and cohesive response using appropriate geographical information, ideas, concepts and / or statistical data.	**9-10**
• Describes responses and strategies used to address ONE change facing the rural place. • Demonstrates an understanding of sustainability. • Considers the potential to apply responses or strategies used in the rural place to Christchurch with reference to at least one source in the Stimulus Book. • Presents a logical response using appropriate geographical information, ideas and concepts.	**7-8**
• Identifies responses to change in a rural urban place. • Demonstrates some understanding of sustainability. • Makes a limited reference to Christchurch. • Presents structured response using appropriate geographical information.	**5-6**
• Names a rural place. • Refers to urban changes. • May refer to the Stimulus Booklet. • Uses some geographical information.	**3-4**
• Makes some reference to urban change.	**1-2**

DIRECTIVE TERMS

Account
- Account for - state reasons for, report on.
- Give an account of -narrate a series of events or transactions.

Analyse
- Identify components and the relationship between them.
- Draw out and relate implications.

Apply
Use, utilise, employ in a particular situation.

Appreciate
Make a judgement about the value of.

Assess
Make a judgement of value, quality, outcomes, results or size.

Calculate
Ascertain/determine from given facts, figures or information.

Clarify
Make clear or plain.

Classify
Arrange or include in classes/categories.

Compare
Show how things are similar or different.

Construct
- Make.
- Build.
- Put together items or arguments.

Contrast
Show how things are different or opposite.

Critically (analyse/evaluate)
Add a degree or level of accuracy depth, knowledge and understanding, logic, questioning, reflection and quality to (analyse/evaluate).

Deduce
Draw conclusions.

Define
State meaning and identify essential qualities.

Demonstrate
Show by example.

Describe
Provide characteristics and features.

Discuss
Identify issues and provide points for and/or against.

Distinguish
- Recognise or note/indicate as being distinct or different from.
- To note differences between.

Evaluate
- Make a judgement based on criteria.
- Determine the value of.

Examine
Inquire into.

Explain
- Relate cause and effect.
- Make the relationships between things evident.
- Provide why and/or how.

Extract
Choose relevant and/or appropriate details.

Extrapolate
Infer from what is known.

Identify
Recognise and name.

Interpret
Draw meaning from.

Investigate
Plan, inquire into and draw conclusions about.

Justify
Support an argument or conclusion.

Outline
Sketch in general terms; indicate the main features of.

Predit
Suggest what may happen based on available information.

Propose
Put forward (for example a point of view, idea, argument, suggestion) for consideration or action.

Recall
Present remembered ideas, facts or experiences.

Recommend
Provide reasons in favour.

Recount
Retell a series of events.

Summarise
Express, concisely, the relevant details.

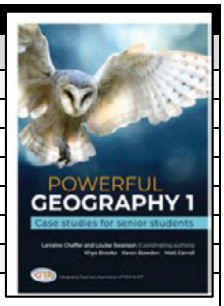
Synthesise
Putting together various elements to make a whole.

Self-explanatory terms in exam questions

It is important to note that the HSC exam questions will continue to incorporate self-explanatory terms like 'how,' 'why,' or 'to what extent.' While key words have a purpose, other subject-based questions will be used in the HSC exam questions.

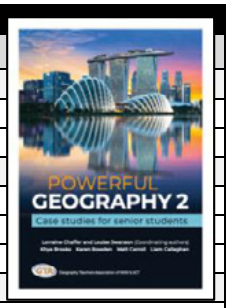
POWERFUL GEOGRAPHY SERIES: A GUIDE TO CASE STUDIES

POWERFUL GEOGRAPHY 1: YEAR 11 *Potential Differentiation **Potential Fieldwork



CASE STUDY	Page	Where you can use this content
EARTH'S NATURAL SYSTEMS		
Small case studies / GEOstories		
Wildlife migrations	6	Wonder of nature, ecological systems
Forest elephants	11	Ecological systems *
Whales	15	Ecological systems *
Dust cycle	17	Geomorphic systems *
Iceberg alley	21	Atmosphere – hydrosphere systems
Major case studies		
The cryosphere	24	Earth's natural systems through the cryosphere. Place study- Patagonia.
Forests **	68	Earth's natural systems through forests. Place studies – Canada's Boreal forests; Congo rainforest
Supporting concepts / Visualise This		
Earth's natural systems	106	Cryosphere and forests / Lake Eyre Basin &Arctic regions / Floods / Climate change-SIDS.
Global atmospheric circulation	109	Congo rainforest / Lake Eyre Basin Option
Global ocean circulation	112	Antarctic and Patagonia / Arctic region Year 12- Coral Triangle & Great Southern Reef
Glacial and interglacial cycles	115	Patagonia and Boreal forests
Ecological succession **	118	Cryosphere; Boreal forests, land cover change.
Permafrost *	123	Cryosphere /Arctic region option study
Fieldwork techniques – Physical	126	Any case study in which students do fieldwork, Venice
PEOPLE, PATTERNS AND PROCESSES		
Small case studies / GEOstories		
Environmental refugees*	136	Migration, Uganda
Global sand crisis*	141	Resource consumption and impacts / Singapore Year 12
Sea floor mining *	147	Earth's natural resources
Churchill	153	Option topic: Human resilience
Satellite Networks (Digital)		Option topic: Technological advances
Major case studies		
Population and Resources Japan and Uganda Oil in Nigeria	160	Population & resource consumption Comparative study of two countries Factors influencing resource use, impacts.
Venice	196	Option topic: Human resilience
Ukraine	230	Option topic: Political power and contested spaces
Supporting concepts / Visualise This		
Demographic transition model	260	Population change- Uganda
Population perspectives *	263	Population change
Global value chains *	266	Resource consumption
Global commons *	269	Resource consumption
Fieldwork techniques – Human **	274	Any case study in which students do fieldwork
HUMAN – ENVIRONMENT INTERACTIONS		
Small case studies / GEOstories		
Wollemi pine	282	Option topic: Natural hazards
Netherlands –flood management	285	Option topic: Natural Hazards
Madagascar: forests of hope mangrove *	291	Landuse & land cover change: Deforestation, reforestation
Morocco: Lost oases *	296	Landuse and land cover change:
Species migration *	303	Land cover change, Climate change
NSW National Park management **	308	Option topic: Natural hazards
Major case studies		
Lake Eyre Basin Region **	318	Option topic: Geographic region
The Arctic Region	358	Option topic: Geographic region
Climate change: Small island developing nations (SIDS)	400	Option topic: Climate change Land cover change
North coast floods 2022 (Digital) **		Option topic: A contemporary Hazard Stage 4 Water cycle- hazard.
Supporting concepts / Visualise This		
The Anthropocene	436	The Arctic region and SIDS
Land cover change **	439	The Arctic region, SIDS, North coast floods
Antarctica's doomsday glacier	444	Land cover change
THE GEOGRAPHICAL INVESTIGATION		
A modelled approach to undertaking the Geographical Investigation – using examples from a student SGP		

POWERFUL GEOGRAPHY 2: YEAR 12 *Potential Differentiation **Potential Fieldwork



CASE STUDY	Where you can use this content
GLOBAL SUSTAINABILITY (GS)	
Small case studies / GEOstories	
Avocado production in Mexico	Influences on economic activities
Benefit sharing Agreement: The San peoples	Marlinja, Salmon, Bananas
Major case studies	
Banana Industry **	Global economic activity
Salmon Aquaculture **	Global economic activity
Fashion **	Global economic activity
Supporting concepts / Visualise This	
Criteria for evaluating industry sustainability	Banana, Salmon, Fashion & Avocado studies
Pillars of sustainability	Banana / Salmon / Fashion & Avocado studies
A Circular economy	Salmon /Fashion studies
Sustainable Development Goals	Salmon / Benefit sharing.
Benefit sharing	The San peoples, Banana Industry, Marlinja (RUP)
ECOSYSTEMS and GLOBAL BIODIVERSITY (EGB)	
Small case studies / GEOstories	
The Okavango Delta *	Nature and complexity of biodiversity / ecological and human stresses / strategies for management Comparative management study for Florida Everglades
Two communities: Traditional Ecological knowledge *	Role of Indigenous peoples in ecosystem management / Coral Triangle
Major case studies. * Option for Fieldwork	
Great Southern Reef: Kelp Forest Ecosystem (GSR) ** Comparative management- South Korea	Ecosystem case study in Australia * Comparative management – South Korea
Coral Triangle: Coral Reef Ecosystem (CT) Comparative management study – GBR**	Ecosystem case study overseas Comparative management – Australia *
Florida Everglades: Wetland Ecosystem (FEW) Comparative management- Okavango Delta	Ecosystem case study overseas Comparative management – Africa **Features of freshwater wetlands
Kosciusko National Park: Alpine ecosystem. (KNP) ** Comparative management- Greater Himalaya NP	Ecosystem case study in Australia * Comparative management- India
Supporting concepts / Visualise This	
Traditional ecological Knowledge	Role of Indigenous peoples in ecosystem management / CT, GSR
Feedback loops	GSR, CT, KNP
Tipping points	GSR, CT, FEW, KNP.
Shifting baselines	GSR, CT, FEW, KNP
Rewilding	Global biodiversity / Lake Eyre Basin (Year 11)
RURAL and URBAN PLACES (RUP)	
Small case studies / GEOstories	
Ljubljana, Slovenia. - European Green Capital - The Bee Path project	Strategies for the sustainable management urban places One successful initiative or project.
Malinga, Northern Territory - Solar farm and battery project	Strategies for the sustainable management of rural Places (remote). One successful initiative or project.
Wagga * - Managing urban salinity in Lloyd.	Strategies for the sustainable management urban places. One successful initiative / project.
Major case studies	
Bellingen **	One place in a rural setting
Green Square **	One place within a larger urban settlement.
Singapore	One large city over 5 million people
Supporting concepts / Visualise This	
Urban settlement patterns	Marlinja / Bellingen **
Urban hierarchies and spheres of influence	Bellingen ** / Singapore

Purchase here

https://ptcnsw.eventsair.com/powerful-geography-1/pg1order/Site/Register

Authors Blog

Teacher support, video links and general comments about teaching the course

https://powerfulgeography.weebly.com/

Follow us on Instagram and Facebook

Powerful Geography

BOOK 1
In stock

BOOK 2
In pre - production.
Orders will open when this process is finalised.

PROGRAM PACKAGE FOR NEW HSC GEOGRAPHY SYLLABUS 2024

Available for all new HSC topics:

- Global sustainability
- Rural and urban places
- Ecosystems and global biodiversity

Your school receives:

- Initial Zoom meeting to discuss your school's learning context and unique student needs
- Comprehensive unit program with teaching strategies tailored to your school context

From experienced HSC Geography Teacher Justin Mahoney who has guided a student to 8th place in state for HSC Geography and won a NSW Geography Teachers Assocation Award.

"Justin Mahoney recently created an AV presentation for the National Parks and Wildlife Service, aimed at Senior Geography students. I was delighted with the final product. I have received very positive feedback from schools regarding the video."

-Karen Riley, Discovery Education Coordinator, National Parks and Wildlife.

WEB WISE
Education Academy

For bookings, please contact, Justin:
Web Wise Education Academy
Email - info@webwiseacademy.com.au
www.webwiseacademy.com.au

Geography Field Studies 2024

Auseco
Education

Fieldwork is easy with an Auseco excursion!

How the day works

- Our field trips run at sites across Sydney and environs, at some of the area's most spectacular locations. Auseco Field Guides meet teachers and students at the site to conduct the field study.
- Your pre-excursion pack includes printable worksheets, directions to the site and risk assessments.
- Your post-excursion pack includes answer sheets, extra information, and photos of the day.

All equipment and secondary data is provided

- Equipment: anemometers, stereoscopes, sand sieves, soil moisture meters, soil depth spikes, soil and water pH kits, conductivity meters, salinity refractometers, turbidity tubes, thermometers, dichotomous keys, fishing nets, hand lenses, laser rangefinders, sound meters, light meters, centrifuges, coverscopes, water viewing scopes, ID charts, clinometers and compasses.
- Secondary data: satellite images, topographic maps, aerial photos and orthophoto maps.
- Personal observation and surveys support students' quantitative data collection.
- Activities feature group and individual activities with expert demonstration. Every student gets a turn using all the equipment.

Curriculum-linked field studies

- Outcomes from NSW K-10 Geography (2015) syllabus and new Geography Stage 6 (2022) syllabus.

Overnight excursions

- Overnight field studies are available at some sites for in-depth experiential learning across multiple locations.

Prices for 2024

Year 7-10 programs: $37 per student + GST

Year 11-12 programs: $39 per student + GST

Some city programs can include a ferry ride at an additional cost of $3.20 per student.

Mt Keira, Camp Coutts and Beaky Point incur an additional cost of $2 per student.

There is a minimum charge of $585 + GST per group. Small classes may request to share a field study with another school to reduce costs.

Good to know

- A 25% holding deposit is required within two weeks of booking to secure your date.
- Deposits are non-refundable if field studies are cancelled less than 30 days prior to the booked date. Postponements are subject to availability.
- In case of bad weather, a field study can be postponed on the day at the school's request.
- We cater for groups of 2 to 210 students, depending on the site.
- Schools will be charged for the number of students booked unless notified 14 days or more prior to field study date.
- We provide one staff member for up to 30 students. If you would prefer a smaller class size, we can provide an additional Auseco Guide for $450 +GST.
- For marine excursions (rock platform and mangroves), schools are to provide sufficient staff for a 1:10 teacher to student ratio.

For all bookings and further information:

www.auseco.com.au

info@auseco.com.au

02 9970 6456

Geography Field Studies with Auseco in 2024

Program	Locations	
Landscapes and Landforms (Stage 4) Investigate natural landforms, including geological and human history. Compare physical characteristics of two landscapes using a variety of field equipment. Use maps and aerial photos to examine land uses and impacts. Observe geomorphic hazards. (Long Reef and Mt Keira).	RIVER VALLEYS COASTLINES ESCARPMENT	Bantry Bay Camp Coutts Camp Kedron Manly Dam Long Reef Mt Keira
Water in the World (Stage 4) Investigate water resources on a local scale. Compare water quality in two local creeks using chemical and biological testing. Review historical aerial photos and enjoy a water filter construction and evaluation exercise. Walk along the dam wall (Manly Dam).	CREEK VALLEY to RESERVOIR	Manly Dam Camp Coutts
Place and Liveability (Stage 4) Investigate liveability of Millers Point, Milsons Point and Lavender Bay using sound, light and height meters and student-led surveys. Experience pull-factors with the best of Sydney's views while crossing the Harbour Bridge. Explore Wendy's Secret Garden.	URBAN	Millers Point to Lavender Bay
Environmental Change and Management (Stage 5) Study coastal processes, record sand dune profiles, dune vegetation and wind. Observe and evaluate historic and modern coastal erosion management strategies. Bushland and rainforest investigations also available.	COASTAL EROSION	Long Reef to Collaroy Cronulla
Changing Places (Stage 5) Examine social and economic changes in two contrasting suburbs of inner Sydney, and their impact on expansion, urban decline and renewal, spatial inequality and land use. A ferry ride around the harbour can be included on the day.	URBAN	Pyrmont to Barangaroo
Sustainable Biomes (Stage 5) Investigate mangrove and seagrass ecosystems within the wetland biome. Test abiotic factors characterising each ecosystem. Catch and identify marine animals to quantify biodiversity. Measure a live oyster population using quadrats, understand the ecosystem services of oysters and discuss economic use of wetlands for oyster farming.	WETLANDS	Botany Bay
Earth's Natural Systems (Stage 6, Year 11) Collect primary data about atmospheric, hydrological, geomorphic and ecological systems and their functioning. Bushland: soil formation, catchment functioning, nutrient/nitrogen cycles. Intertidal wetlands: tidal and weather systems, productivity, species migration. Coastal dune systems: coastal processes, nutrient cycles, invasive species. Rainforest systems: soil formation, biological productivity, landslips, energy flow.	BUSHLAND COASTAL DUNES WETLANDS RAINFOREST	Bantry Bay Camp Kedron Long Reef Cronulla Botany Bay Mt Keira
Human-environment Interactions (Stage 6, Year 11) Study 1: Geographical regions (Sydney Basin): Study the physical characteristics of a region and what makes it prone to certain challenges (urban runoff / coastal erosion). Study 2: Contemporary Hazard (bushfire): Collect data about processes that determine the nature and frequency of bushfire events.	SYDNEY BASIN BUSHFIRE	Bantry Bay Bantry Bay Camp Coutts
People, Patterns & Processes (Stage 6, Year 11) Study 3: Place and cultural change (central Sydney) A case study of an area that has shed its traditional roots and emerged as a diverse and vibrant community.	URBAN	Central Sydney
Rural & Urban Places (Stage 6, Year 12) Study one urban place in the Sydney metropolitan region. Investigate the physical and human processes that have shaped its identity, its cultural, economic and political links, social, economic and environmental change, and applications of sustainable development.	URBAN	TBC
Ecosystems & Global Biodiversity (Stage 6, Year 12) Investigate mangroves and seagrass in a wetland ecosystem at Botany Bay. Study biodiversity by catching and identifying flora and fauna that occupy this ecosystem. Measure the physical characteristics that allow this ecosystem to function, and observe and quantify human impacts to assess vulnerability, resilience and ecological disturbance. Discuss options for sustainable management with differing perspectives due to economic, political and sociocultural factors.	WETLANDS	Botany Bay

Environmental and Zoo Education Centres NSW

NSW GOVERNMENT | Education

Discover, Learn, and Engage at our Environmental and Zoo Education Centres

Welcome to our Environmental and Zoo Education Centres (EZEC) network, where learning knows no bounds! As an initiative by the NSW Department of Education, we're committed to providing enriching educational experiences that transcend traditional classroom settings. With 24 centres spread across NSW, our dedicated and accredited NSW teachers make learning come alive in a fun and engaging way.

Why Choose an EZEC?

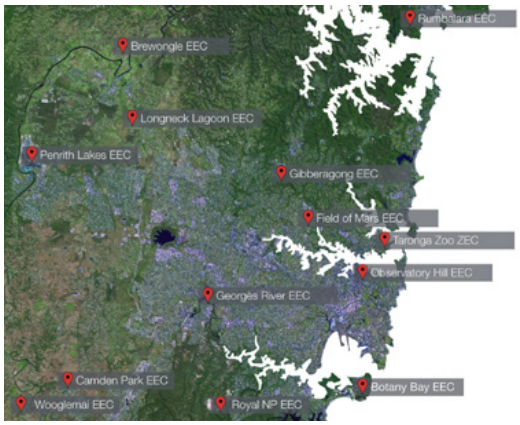
- **Syllabus Integration:** Our programs seamlessly integrate with the NSW curriculum, enhancing classroom objectives across various programs linked to curriculum requirements across Stages 4 to 6.
- **Hands-on Learning:** Students engage in interactive, immersive experiences fostering curiosity and critical thinking.
- **Accredited Teachers:** Led by current, experienced NSW teachers who facilitate enriching learning experiences for students of all ages.
- **Accessibility:** Access our 24 conveniently located centres across NSW to support your classroom teaching - many centres offer all-terrain wheelchairs.
- **Equipment:** We provide all the equipment required for authentic hands-on learning experiences.
- **Immersive Outdoor Learning:** Our programs emphasise the well-being benefits of outdoor education, where students reap the invaluable benefits of connecting with nature.

- **Integration of Technology:** We integrate digital tools for real-world applications that enhance students' learning experiences.
- **Professional Learning for Educators:** We support teachers' continuous growth with comprehensive professional learning in outdoor education, environmental stewardship, cultural learning, fieldwork skills development and curriculum integration.

Where are we?

The NSW Department of Education offers 24 NSW Environmental and Zoo Education Centres, with 13 Centres within the Sydney Basin.

Centres Across NSW

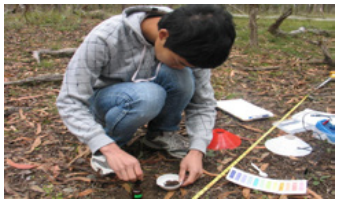


Sydney Basin Centres

What programs do we offer?

The table below highlights the range of Stage 4 and 5 programs available across the EZEC Network. Visit your chosen Centre for booking information.

Stage 4	
Syllabus Topic	*Centres offering fieldwork - Location*
Landscapes and Landforms	• Awabakal - Shortland and Dudley • Bournda - Bournda NP • Brewongle - Sackville North • Cascade - Dorrigo • Dorroughby - Dorroughby • Field of Mars - East Ryde • Georges River - Chipping Norton • Gibberagong - Kuring-gai Chase NP • Illawarra - Shell Cove • Kamay Botany Bay - Kurnell • Observatory Hill - The Rocks Sydney • Penrith Lakes - Cranebrook • Royal National Park - Royal NP • Rumbalara - Gosford • Warrumbungle - Warrumbungle NP
Place and Liveability	• Cascade - Dorrigo • Dorroughby - Dorroughby • Field of Mars - East Ryde • Kamay Botany Bay - Kurnell • Observatory Hill - The Rocks Sydney • Rumbalara - Gosford • Wooglemai - Oakdale
Water in the World	• Awabakal - Shortland and Dudley • Brewongle - Sackville North • Cascade - Dorrigo • Dorroughby - Dorroughby • Georges River - Chipping Norton • Illawarra - Shell Cove • Kamay Botany Bay - Kurnell • Longneck Lagoon - Maraylya • Penrith Lakes - Cranebrook • Red Hill - Gulgong • Royal National Park - Royal NP • Rumbalara - Gosford



Stage 5	
Syllabus Topic	*Centres offering fieldwork - Location*
Sustainable Biomes	• Brewongle - Sackville North • Camden Park - Menangle • Dorroughby - Dorroughby • Penrith Lakes - Cranebrook • Red Hill - Gulgong • Rumbalara - Gosford
Changing Places	• Awabakal - Shortland and Dudley • Observatory Hill - The Rocks Sydney
Environmental Change and Management	• Awabakal - Shortland and Dudley • Bournda - Bournda NP • Brewongle - Sackville North • Cascade - Dorrigo • Dorroughby - Dorroughby • Field of Mars - East Ryde • Georges River - Chipping Norton • Gibberagong - Kuring-gai Chase NP • Illawarra - Shell Cove • Kamay Botany Bay - Kurnell • Longneck Lagoon - Maraylya • Observatory Hill - The Rocks Sydney • Penrith Lakes - Cranebrook • Red Hill - Gulgong • Riverina - Wagga Wagga • Royal National Park - Royal NP • Rumbalara - Gosford • Warrumbungle - Warrumbungle NP • Wooglemai - Oakdale • Taronga Zoo Sydney - Mosman

New Syllabus. New Opportunities.

With the introduction of the new Stage 6 syllabus for Year 11 in Term 1 this year and Term 4 for Year 12, we have revised our existing programs and developed new ones to help you further. The tables below outline which Centres offer learning opportunities for the new HSC Geography syllabus.

Stage 6 - Year 11	
Syllabus Topic	*Centres offering fieldwork*
Earth's Natural Systems	• Awabakal - Shortland and Dudley • Brewongle - Sackville North • Field of Mars - East Ryde • Georges River - Chipping Norton • Gibberagong - Kuring-gai Chase NP • Illawarra - Shell Cove • Kamay Botany Bay - Kurnell • Longneck Lagoon - Maraylya • Observatory Hill - The Rocks Sydney • Penrith Lakes - Cranebrook • Royal National Park - Royal NP • Rumbalara - Gosford • Warrumbungle - Warrumbungle NP
People, Patterns and Processes	• Field of Mars - East Ryde • Observatory Hill - The Rocks Sydney
Geographical Investigation	• Illawarra - Shell Cove • Observatory Hill - The Rocks Sydney
Human Environment Interactions	• Field of Mars - East Ryde • Longneck Lagoon - Maraylya

Stage 6 - Year 12	
Syllabus Topic	*Centres offering fieldwork*
Global Sustainability	• Observatory Hill - The Rocks Sydney • Taronga Zoo Sydney - Mosman
Rural and Urban Places	• Awabakal - Shortland and Dudley • Observatory Hill - The Rocks Sydney
Ecosystems and Biodiversity	• Awabakal - Shortland and Dudley • Dorroughby - Dorroughby • Georges River - Chipping Norton • Illawarra - Shell Cove • Kamay Botany Bay - Kurnell • Observatory Hill - The Rocks Sydney • Penrith Lakes - Cranebrook • Riverina - Wagga Wagga • Royal National Park - Royal NP • Rumbalara - Gosford • Wambangalang - Dubbo

How to book?

To book your fieldwork, visit https://nsweec.schools.nsw.gov.au/ and click on your chosen Centre. Alternatively, scan the QR code:

The Biggest Threats to Earth's Biodiversity

Originally published in Visual Capitalist November 2020 written by Carmen Ang

https://www.visualcapitalist.com/biggest-threats-to-earths-biodiversity/

Biodiversity benefits humanity in many ways. It helps make the global economy more resilient, it functions as an integral part of our culture and identity, and research has shown it's even linked to our physical health.

Biodiversity benefits humanity in many ways. It helps make the global economy more resilient, it functions as an integral part of our culture and identity, and research has shown it's even linked to our physical health.

However, despite its importance, Earth's biodiversity has decreased significantly over the last few decades. In fact, between 1970 and 2016, the population of vertebrate species fell by **68%** on average worldwide. What's causing this global decline?

Today's graphic uses data from WWF's Living Planet Report 2020 to illustrate the biggest threats to Earth's biodiversity, and the impact each threat has had globally.

Measuring the Loss of Biodiversity

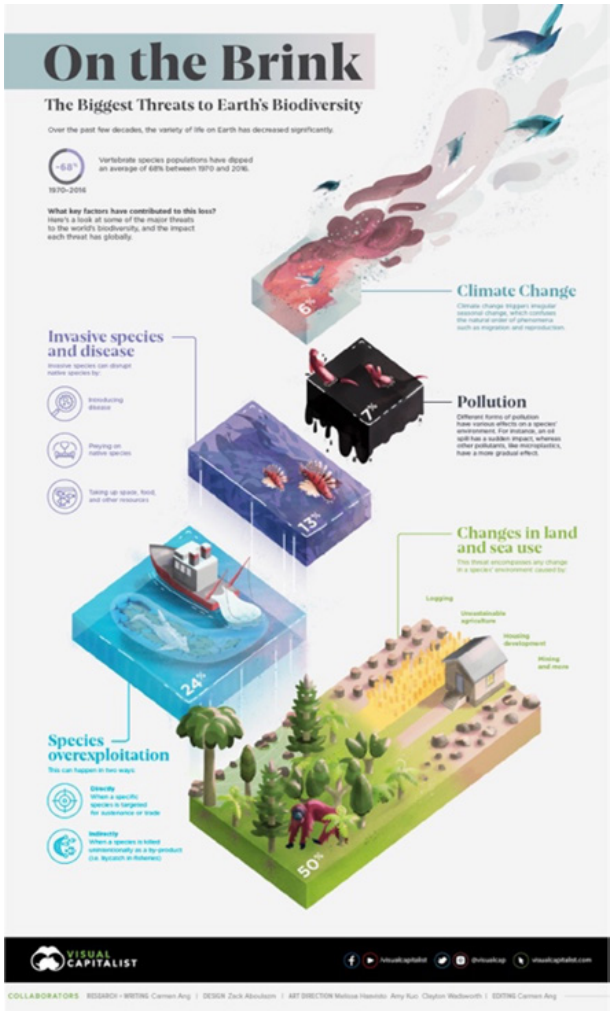
Before looking at biodiversity's biggest threats, first thing's first - how exactly has biodiversity changed over the years?

WWF uses the Living Planet Index (LPI) to measure biodiversity worldwide. Using data from over **4,000** different species, LPI tracks the abundance of mammals, birds, fish, reptiles, and amphibians across the globe.

Here's a look at each region's average decline between 1970 and 2016:

Latin America & Caribbean has seen the biggest drop in biodiversity at **94%**. This region's drastic decline has been mainly driven by declining reptile, amphibian, and fish populations.

Rank	Region	Average decline (between 1970 and 2016
1	Latin America & Caribbean	94%
2	Africa	65%
3	Asia Pacific	45%
4	North America	33%
5	Europe and Central Asia	24%



NOTE: This poster is licensed by GTANSW & ACT and is available for purchase on the GTANSW & ACT website (Resources Tab)

Despite varying rates of loss between regions, it's clear that overall, biodiversity is on the decline. What main factors are driving this loss, and how do these threats differ from region to region?

The Biggest Threats to Earth's Biodiversity

Biggest Threats to Biodiversity, Overall

While it's challenging to create an exhaustive list, WWF has identified **five major threats** and shown each threats proportional impact, averaged across all regions:

Threat	Proportion of threat (average across all regions)
Changes in land and sea use	50%
Species overexploitation	24%
Invasive species and disease	13%
Pollution	7%
Climate Change	6%

Across the board, changes in land and sea use account for the largest portion of loss, making up **50%** of recorded threats to biodiversity on average. This makes sense, considering that approximately one acre of the Earth's rainforests is disappearing every *two seconds*.

Species overexploitation is the second biggest threat at **24%** on average, while invasive species takes the third spot at **13%**.

Biggest Threats to Biodiversity, By Region

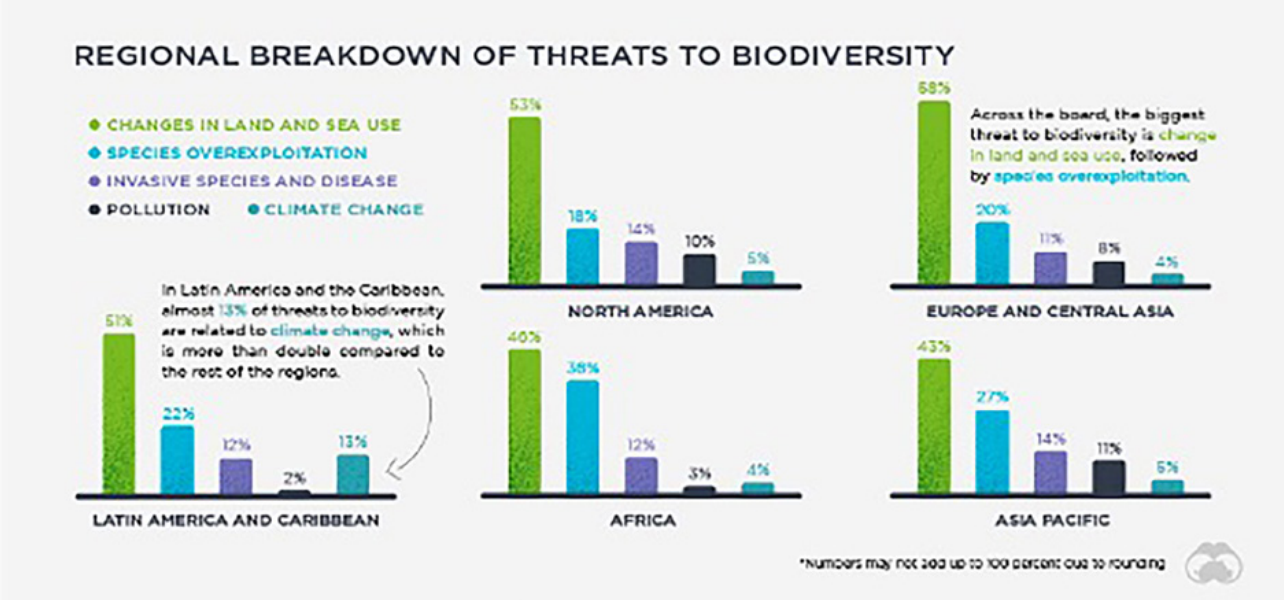
When looking at the regional breakdown, the order of threats in terms of biodiversity impact is relatively consistent across all regions - however, there are a few discrepancies:

In Latin America and Caribbean, climate change has been a bigger biodiversity threat than in other regions, and this is possibly linked to an increase in natural disasters. Between 2000 and 2013, the region experienced extreme climate and hydro-meteorological events, from typhoons and hurricanes to flash floods and droughts.

Another notable variation from the mean is species over-exploitation in Africa, which makes up **35%** of the region's threats. This is higher than in other regions, which sit around 18-27%.

While the regional breakdowns differ slightly from place to place, one thing remains constant across the board - all species, no matter how small, play an important role in the maintenance of Earth's ecosystems.

Will we continue to see a steady decline in Earth's biodiversity, or will things level out in the near future?



Visualizing the Accumulation of Human-Made Mass on Earth

Originally published in Visual Capitalist November 2021 by Bruno Venditti. Graphic design Mark Belan.

https://www.visualcapitalist.com/visualizing-the-accumulation-of-human-made-mass-on-earth/

The world is not getting any bigger but the human population continues to grow, consuming more and more resources and altering the very environment we rely on.

In 2020, the amount of human-made mass, or anthropogenic mass, exceeded for the first time the dry weight (except for water and fluids) of all life on Earth, including humans, animals, plants, fungi, and even microorganisms.

In this infographic based on a study published in Nature, we break down the composition of all human-made materials and the rate of their production.

A Man-made Planet

Anthropogenic mass is defined as the mass embedded in inanimate solid objects made by humans that have not been demolished or taken out of service - which is separately defined as *anthropogenic mass waste*.

Over the past century or so, human-made mass has increased rapidly, doubling approximately every 20 years. The collective mass of these materials has gone from 3% of the world's biomass in 1900 to being on par with it today.

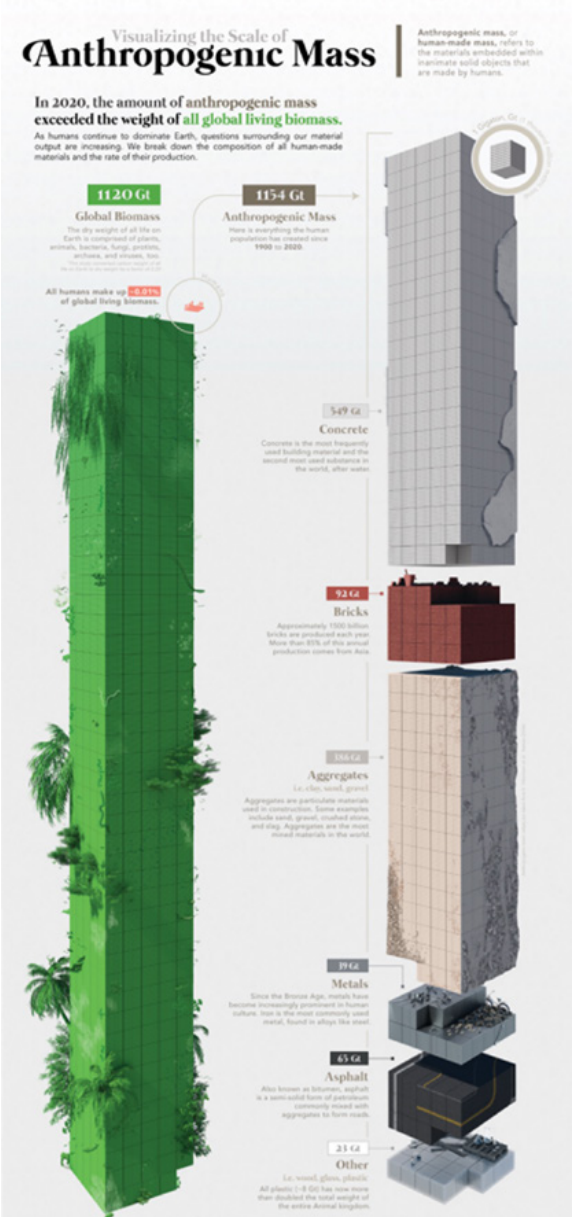
While we often overlook the presence of raw materials, they are what make the modern economy possible. To build roads, houses, buildings, printer paper, coffee mugs, computers, and all other human-made things, it requires billions of tons of fossil fuels, metals and minerals, wood, and agricultural products.

Human-Made Mass

Every year, we extract almost 90 billion tons of raw materials from the Earth. A single smartphone, for example, can carry roughly 80% of the stable elements on the periodic table.

The rate of accumulation for anthropogenic mass has now reached 30 gigatons (Gt)-equivalent to 30 billion metric tons-per year, based on the average for the past five years. This corresponds to each person on the globe producing more than his or her body weight in anthropogenic mass every week.

At the top of the list is concrete. Used for building and infrastructure, concrete is the second most used substance in the world, after water.

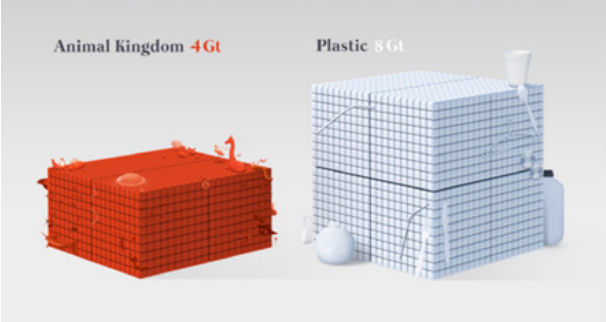


NOTE: This poster is licensed by GTANSW & ACT and printed for Stage 6 teachers attending the GTANSW & ACT 2024 Annual Conference. Additional copies can be purchased via the GTANSW & ACT website (Resources Tab)

Visualizing the Accumulation of Human-Made Mass on Earth

Human-Made Mass	Description	1900 (mass/Gt)	1940 (mass/Gt)	1980 (mass/Gt)	2020 (mass/Gt)
Concrete	Used for building and infrastructure, including cement, gravel and sand	2	10	86	549
Aggregates	Gravel and sand, mainly used as bedding for roads and buildings	17	30	135	386
Bricks	Mostly composed of clay and used for constructions	11	16	28	92
Asphalt	Bitumen, gravel and sand, used mainly for road construction/pavement	0	1	22	65
Metals	Mostly iron/steel, aluminum and copper	1	3	13	39
Other	Solid wood products, paper/paperboard, container and flat glass and plastic	4	6	11	23

Bricks and aggregates like gravel and sand also represent a big part of human-made mass. Although small compared to other materials in our list, the mass of plastic we've made is greater than the overall mass of all terrestrial and marine animals combined.



As the rate of growth of human-made mass continues to accelerate, it could become triple the total amount of global living biomass by 2040.

Can We Work It Out?

While the mass of humans is only about 0.01% of all biomass, our impact is like no other form of life on Earth. We are one of the few species that can alter the environment to the point of affecting all life.

At the current pace, the reserves of some materials like fossil fuels and minerals could run out in less than 100 years. As a result, prospectors are widening their search as they seek fresh sources of raw materials, exploring places like the Arctic, the deep sea, and even asteroids.

As the world population continues to increase, so does the pressure on the natural environment. It is an unavoidable fact that consumption will increase, but in an era of net-zero policies and carbon credits, accounting for the human impact on the environment will be more important than ever.

Sustainable Tourism needs to be Built with the Help of Locals

Originally published: 2023 The CONVERSATION (CC)

https://theconversation.com/sustainable-tourism-needs-to-be-built-with-the-help-of-locals-211296

Foz do Iguaçu / Brazil - February 23 2020: Huge crowd of tourists over a walkway at Iguassu Waterfalls National Park, result of over tourism during Carnival and popular holidays

In the wake of the pandemic, tourism is experiencing a period of transition in which two trends which were already prevalent pre Covid-19 have gained momentum:

- Sustainability, together with climate change, the circular economy and the Sustainable Development Goals of the UN's 2030 Agenda.
- Digitalization, together with the new technological revolution.

If we focus on sustainability - whilst still emphasizing that technological ecosystems are essential for the development of tourism - we have to be aware that making sustainable that which has not been designed as such (a destination, a resort, a mode of transport, etc.) is not easy, fast or affordable. This is especially true since, rather than conforming to standards, labels or certifications, we must change our relationship with the environment in order to be sustainable, rather than just appearing to be so.

Sustainability must be economical, environmental and social

When a term is used so frequently, its meaning tends to become diluted. In fact, in this case, the term sustainable tourism is increasingly being replaced by regenerative tourism.

Not all aspects of sustainability are addressed with equal emphasis. Economic sustainability is taken for granted and environmental sustainability is taken into immediate consideration, while social sustainability is put on the back burner (see, among many others, the case of Ibiza and the cost of housing).

If there is to be true social sustainability, which in turn drives economic and environmental sustainability, the governance of tourism has to evolve.

Before the pandemic, and in the post-pandemic period, news related to the sustainability of tourism appeared in the media.

The Biggest Threats to Earth's Biodiversity

Negative attitudes towards tourism are once again prevalent, although in reality these are not directed against tourism itself but against certain models of tourism development, the product of a certain governance where it is important to take a look at who makes decisions and how.

More than a one-off phenomenon, the problem of mass tourism is being tackled with various types of measures, such as the following:

- The use of fiscal measures(e.g. ecotaxes).
- Limiting the capacity of certain spaces (or even temporarily closing them).
- The use of the variable prices to regulate demand.
- The use of technological tools that assist in redirecting tourist flows, in an attempt to disperse the masses to other attractions that are not overcrowded (assuming that those affected wish to do so).
- The sanctioning of certain behaviour.
- Limiting accommodation options.

The case of the island of Sardinia and its beaches is perhaps less well known than others, but very telling in this context.

Appreciating tourism

The positive attitude of the population towards the impact of tourism development in their area may change significantly if the negative impact is perceived as outweighing the positive effects of it.

This happens when the tolerance level of the local community is exceeded and tourism no longer contributes positively to their quality of life. The problem arises when those who live there permanently begin to feel that friction with tourists disturbs and damages their lives to excess.

When no one asks them, listens to them, takes them into account and decisions are made that severely affect their lives, it is not surprising that citizens turn against tourism when, in reality, the problem is not tourism, but the management of it.

It is only by involving these communities in decision-making that we will find the missing link in tourism governance.

Today, we usually speak of co-governance rather than governance. In other words, public-private partnership: a two-way governance which, although necessary, is not sufficient because they alone are not the only stakeholders involved.

A partnership with citizens, in a broad sense, is essential to ensure their welfare and to avoid or reverse the trend of disconnection with tourism activities.

The point is that tourism is required as an economic activity that affects the entire community, and the latter is something that seems to be missing or unwilling to be addressed. Tourism should not be created by political and business representatives without the local people, but with them. That's the big difference.

There is an added complexity, particularly in terms of legitimacy, in identifying the representatives of stakeholders in the territory and establishing effective participation mechanisms - not only with a voice, but also with a vote in certain decisions. However, this is the best way to support the tourism industry and to overcome mistrust and detachment.

We must move towards inclusive and integrative governance, with a three-pronged approach: public, private and community, whose study and application are virtually unknown fields.

The question is not so much of what to do, but how to do it: a new model of shared leadership must include a redistribution of power within the system, which will require an extra effort to break down barriers and overcome resistance.

Co-governance and well-being

To avoid negative attitudes towards tourism, and promote harmonious relationships between locals and visitors as a path to sustainability, tourism must be able to forge a broad alliance with society.

It is not about managing a destination, but a community with permanent residents and tourists, the latter being understood as temporary residents. The well-being of both must be at the core of the governance architecture.

Although there is usually short-sightedness in political decisions - marked by electoral horizons - and in business decision-making - especially if they are geared towards speculation and immediate returns - the lack of support from the local population will end up generating a boomerang effect.

Do we know the type of tourism development desired (or tolerated) by host communities? Are the voices of the local population heard and taken into account in the decision making processes, with a view to their well-being? Local communities have a much more decisive role to play in consolidating democracies. A tourism-oriented society must be geared towards tourism and committed to its development and co-creation.

Ultra-Fast Fashion is a Disturbing Trend Undermining Efforts to make the Whole Industry more Sustainable

Originally published: 2024 The CONVERSATION (CC)

https://theconversation.com/ultra-fast-fashion-is-a-disturbing-trend-undermining-efforts-to-make-the-whole-industry-more-sustainable-224253

Since the 1990s, **fast fashion** has enabled everyday people to buy the latest catwalk trends. But the sheer volume of garments being whipped up, sold and soon discarded is **contributing to a global sustainability crisis**.

Since the 1990s, fast fashion has enabled everyday people to buy the latest catwalk trends. But the sheer volume of garments being whipped up, sold and soon discarded is contributing to a global sustainability crisis.

Now, just when the fashion industry should be waking up and breaking free of this vicious cycle, it's heading in the opposite direction. We're on a downward spiral, from fast fashion to ultra-fast fashion. The amount of natural resources consumed and waste produced is snowballing.

Ultra-fast fashion is marked by even faster production cycles, blink-and-you'll-miss-it trends, and poor labour practices. Brands like Shein, Boohoo and Cider are liberated from the concept of seasonal collections. Instead they are producing garments at breakneck speeds and self-generating microtrends such as balletcore, Barbiecore and even mermaidcore. At the same time there is limited transparency or accountability around clothing supply chains.

The overproduction and consumption of clothing cannot be allowed to continue. Without change, the industry will account for 26% of the world's carbon budget for limiting global warming to 2°C by 2050.

https://www.youtube.com/watch?v=eluM6lykHxc&t=240s

The fashion industry must take responsibility for its actions. Policymakers also have an important role to play in enabling the necessary shift towards a more responsible and circular fashion economy. And let's not forget the power of consumers.

Cheap clothing at what cost?

It was once thought the pandemic would trigger a transition to a more sustainable fashion industry. Unfortunately in reality the industry is getting worse, not better.

Most ultra-fast fashion brands emerged in the late 2010s following the most well known, Shein, founded in 2008. These online, direct-to-consumer brands exploded in popularity during lockdowns, with Shein holding the title of the world's most popular brand in 2020.

Established brands such as Gap introduce 12,000 new items a year and H&M 25,000. But Shein leaves them in the dust, listing 1.3 million items in the same amount of time. How is this even possible?

The ultra-fast fashion model thrives on data and addictive social media marketing to create insatiable consumer demand.

But Shein's incredibly low prices (its website has thousands of items under A$5) come at a human cost. The company's own 2021 Sustainability and Social Impact Report (later removed from the site) found only 2% of its factories and warehouses met its own worker safety standards, with the rest requiring corrective action.

The brand has also forgone in-house designers. Instead it works with independent suppliers who can design and manufacture a garment in two weeks.

The result is an incredibly profitable business model. Shein filed for an initial public offering (IPO) last year to value the brand at US$136 billion, up from US$2.5 billion in 2018.

Ultra-Fast Fashion is a Disturbing Trend Undermining Efforts to make the Whole Industry more Sustainable

https://www.youtube.com/watch?v=gWotBPtsulo&t=2s

Shifting from fast to ultra-fast fashion has serious environmental and social consequences. This includes even more exploitative labour practices. Shein garment workers reportedly work 75-hour weeks and warehouses operate 24/7.

Ignoring this shift isn't just a fashion faux pas. Doing so jeopardises national efforts for a more sustainable fashion industry.

Fast Fashion: Why garment workers' lives are still in danger 10 years after Rana Plaza - Podcast

Originally published: 2023 The CONVERSATION (CC)

A PODCAST (Hyperlink): https://theconversation.com/fast-fashion-why-garment-workers-lives-are-still-in-danger-10-years-after-rana-plaza-podcast-203122

A seamless transition to sustainability

A national product stewardship scheme called Seamless promises to transform the fashion industry by 2030.

The idea is to bring fashion into the circular economy. Ultimately that means zero waste, but in the meantime raw materials would be kept in the supply chain for as long as possible by designing out and minimising waste.

Members will contribute a four-cent levy for every clothing item they produce or import.

These funds go into clothing collection, research, recycling projects and education campaigns.

BIG W, David Jones, Lorna Jane, Rip Curl, R.M. Williams, THE ICONIC, Sussan Group and Cotton On are Seamless Foundation Members. Each has contributed A$100,000 to the development of the scheme.

As one of the world's first industry-led collective product stewardship initiatives for clothing textiles, Seamless presents a unique opportunity to drive change towards a more sustainable and circular fashion industry.

But there is a risk ultra-fast fashion brands may act as freeriders in Seamless, benefiting from the investment and initiatives without making meaningful contributions. Shein and others will continue putting more and more product on the market, which will need to be dealt with at the end of its short life. But if they fail to commit to the scheme, they won't be the ones paying for that.

Seamless must also recognise ultra-fast fashion in tackling the industry's environmental and social sustainability challenges. At the moment they're only talking about fast fashion and ignoring the rise of ultra-fast fashion. Their global scan, for example, includes a discussion of fast fashion and no mention of ultra-fast fashion.

Fast Fashion: Why garment workers' lives are still in danger 10 years after Rana Plaza - Podcast

This also points to a lack of data more broadly in the industry but in the case of Seamless, it could have a big impact if this growing market segment is ignored.

Shein and Temu are estimated to earn a combined $2 billion in sales in 2024, with customers from all walks of life.

The critical crackdown

Some brands are actively engaged and working towards a more sustainable future. But others such as Temu are learning from Shein and looking to emulate their business model.

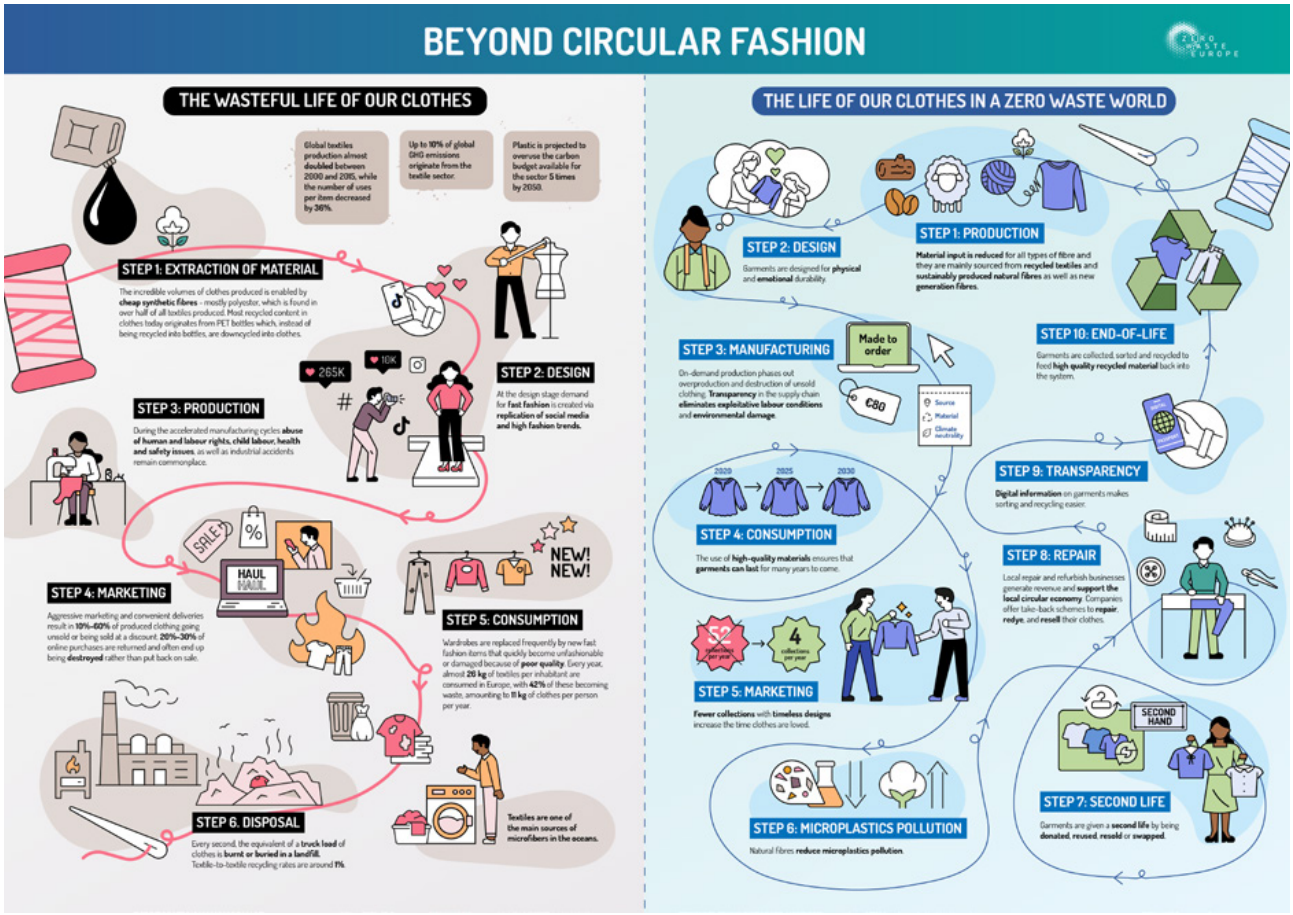
The transition to a more sustainable and responsible fashion industry requires a greater understanding of ultra-fast fashion, urgent systemic changes and collective efforts.

The Institute for Sustainable Futures, where I work, is a founding member of an international academic research network aimed at tackling the complexities of ultra-fast fashion. That includes how ultra-fast fashion is affecting the livelihoods of garment workers, how it's fuelling textile waste and underscoring the industry's struggle to embrace circular economy principles. We're also investigating how to reshape consumer behaviour, away from social media-fuelled hauls towards more sustainable consumption particularly among Gen-Z consumers.

Last month, Federal Environment Minister Tanya Plibersek announced a potential intervention, perhaps by introducing minimum environmental standards or a clothing levy by July.

The clock is ticking. It is time to lay the foundation for a more sustainable and just fashion industry. Australia has a rich fashion history and is home to many leading local brands - many of whom have gone global. These brands show us what is possible when good design, sustainability and innovation drive an industry.

Ultimately, our collective choices wield immense power. By understanding the consequences of our fashion habits and advocating for change, we can all be catalysts for a more sustainable and just fashion industry.



Source. Zero Waste Europe
https://zerowasteeurope.eu/library/beyond-circular-fashion-infographic/

The Benefits and Challenges of Regional Living: A Case Study of Five Regional Cities

Source: Crommelin, L., Denham, T., Troy, L., Harrison, J., Gilbert, H., Dühr, S. and Pinnegar, S. (2022) Understanding the lived experience and benefits of regional cities, AHURI Final Report No. 377, Australian Housing and Urban Research Institute Limited, Melbourne.

Available from the AHURI website at ahuri.edu.au/research/final-reports/377

What this research is about This research investigates the lived experience of regional city residents (in five case studies) to understand how the benefits and disadvantages of regional city life are perceived and to explore attitudes towards population growth.

Wodonga in Rural Victoria. Shutterstock

The context of this research

Over the 21st century, Australia's population has grown at a high rate, predominantly as a result of international migration. This growth has been concentrated in the major cities, while populations in many of the more remote areas of inland Australia have been stagnant or declined. As a result, there are two policy concerns regarding the distribution of population and growth in Australia: the need to ameliorate metropolitan population pressures by redirecting population growth out of the capital cities, and the uncertain futures of many parts of regional Australia that are not currently growing. 'Residents in all cities had concerns about the availability of essential services.'

The key findings

The study involved interviewing residents and policy stakeholders in five regional cities across Australia: AlburyWodonga (Vic/NSW), Cairns (Qld), Mildura (Vic), Whyalla (SA) and Wollongong (NSW). The case studies reflect a broad range of different regional city circumstances and issues, including remoteness, industrial strengths, population trends, size and environmental vulnerabilities.

Some shared experiences and concerns emerged from the five cases:

- **Lifestyle**: In cities that were growing, regional residents were concerned about growth diminishing the lifestyle appeal of their cities. Participants used phrases such as 'village feel' and 'small town' to encapsulate the lifestyle they value and why they

are reticent about growth. This sense of disquiet indicates that regional growth policies need to show how population growth will benefit regional communities, rather than be something that just happens to them.

- **Services**: Residents in all cities had concerns about the availability of essential services (although this was less pronounced in Wollongong, given the proximity of services in Sydney). Many participants were frustrated with existing levels of service provision and raised concerns about the likelihood of increasing demands on health and education as a result of population growth. This suggests that residents see governments as unlikely to provide the additional investment needed to manage growth effectively. Recurring examples included reports of an undersupply of general practitioners across regional Australia, and limited access to specialised services in both health and education. The latter was a particularly pronounced issue in remote locations due to the time and costs of travel to major cities, where these services predominate.
- **Housing**: Housing affordability and availability was a concern across all five case study cities, despite their differing economic circumstances. While affordability was less of a concern in Whyalla, restrictions on access to finance meant buying or renovating housing could still be challenging. Affordable and spacious housing and house blocks were seen as an important element of regional city living and of considerable appeal to many residents arriving from the larger cities, particularly young families. The availability of this traditional housing offer in regional cities was seen as a crucial part of maintaining the appeal of regional living for some participants. However, the affordability and availability of regional housing - especially rental - was felt to have lessened as a result of regional population growth during COVID-19. Other issues included the limited range of housing options (such as townhouses and apartments) in some regional areas, which may present an ongoing challenge as residents' housing needs change over time. 'Research shows that migrants who would prefer to remain in regional cities are more likely to leave if they cannot find adequate employment.'
- **Ongoing employment**: Participants noted that while regional housing markets are often more affordable, it is not always possible to maintain income levels when moving from a major metropolitan area to a regional city. Some participants who had relocated from metropolitan areas found they had to adjust their expectations of work and career when faced with regional labour markets. While some participants related how they had built a successful career in regional cities, others referred to adjusting expectations, 'parking their ego' or planning a return to metropolitan areas in response to employment and career opportunities. This made assessments of the greater affordability benefits of regional living versus metropolitan living more complex than they might initially appear. A primary focus for growth policy should be on improving regional labour markets, which would then attract population. This extends further than providing more jobs, and includes the need to consider how long-term career aspirations can be fulfilled in nonmetropolitan Australia. Research shows that migrants who would prefer to remain in regional cities are more likely to leave if they cannot find adequate employment. Providing ongoing employment trajectories for skilled workers, and appropriate employment for their spouses, has also proven an impediment to the long-term success of government decentralisation programs.

'Participants noted that while regional housing markets are often more affordable, it is not always possible to maintain income levels when moving from a major metropolitan area to a regional city.'

Albury-Wodonga

The population of the twin cities of Albury-Wodonga was 89,007 at the 2016 census, an increase just over 11% from 2006. The greatest increase was in the 60 to 74 year age bracket, reflecting a broad trend toward an ageing population in regional Australia. All residents and stakeholders interviewed had moved into the area from elsewhere, with the main reason being for work, followed closely by lifestyle and amenity. All agreed that while wages were lower than in the capital cities, so too was cost of living, particularly housing. One resident indicated that on moving to the area he had taken a 30 per cent salary cut. This salary, together with a lack of available career progression, was a driving factor behind not wanting to stay in Albury-Wodonga.

'There was an acknowledgment of the tension between retaining the 'country feel' of a smaller population while providing the level of service, infrastructure and diversity of housing options of a larger city.'

The availability of jobs was a focus point, suggesting a thinness of the job market in certain industries and the need for more well-paid, stable employment opportunities. There were also concerns raised about the lack of specialist health care and a perceived lack of diversity in secondary schooling options. There was also concern that tertiary institutions in the area did not offer a sufficient range of courses, particularly those leading to roles in

The Benefits and Challenges of Regional Living: A Case Study of Five Regional Cities

in-demand specialist industries such as engineering, health specialists and allied health professions. There was an acknowledgment of the tension between retaining the 'country feel' of a smaller population while providing the level of service, infrastructure and diversity of housing options of a larger city.

Cairns

Cairns was the fastest growing of the case study cities in the period 2006-2016, with a 26 per cent increase in population spread relatively evenly across age groups. Cairns has a distinctive amenity and lifestyle appeal that intersects with a comparative diversity of key industries in the area. The economic profile of Cairns and its direct connections to global economies (via its international airport with direct connections into Asia) distinguish it from many other regional cities across Australia. There were three main reasons participants decided to migrate to Cairns: lifestyle, family and international connections. All participants noted the challenges of securing housing. This was particularly the case in rental housing where issues of availability (more than affordability) were apparent, and challenges confronted even for people commanding considerable incomes. Short-term accommodation, such as Airbnb, is affecting rental housing availability in popular tourist destinations, and likely takes some supply out of the long-term rental market. This problem is compounded, at least in part, by new dwelling construction that is more geared toward a tourist accommodation market than it is to long-term occupation. Congestion has become a major issue for the local community, with some suggesting it is threatening the lifestyle factors that attracted them in the first place. As regional cities scale up, the importance of public transport increases, but remains difficult to provide effectively without significant public subsidisation. 'As regional cities scale up, the importance of public transport increases, but remains difficult to provide effectively without significant public subsidisation.'

'As regional cities scale up, the importance of public transport increases, but remains difficult to provide effectively without significant public subsidisation.'

Mildura

Mildura has more than 33,000 residents, with population growth from 2006-2016 mainly due to increased residents in their 20s and those over 50. Key benefits identified included great local produce, lots of community activities, easy access to natural attractions, large house and lot sizes, and the ease of getting around. Key concerns included a perceived lack of specialist health and education services, a tight rental market, the need for faster and more affordable transport to Adelaide and Melbourne, and administrative complexities created by proximity to two state borders.

There were concerns that growth would result in Mildura losing its 'town feel'. However, there was also an acknowledgement that growth may lead to additional government investment and improved services. The population of the economic region is in decline and the

Cairns, Queensland. Shutterstock.

The Benefits and Challenges of Regional Living: A Case Study of Five Regional Cities

future prospect of less water for irrigation indicates a risk to the intensity of agriculture, reducing the amount of work available. 'Several participants noted that the cheap house prices are often offset by stricter limits on accessing finance, such as higher deposit rates due to poor resale prospects.'

Whyalla

Located 400 kilometres from Adelaide, Whyalla (population 21,501) is South Australia's third largest city, despite having lost a third of its population since the 1970s. The steelworks are a key employer and underpin the city's economic trajectory. The city is also an important regional service hub. Employment opportunities were a key driver of participants' decisions to move to Whyalla. Benefits that convinced them to stay included the friendly and connected community, the ease of movement and the proximity of outback and coastal landscapes. The recent focus on improving educational facilities also added to the city's appeal. While participants felt that services were good, concerns included limited access to specialist health services, ageing infrastructure, and the need for economic diversification to ensure the city's longevity. While housing is more affordable than in other case study cities, much of the stock is ageing and no longer fit-forpurpose. Several participants noted that the cheap house prices are often offset by stricter limits on accessing finance, such as higher deposit rates due to poor resale prospects. Local attitudes towards growth were positive; participants recognised that a shrinking population made it difficult to upgrade services and diversify the economy. Given recent population decline, there was little concern that existing infrastructure would struggle to cope with growth, at least in the short-term, as the city originally developed for a larger population.

Wollongong

EDITORS NOTE; In the context of the NESA Syllabus Wollongong would not qualify as a rural regional settlement.

Wollongong has a service and innovation-based economy and is the largest of the five case study cities, with the highest housing prices. Over 13 per cent of the population commutes to Sydney daily for work. Participants identified the city's key benefits as the coastal lifestyle, easy access to diverse regional attractions, high quality education, and proximity to Sydney's services and entertainment. 'More broadly, the findings indicate that policy making needs to be approached from a regional perspective, with the goal of making regional Australia an attractive place to live and work, rather than approached as a solution to metropolitan population pressures.' Key concerns included diminishing housing affordability pushing lower-income residents out of the city, limited public transport, and employment market dynamics-particularly a mismatch between workers and available service sector roles, and thinness in professional labour markets. Attitudes towards growth reflected a mix of (i) feeling it was inevitable given the city's proximity to Sydney; (ii) acknowledging that growth had helped the city transition to a more diverse economy; and (iii) concern that Wollongong was at a tipping point, where further growth would undermine amenity benefits.

What this research means for policy makers For pro-growth policies to be well-received in regional areas, it is essential that they are perceived as being designed to benefit local residents. The research also indicates that a primary focus for growth policy should be on improving regional labour markets, which would then attract population. This includes the need to consider how long-term career aspirations can be fulfilled in nonmetropolitan Australia. More broadly, the findings indicate that policy making needs to be approached from a regional perspective, with the goal of making regional Australia an attractive place to live and work, rather than approached as a solution to metropolitan population pressures. Planning for regional growth will ensure that benefits from additional population (e.g. better services and stronger economies) can be realised, while minimising the diseconomies of scale and the impact on the 'village feel' of regional cities. Demonstrated long-term commitments to goal-oriented plans may also address the reticence of regional residents towards population growth, by making clear the benefits and providing assurance that they will be realised. For the national settlement structure, an underlying issue indicated by this research is that the gap between Australia's major cities and smaller cities means that there are few 'middle ground' options available, which could provide both diverse career opportunities and the lifestyle and housing benefits of regional areas. Methodology This research interviewed residents and policy stakeholders in five regional cities across Australia. A resident focus group and stakeholder interviews were conducted in each city.

These 7 Cities are Tackling Heatwaves with Innovative Solutions 2023

World Economic Forum

https://www.weforum.org/agenda/2023/05/cities-heatwaves-climate-solutions/

Screenshot from "How we can protect cities from heatwaves" https://www.youtube.com/watch?v=wCyVpkv2ZN4

- In heatwaves, urban spaces often reach the highest temperatures.
- But cities including Sydney, Paris and Los Angeles are developing ways to keep their citizens cooler.
- Solutions include more awnings, creating rooftop gardens and painting road surfaces with reflective white paint.

Heatwaves are making cities some of the hottest places to be.

City infrastructure - like roads and buildings - absorbs heat and then releases it back into the city, meaning the highest temperatures in a heatwave are often in urban areas.

From Europe to China, India and Pakistan, the United States and Africa, this has been bad news for cities as temperatures have reached record highs.

Almost 90 cities issued heat alerts in the extreme weather over the summer of 2022, according to the United Nations Environment Programme.

But cities are learning to tackle extreme heat - sometimes with ingenious solutions.

https://www.youtube.com/watch?v=wCyVpkv2ZN4

These 7 Cities are Tackling Heatwaves with Innovative Solutions 2023

Here are seven examples.

Seville's 'policy of shade'

In a city that regularly hits 40°C in the summer months, it's perhaps no surprise that Seville was the world's first city to categorize heatwaves in the same way that the US and Asian countries name hurricanes, reports Bloomberg.

To tackle the increasing heat, more awnings have been installed across the Spanish city. "We call it a policy of shade," the city's mayor, Antonio Muñoz, told Bloomberg. "It's just one of the many things we need to do if we want to be able to use the streets - from children playing to people who want to do their shopping or just sit outside and talk."

Seville also plants 5,000 trees a year, is switching to construction materials that reflect heat and is installing more public fountains, reports Bloomberg.

Sydney's tree plan

In Greater Sydney, an area covering 1.3 million hectares around Australia's capital city, there are plans to increase the tree canopy by planting five million more trees by 2030.

Trees help to cool cities by providing shade and moisture. They also naturally absorb and store carbon dioxide, which helps to combat climate change.

LA's white paint experiment against heatwaves

In Los Angeles in the United States, city authorities started experimenting with painting streets white back in 2019. The aim is to bounce the sun's rays back into space, cooling the surrounding area. Ten streets in ten neighbourhoods have been painted so far with the reflective coating, according to the website Reasons to be Cheerful. On hot days, the white paint cools the road's surface and the surrounding area, the city's sustainability officer says.

Abu Dhabi's self-shading tower block

In Abu Dhabi in the United Arab Emirates, climate change is predicted to push average temperatures well above 50C in the second part of the century, bringing extreme heatwave conditions that could make the city unliveable.

But innovative design can help buildings deflect heat. One example is the Al Bahar Towers. The 26-storey building is fitted with computer-controlled folding screens that open and close to provide shade depending on the sun's position, explains consulting engineers, Arup.

Paris creates 'cool islands' to tackle heatwaves

Heatwaves across France broke temperature records last summer - with the capital, Paris, reaching 36°C in August 2022 - while an April 2023 study found that Paris had the highest heat-related mortality relative risk of 854 European cities.

Paris is responding to the heating effect of the climate crisis by creating 800 'cool island' spaces across the city. These are listed on an app and include parks, water fountains and public buildings like swimming pools and museums.

The spaces can be between 2C and 4C cooler than surrounding streets. Paris also plans to plant 170,000 trees by 2026.

Rotterdam's green rooftops

Planting greenery on rooftops can help cities keep cool, and Rotterdam in the Netherlands recently demonstrated this with the Rotterdam Rooftop Walk initiative.

The city hopes to green over 900,000 square metres of rooftops. By storing water, rooftops planted with vegetation can also help reduce flooding.

Green roofs can reduce ambient temperatures in a city by up to 15C, according to the United States Environmental Protection Agency.

Medellin creates green corridors for citizens

In Colombia, the country's second biggest city, Medellin, has created a network of 30 shady routes across the city known as 'green corridors' to fight heatwaves.

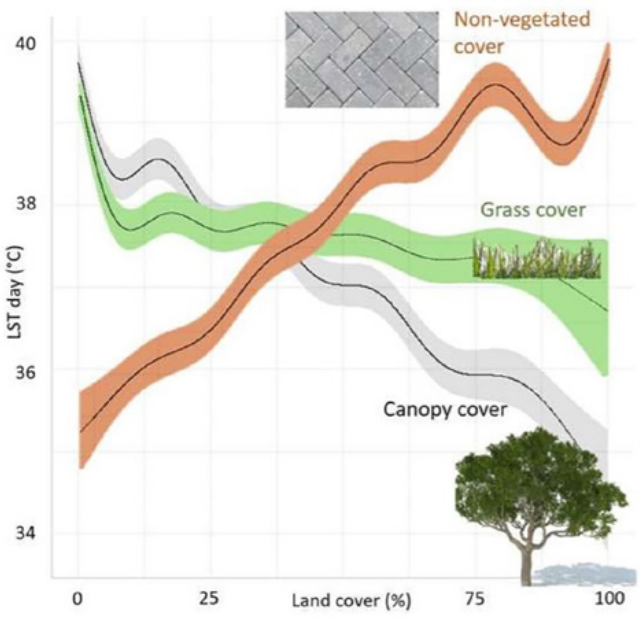
According to Reuters, thousands of native trees, palms, bamboo and tropical plants have been planted around sidewalks, parks and busy traffic routes, providing shaded places for people to travel and gather.

Urban Trees could cut Extreme Heat by up to 6 Degrees

Originally published: 2020 The CONVERSATION (CC)

https://phys.org/news/2020-03-urban-trees-extreme-degrees.html

Australia just experienced **the second-warmest summer on record**, with **2019 being the hottest year**. Summer temperatures soared across the country, causing great economic and human loss. The good news is we can do something about this in our own backyards. We have found trees and vegetation can lower local land temperatures by up to 5-6°C on days of extreme heat.



Our newly published research into a summer heatwave in Adelaide suggests that a simple solution to extreme heat is literally at everyone's doorstep. It relies on the trees, the grasses and the vegetation in our own backyards.

What did the study show?

During a three-day heatwave that hit Adelaide in 2017, AdaptWest took to the skies to measure land surface temperatures from an aircraft. Our analysis of the data collected on that day suggests urban trees and grasses can lower daytime land temperatures by up to 5-6°C during extreme heat.

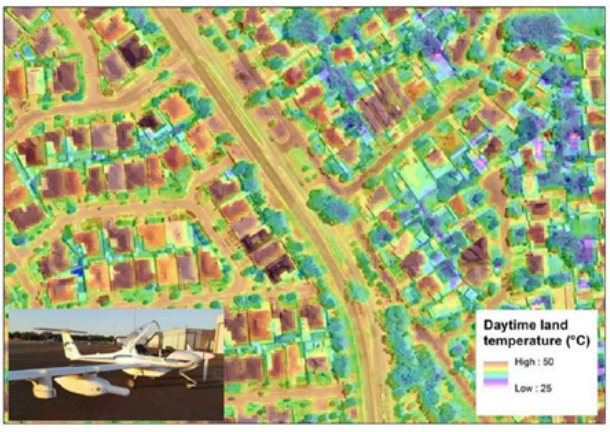
The largest temperature reductions were in the hottest suburbs and those further away from the coast. These significant reductions were mostly achieved thanks to backyard trees.

So this benefit that urban trees provide has two key aspects:

- maximum cooling happens *when needed the most* - during days of unbearable heat.
- maximum cooling happens *where needed the most* - close to us, the people, in the communities where we live.

Our analysis also shows the humble home garden more than pulls its weight when it comes to reducing extreme urban heat and its harmful effects. Although yards and gardens cover only about 20% of urban land, these private spaces provide more than 40% of the tree cover and 30% of grass cover across western Adelaide. This is comparable to what can be found in many other Australian cities and towns.

In fact, private tree canopy cover is considerably greater than that of typical urban parks or public green areas. This means these private green spaces are a vital yet often overlooked resource for fighting extreme heat.



Daytime thermal imaging of land surface temperature in Walkley Heights, Adelaide, taken from an aircraft.

Urban Trees could cut Extreme Heat by up to 6 Degrees

Planning climate-ready cities

Climate models and projections predict extreme heat days and heatwaves will become more frequent and intense. Penrith reached 48.9°C on January 4 this year, making Western Sydney the hottest place on Earth that day. Given that heatwaves are already considered Australia's deadliest climate-related disaster, the forecast temperatures pose an urgent threat to human livelihoods.

Urban planning is increasingly having to take extreme temperatures into account. For instance, the City of Sydney recently announced an ambitious policy to increase urban green cover to 40% by 2050 for climate change resilience. Currently, this level of green cover is found in only a handful of suburbs in cities like Melbourne, Sydney and Adelaide.

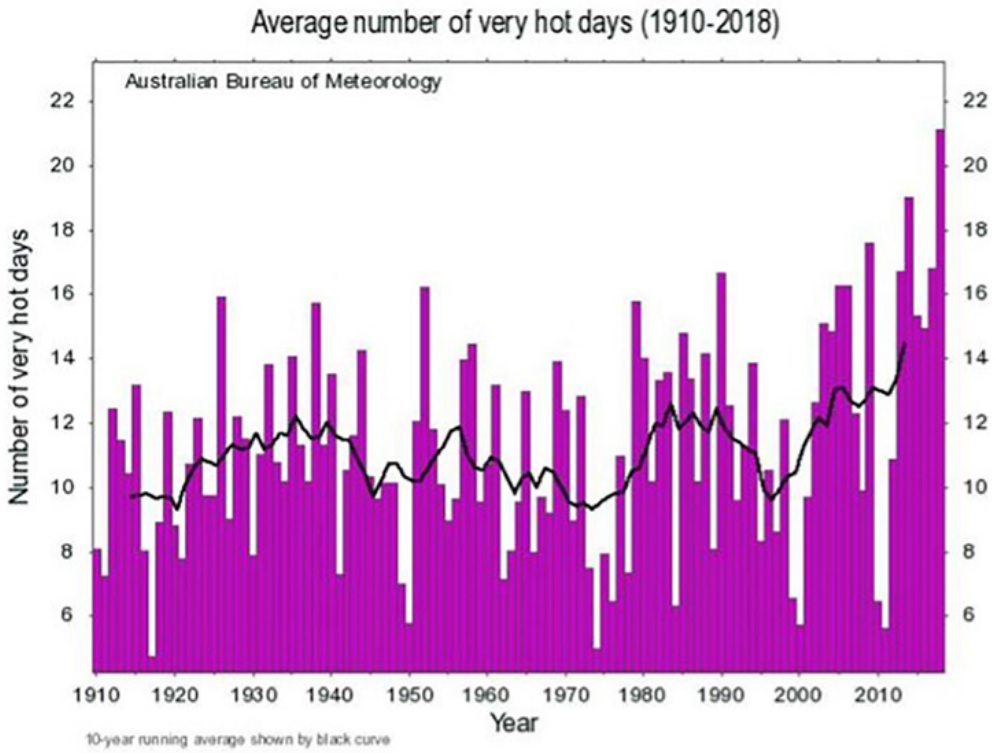
To achieve such ambitious and life-sustaining goals, our results point to the need to retain, protect and enhance urban greenery in our own yards. As our cities become increasingly dense, people's trees and yards can play an invaluable role in adapting to climate change.

Most council, state and federal policies to date have neglected yards and their trees when thinking about climate change adaptation. When envisioning how Australian cities should grow, develop and thrive, more attention has to be given to the spaces where our yards and trees can help reduce the catastrophic effects of a warming climate on people and communities, right at our doorstep.

Climate change is causing a social, cultural and political revolution. It calls for bold, decisive and immediate action. This is a lifetime opportunity for smart and proactive planning, policy-making and community action. This work needs to begin now.

Urban forests don't grow quickly, however. We need to be encouraging low-water-use grass and shrub covers as a fast interim strategy for urban cooling.

This is a stopgap measure until a large army of climate-ready tree soldiers, that we can decide to plant today, take over the job of fighting climate change and extreme heat in our future cities.



The Geography Teachers Association of NSW & ACT Inc.

The 2024 GTA NSW & ACT

Young Geographer Awards

Registration opens June 2024 & closes Friday 4 October 2024

The Young Geographer Awards invites students in NSW and the ACT to demonstrate engagement with Geography, the discipline and with the tools and skills of Geography through the creation and conduct of an inquiry-based research project. Although it is not essential, teachers are encouraged to incorporate the research and construction of the project into their teaching programs to help support students.

Register here:

Senior Entries | Junior Entries | Teacher Entries

Visit www.gtansw.org.au for more information.

Prizes

Prizes for the winning entries in any category are:

- 1st Prize $500
- 2nd Prize $250
- 3rd Prize $100

Award Categories

Geographical Research Award

This award allows students to demonstrate original geographic research on any topic from the Australian Curriculum or NSW K-10 Geography Syllabus. Students will identify an inquiry focus and should conduct both primary and secondary research to investigate this topic. Category submissions will be judged against entries in the same Stage.

Geography in STEM Award

This award allows students to demonstrate geographic research on any topic from the Australian Curriculum or NSW K-10 Geography Syllabus. However, a significant STEM contribution must be present in the final product and Geography must drive the project. The STEM contribution may be explicitly evident in the collection of primary data, the tools used for analysis of data and/or in the final presentation and communication of the research.

NESA Senior Geography Project (SGP) / IB Internal Assessment Award / ACT equivalent project

This award recognises excellence in the NSW Senior Geography Project (SGP) or International Baccalaureate Internal Assessment (IA) Projects. Those who study Geography in the ACT may also submit Geography research projects of a similar scope.

GTA NSW & ACT Geography Teacher Award

This award is for teachers that inspire 'Young Geographers' and recognises the creativity and knowledge of the implementation of fieldwork within the classroom. Participating teachers are asked to submit evidence regarding how they implement fieldwork into their teaching and throughout the school. This evidence could be an assessment task, fieldwork booklet, teaching program etc. In addition to the evidence, they are to write a 500 word summary that examines how they successfully incorporated fieldwork into their teaching practice by referring to the evidence they have submitted.

Project Specifications

The projects submitted for all categories should:

- Be less than 3000 words when written or under 10 minutes in an audio-visual format.
- Incorporate appropriate primary and secondary research for the inquiry topic.
- Demonstrate excellent research skills.
- Demonstrate excellent communication of geographical information using a variety of tools and skills.
- Demonstrate the capacity for active citizenship from the undertaken research.

All award entries must be submitted digitally as either Acrobat PDF files, websites or suitable audio-visual files.

Award Timeline

2024 competition closing date: Friday 4 October

Each school is able to submit a maximum of four (4) entries per category. There is no cost for entry to the competition.

Judging will take place between Term 4 2024 and Term 1 2025. Members of GTA NSW & ACT are encouraged to apply and participate as a member of the judging panel. The judging is a valuable Professional Development event and participation in the judging process, for example SGP marking, will help teachers gain perspective about their own classroom practice and student achievement.

Prize winners will be notified by March 2025. Prizes will only be awarded when suitable entries are available. All competition entrants will receive a YGA Certificate of Participation.

Advice To Contributors

Geography Bulletin guidelines

1. *Objective:* The *Geography Bulletin* is the quarterly journal of The Geography Teachers' Association of NSW & ACT Inc. The role of the *Geography Bulletin* is to disseminate up-to-date geographical information and to widen access to new geographic teaching ideas, methods and content. Articles of interest to teachers and students of geography in both secondary and tertiary institutions are invited, and contributions of factually correct, informed analyses, and case studies suitable for use in secondary schools are particularly welcomed.

2. *Content:* Articles, not normally exceeding 5000 words, should be submitted to the GTA NSW & ACT Office by email editor@gtanswact.org.au

   Submissions can also be sent directly to the editor: Diana Gearside (editor@gtanswact.org.au)

   Articles are welcomed from tertiary and secondary teachers, students, business and government representatives. Articles may also be solicited from time to time. Articles submitted will be evaluated according to their ability to meet the objectives outlined above.

3. *Format:* Digital submission in Word format.
   - Tables should be on separate pages, one per page, and figures should be clearly drawn, one per page, in black on opaque coloured background, suitable for reproduction.
   - Photographs should be in high resolution digital format. An indication should be given in the text of approximate location of tables, figures and photographs.
   - Every illustration needs a caption.
   - Photographs, tables and illustrations sourced from the internet must acknowledge the source and have a URL link to the original context.

   Note: Please try to limit the number of images per page to facilitate ease of reproduction by teachers.

   Diagrams created using templates should be saved as an image for ease of incorporation into the *Bulletin*.

   All assessment or skills tasks should have an introduction explaining links to syllabus content and outcomes. A Marking Guideline for this type of article is encouraged.

4. *Title:* The title should be short, yet clear and descriptive. The author's name should appear in full, together with a full title of position held and location of employment.

5. *Covering Letter:* As email with submitted articles. If the manuscript has been submitted to another journal, this should be stated clearly.

6. *Photo of Contributor:* Contributors may enclose a passport-type photograph and a brief biographical statement as part of their article.

7. *References:* References should follow the conventional author-date format:

   Abbott, B. K. (1980) *The historical and geographical development of Muswellbrook* Newcastle: Hunter Valley Press.

   Harrison, T. L. (1973a) *Railway to Jugiong* Adelaide: The Rosebud Press. *(2nd Ed.)*

8. ***Spelling*** should follow the *Macquarie Dictionary*, and Australian place names should follow the Geographical Place Names Board for the appropriate state.

Refereeing

All suitable manuscripts submitted to the *Geography Bulletin* are subject to the process of review. The authors and contributors alone are responsible for the opinions expressed in their articles and while reasonable checks are made to ensure the accuracy of all statements, neither the editor nor the Geography Teachers' Association of NSW & ACT Inc accepts responsibility for statements or opinions expressed herein.

Books for review should be sent to:

The GTA NSW & ACT Council
PO Box 699
Lidcombe NSW 1825.

Editions

There are four bulletins each year – two published each semester. Special Editions are created on need.

Notice to Advertisers

'*Geography Bulletin*' welcomes advertisements concerning publications, resources, workshops, etc. relevant to geography education.

FULL PAGE (26 x 18cm) – $368.50
Special issues $649.00

HALF PAGE (18 x 13cm or 26 x 8.5cm) – $214.50
Special Issues $382.80

QUARTER PAGE (13 x 8.5cm or 18 x 6.5cm) – $132.00
Special issues $242.00

All prices include GST

Advertising bookings should be directed to:

GTA NSW & ACT Office
Telephone: (02) 9052 6451
Email: admin@gtanswact.org.au

GTA

The
Geography Teachers Association
of NSW & ACT Inc.