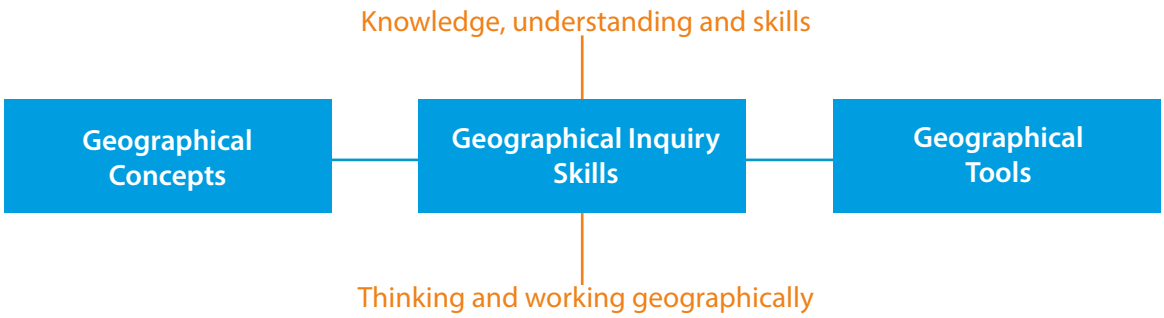
INTRODUCTORY ANALYSIS

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

EDITORIAL COMMENT

- It is recommended that teachers plan across Years 11 and 12 to incorporate the development of conceptual knowledge, skills and links between topic areas.
- In the digital syllabus document –

  BLUE BOXES indicate content to be included (YOU MUST DO)

  GREY BOXES are EXAMPLES ONLY. They are there to guide your choice of content but are not restricted to these examples

CONSIDERATIONS

SCOPE AND SEQUENCE

No predetermined order to Focus Area delivery HOWEVER …….
Things to consider

- Is there a 'best fit'?
- Fieldwork timing
- School restrictions
- Examination periods within the school structure

FIELDWORK

- 12 hours Year 11
- 12 hours Year 12
- Plus, the Geographical Investigation – accessible location (local or convenient) / Individual or group
- Fieldwork instruments to be integrated as appropriate.
- Compulsory HSC Fieldwork Assessment Task Activity (Weighting 20 – 30%)

Identifying fieldwork opportunities and choosing studies

1. Focus areas based on natural systems

- Earth's Natural Systems eg, a forest, sand dunes
- Changes to Earth's natural systems eg, ecological succession, deforestation
- Ecosystems and global biodiversity – two types / one in Australia / comparative management studies

2. Focus areas based on human features / change

- Population and natural resources
- Options studies – identifying unique local places transformed by human processes
- Sustainability / Global Economic activity – what can you do at a local scale?
- Rural and urban places – selecting places to allow fieldwork

OUTCOMES

- Progression from 11–12
- Focus of all learning activities

STUDIES

PLACE based studies throughout.

OPTION STUDIES – flexibility to suit cohort, resources, and geographic location.

HSC EXAMINATION SPECIFICATIONS*

Section I (15 mks) Objective response Qs
May require students to refer to the stimulus booklet and apply skills and tools.

Section II (45 mks) 4–6 short-answer Qs – 10–14 items in total.
At least one item, (5–8 marks) – integration of knowledge from more than one focus area.

Q's may require reference to the stimulus booklet and to apply skills and tools.

Section III (20 mks)
ONE structured extended-response question (RUP OR EGB). 2 or 3 parts.

May require reference to the stimulus booklet and to apply skills and tools.

Section IV (20 mks)
ONE unstructured extended-response question (RUP OR EGB).

Qs may require reference to the stimulus booklet.

* SEE THE SAMPLE EXAMINATION PAPER ON THE NESA WEBSITE – https://curriculum.nsw.edu.au/syllabuses/geography-11-12-2022?tab=teaching-and-learning

SELECTED GLOSSARY TERMS *

- **New concepts – a selection of these is shown below**
- **Option topics – some Year 12 concepts may be relevant in Year 11. See examples in RED**
  For example: A region study may provide an opportunity to introduce the concept of a hierarchy of urban places. A study of climate change would be relevant to introducing the concept of tipping points
- **Opportunities to build understanding over 2 years**

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.

Ecological hazard – A biological hazard that has the potential to impact adversely on the wellbeing of people or the environment more generally. Examples of ecological hazards include malaria, plagues, invasive species.

Ecological disturbance – Temporary changes or events in an ecosystem that cause disturbance to its functioning, e.g., 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.

Geographic region – A region exhibits shared natural or human characteristics, e.g., political, economic, social, cultural, climate, land/water cover, vegetation, that distinguishes the region from neighbouring regions. Regions can be divisions of a nation, or larger than a nation.

Land cover – The natural and artificial features and structures that cover the land's surface eg, trees, grass, crops, wetlands, water, ice, buildings, and pavement.

Overview effect – A shift in awareness reported by some astronauts who have viewed the Earth from space, including the wonder of the Earth, the thinness of its atmosphere, and the absence of national boundaries

Risk management – In the context of Geography 11–12 and Geography 11–12 Life Skills, risk management is defined in terms of preparedness, mitigation and/or prevention of a natural or ecological hazard.

Preparedness involves planning the interventions needed to prevent or mitigate the effects of a hazard.

Mitigation involves the implementation of strategies to eliminate or minimise the effects of these hazards.

Adaptation involves adjusting to the changed environmental circumstances.

Tipping points – 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.

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. Shifting baselines describes the situation where knowledge is lost about the original state of the natural world.

Urban hierarchy – The ranking of urban places in descending order, e.g., cities, determined by population size.

* SEE THE FULL GLOSSARY ON THE NESA WEBSITE – https://curriculum.nsw.edu.au/syllabuses/geography-11-12-2022?tab=glossary

EARTH'S NATURAL SYSTEMS

Overview of the uniqueness and diversity of the Earth

- Nature as a source of wonder
- People's connection to the natural world and why it can vary
- The universal value of Earth's environments

Processes, cycles, and circulations connecting natural systems

- Characteristics of Earth's natural systems and factors affecting their functioning including latitude, altitude, continentality, oceanity, seasonality.
- The processes, cycles and circulations connecting natural systems including – atmospheric systems, hydrological systems, geomorphic systems, ecological systems

Natural systems and land cover change

- The nature and extent of Earth's land cover, including water
- Natural processes, cycles and circulations that change Earth's land and water cover – including climatic and glacial cycles, the invasion and ecological succession of vegetation communities
- The natural processes, cycles and circulations that have shaped the land and/or water cover of **ONE place**

40 HOURS

OVERVIEW
Maximum 4 hours
Wonder of nature / values

MAIN CONTENT
New focus: Processes, cycles, and circulations
Interconnections

Natural change over time
Natural causes of climate change

Land cover change

Place based example

EDITORIAL COMMENT

Opportunities:

- Fieldwork – a focus on Earth systems and interconnections e.g., local forest, wetland, beach.
- Spatial technologies – give perspective from local to regional scales e.g., Null Earth
- You could teach the topic through the lens of one natural system to illustrate interconnectedness of systems through processes, cycles, and circulations e.g., forest systems

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

GUEST SPEAKER

RICHARD KINGSFORD, Professor of Environmental Science, Director of Centre for Ecosystem Science School of Biological, Earth and Environmental Sciences UNSW Sydney.

TOPIC: Earth's Natural Systems – Lake Eyre Basin

A SUMMARY OF KEY POINTS

Professor Kingsford spoke about the unique natural systems in the Lake Eyre Basin.

He also extended his presentation to look at Human-Environment Interactions, particularly the issue of unconventional gas exploitation (including fracking).

Lake Eyre Basin: Natural systems:

- A unique arid system covering approximately one-sixth of Australia.
- Large shallow inland basin – below sea level in places, Great Artesian Basin beneath.
- Very dry – low rainfall but sometimes experiences large rain events caused largely by cyclones (north) or cold fronts (south). (Atmospheric – hydrological systems).
- Boom and bust cycles – cause changes in habitat and productivity (ecological systems).
- Wetland biodiversity – extensive floodplains upstream from Lake Eyre. Some permanent waterholes with high levels of biodiversity (aquatic and bird) e.g. pelican colonies of 30,000 – 40,000.
- Water drives ecological productivity and processes boom and bust cycles.
- Dry spells create challenges to organisms – long periods of little or no water, up to two years in Cooper Creek). Turtles size (carapace length) influenced by water availability. Permanent waterholes = bigger turtles. Threat of climate change if waterholes dry up.

Human-Environment Interactions

Extensive pastoral and tourism industries.

Major threats:

- Oil and unconventional gas (coal seam gas) – infrastructure and spills.
- Invasive species e.g., cactus, sleepy cod (native invasive species), invasive yabby.
- Floodplain developments e.g., roads, levee banks interrupt water flows.
- Dams and irrigation systems reduce water flows essential for ecological productivit.y
- Climate change.

There has been oil and gas development on floodplain – *The Conversation* https://theconversation.com/the-magnificent-lake-eyre-basin-is-threatened-by-831-oil-and-gas-wells-and-more-are-planned-is-that-what-australians-really-want-191078

Teacher idea: Use Google Earth satellite imagery to compare differences in the LEB over time.

Ramsar site – mines in the middle of a globally important ecosystem.

Impacts of developments include fragmentation of flow, alteration of flow, pollution on site and fugitive emissions- greenhouse gases, water use.

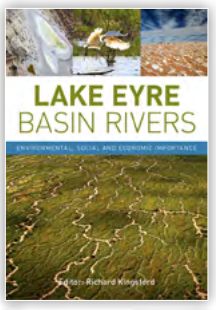
Action by states has been ineffective in enforcing protection of a unique natural system.

In summary

- Great desert river system with high cultural and environmental value.
- Some sustainable industries e.g., tourism, organic cattle farming.
- Long term impacts of oil and gas development are a major concern.
- Future depends on the actions of governments – Aust, QLD, SA.
- Remoteness leads to lack of awareness/ understanding of the unique natural system.

EDITOR BOOK RECOMMENDATION

Lake Eyre Basin Rivers
Editor: Richard Kingsford



DISCUSSION QUESTIONS

Consider the following focus questions when planning this topic

FOCUS QUESTIONS: EARTH'S NATURAL SYSTEMS

- Identify three key differences with the current syllabus.
- What did you learn about natural systems from the Lake Eyre Basin presentation? (Conference delegates)
- Are there concepts and / or content areas you not confident with?
- What would you consider for the place study?
- What opportunities are there for fieldwork and using spatial technologies?
- Suggest one effective teaching strategy that would suit the delivery of the content and skills.
- Where might you place this Focus Area in a Scope and Sequence for the Year 11 course?
- Record THREE BIG IDEAS you have for this topic

RESOURCES

BOOKS

MAGAZINES

SOCIAL MEDIA

VIDEO & PODCAST

WEBSITES

SPATIAL TECHNOLOGIES

PAST GEOGRAPHY BULLETINS

PROCESSES, CYCLES AND CIRCULATIONS

Understanding the Carbon Cycle	Volume 53, Special Edition 2021
The Carbon Cycle Game	Volume 53, Special Edition 2021
The Cryosphere	Volume 52, No 3, 2020
How I teach – Global Atmospheric Circulation Model	Volume 52, No 3, 2020
Biophysical Interactions: flipped classroom	Volume 47, No 3, 2015

PEOPLE, PATTERNS AND PROCESSES

Overview of the diversity and extent of human activity

- The diversity and extent of human activity on the Earth's surface on a global scale, including spatial patterns of settlement, infrastructure, and agricultural and industrial production
- Spatial patterns related to culture
- The increasingly integrated nature of the world including
  - economic activities and cultures, the effect of technological change on interconnections between places in relation to distance and time,
  - the role of transnational corporations (TNCs), world cities, migration and tourism in international integration

Population and resource consumption

- The characteristics, growth and distribution of the world's population - including trends, rates of change and density
- Influences that shape global population change - including demographic transition, population movements
- Challenges arising from population change – environmental, economic and social
- Population characteristics and trends in **TWO countries** – including reasons for similarities and/or differences, challenges and responses in each country, varying perspectives on population management
- Links between population characteristics and natural resources – including the global distribution and consumption of natural resources, population size, distribution and concentration, and levels of resource consumption in various places, challenges of resource consumption, including depletion of resources, impacts on Indigenous Peoples, environmental degradation, and inequalities in human wellbeing

People, patterns and processes study

Students undertake ONE of the following studies to develop an understanding of the role of people in changing places and environments, the processes involved, and various responses to change.

- Study 1: Human resilience in diverse environments
- Study 2: Local places and global economic change
- Study 3: Place and cultural change
- Study 4: Political power and contested spaces
- Study 5: Technological advances and the transformation of places

40 HOURS

OVERVIEW
Big picture
Extent of human footprint
Maximum 4 hours

Global features, trends and challenges related to population

Place based studies

EDITORIAL COMMENT:
Choose countries with very different experiences to make explanations more interesting.

EDITORIAL COMMENT:
Treat resource consumption generally backed up by examples for each link or do case studies that illustrate many challenges.

Each has a focus on one human cause of change to places
- **Human character… man vs environment**
- **Economic integration**
- **Cultural integration**
- **Political change / conflict**
- **Technological change**

Common language across all studies
- **Characteristics of places**
- **Change / transformation**
- **Impacts and / or responses to change**

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

OPTIONS: PEOPLE, PATTERNS & PROCESSES

STUDY 1: HUMAN RESILIENCE IN DIVERSE ENVIRONMENTS

- Environments that challenge some forms of human occupation and survival
- Characteristics of environments that contribute to human occupation and endeavour
- The contribution of human ingenuity and resilience to the character of places.

ONE environment at a local or national scale that challenges human occupation and survival, including spatial patterns and characteristics of the environment, evidence of human ingenuity and resilience, impacts of, and responses to, change, opportunities to enhance environmental sustainability and/or human wellbeing.

STUDY 2: LOCAL PLACES AND GLOBAL ECONOMIC CHANGE

- Places relatively unaffected by global economic change
- Changes to places resulting from global economic integration and global flows of people, goods and ideas
- Impacts of change on the human and physical characteristics of places, including impacts on Indigenous Peoples and lands.

ONE place outside Australia shaped by international economic integration including nature of change resulting from global linkages, responses to economic integration, opportunities to enhance environmental sustainability and/or human wellbeing.

STUDY 3: PLACE AND CULTURAL CHANGE

- Culture of place
- Influences on the culture of place including the continuity of cultures in different places, the processes of diffusion, adoption and adaptation of culture, the mediums facilitating cultural change
- Evidence of cultural change in various places around the world
- Impacts of, and responses to, change.

ONE place at a local or national scale including the spatial and cultural characteristics of the place, influences on the cultural identity of the place, perceptions of, and responses to, cultural continuity and/or change, opportunities to enhance environmental sustainability and/or human wellbeing.

STUDY 4: POLITICAL POWER AND CONTESTED SPACES

Students investigate:

- The geopolitical characteristics of places from a global perspective, including nation-states and territories, political systems and ideologies, and power blocs
- Influences on political tension and conflict
- Impacts of, and responses to, political tension and conflict.

ONE contested space at a local or regional scale including spatial patterns and characteristics of the space, the influence of economic, environmental, social, cultural and/or technological factors, impacts of political tension and/or conflict on people, places and the environment, opportunities to enhance environmental sustainability and/or human wellbeing.

STUDY 5: TECHNOLOGICAL ADVANCES AND THE TRANSFORMATION OF PLACES

Students investigate:

- Technological advances that have contributed to the rise of global networks
- The spatial pattern of networks
- The role of networks in transforming places, and the implications for people and/or environments

ONE study of a network at any scale including, spatial patterns and/or characteristics of the network, the development and/or operation of the network and technological advances, impacts of, and responses to change, opportunities to enhance environmental sustainability and/or human wellbeing.

MY IDEAS

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

GUEST SPEAKER

SIMON KUESTENMACHER, Director and Co-founder of The Demographics Group, he presents on demographic and global trends that are shaping Australia today and into the future.

TOPIC: Global population trends and insights

A SUMMARY OF KEY POINTS

The following is a brief summary of some of the insights into global population and resources Simon provided.

- Overpopulation – have we reached peak humanity? Most common population projections are from the UN – but they are revising these. In 200 – 300 years concerns will be about a very old population and low birth rates. Working age population will peak in 2060's (UN).
- For Australia, basing population growth on immigration may not work long term – it will be more expensive as countries seek compensation for exporting their people to other places.
- Urban Asian middle class continues to expand – not slum dwellers but the largest middle class in human history.
- Australia has a simple economic model – dig it up, sell it, entertain people, and teach them. This will continue in the future. China is still urbanising, demand for iron ore and other resources from Australia will continue. Impact of India will continue with increased demand.
- *Double Net Importers* vs *Double Net Exporters*. USA produces more energy and food than it uses so it exports excess. China is extremely reliant on global trade (of energy and food) as are UK, Spain, Sweden, Finland, Germany (much of Europe), Chile, Japan, Philippines, parts of Africa, and Sri Lanka..
- Double net exporters are USA, Russia, Canada, Australia, South Africa, Indonesia. China is very reliant on Australia (energy and food) – Are we the Lucky Country? Read more in Simon's article **HERE**
- Massive challenges of climate change – will lead to big population movements 'global mega trends' – massive challenges for harder to defend border countries (not Australia. Some areas including Russia will benefit from climate change e.g., increased yields. Implications for urban sprawl taking up key farming land.

In summary:

- Global population keeps growing but only for a few more decades. Peak baby has passed.
- Australia's reliance on cheap migration will only last for another decade.
- Birth rates in Sub-Saharan Africa are much higher than globally but rapidly falling. Climate data will lead to movements from this region. 'Starve or move' or 'adjust family size expectation'. Africa still fastest growing area and they will move to Europe (slowest growing area). This will increase challenges e.g., cultural integration.
- Demographics aren't everything but they are everywhere. Russia reached its population peak just before invading Ukraine. Conscription of 18–27 year-old males – this demographic is increasing. Russian population decline has started and will continue. Russia faces a small window of demographic opportunity to 'pull off' European war while it has a high % in the 18–27 years age group.

Simon is on social media – Facebook and Twitter

NOTE: SEE ARTICLES ON POPULATION and GOLD EXPLOITATION LATER IN THIS EDITION

DISCUSSION QUESTIONS

Consider the following focus questions when planning this topic

FOCUS QUESTIONS PEOPLE, PATTERNS AND PROCESSES

- Where does the content of the expert presentation sit in the new syllabus?
- What will you look for when choosing TWO countries to compare in relation to population?
- Are there content areas you are not confident with?
- What options would you consider for this topic?
- What opportunities are there for spatial technologies and fieldwork?
- Suggest one effective teaching strategy that would suit the delivery of the content and skills.
- Where might this Focus Area fit in a Scope and Sequence Plan for the Year 11 course.
- Record THREE BIG IDEAS you have for this topic.

RESOURCES

BOOKS

MAGAZINES

SOCIAL MEDIA

VIDEO & PODCAST

WEBSITES

SPATIAL TECHNOLOGIES

RESOURCES

PAST GEOGRAPHY BULLETINS

POPULATION

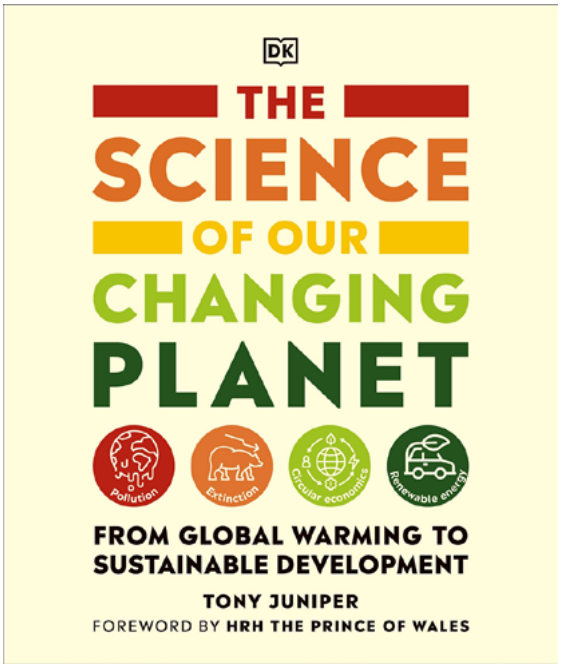
Population Boom or Bust	Volume 52, Special Edition, 2020
Population: 'World population may shrink by 2020'	Volume 52, Special Edition, 2020
Population: 'One million face displacement by 2050'	Volume 52, Special Edition, 2020
Population: 'Nearly 80- million displaced worldwide'	Volume 52, Special Edition, 2020
The problem of an ageing population	Volume 52, No 1, 2020

NATURAL RESOURCES

Case Study: Rare Earths	Volume 52, Special edition, 2020
'China may weaponise rare earths'	Volume 52, Special edition, 2020
'Environmental management in mining'	Volume 52, Special edition, 2020
Sand mafia in India	Volume, No 3, 2017
India's Blood Mica	Volume, No 3, 2017
Bangladesh leather	Volume, No 3, 2017

EDITOR BOOK RECOMMENDATION

The Science of Our Changing Planet by Tony Juniper
Dorling Kindersley Ltd.



YEAR 11 FOCUS AREA

HUMAN - ENVIRONMENT INTERACTIONS

Overview of change to Earth's natural systems over time

- Natural change compared to human-induced change
- Evidence of climate change in the contemporary world
- Evidence for the causes of climate change over time
- Land cover change at a global scale, including deforestation, desertification, melting glaciers and retreating ice sheets

Land use and land cover change

- The extent and rate of change in ONE form of land cover
  Examples of **land cover**: forests, deserts, glaciers, ice sheets

Human–environment interactions study

Students undertake ONE of the following studies to develop an understanding of natural and human elements, how they interact, and the implications of the interactions for people and the environment.

- Study 1: A geographic region (this may fall within a state or country or encompass a small group of neighbouring countries)
- Study 2: A contemporary hazard (ONE natural hazard OR ecological hazard)
- Study 3: Climate change.

20 HOURS

Overview maximum 3 hours

EDITORIAL COMMENT:
Teachers may choose to do this at the end of Focus area one Natural Systems to follow natural change over time.

OPTIONS: Changing land cover
- **deforestation**
- **desertification**
- **retreating ice sheets**
- **melting glaciers**

Focus in all options on
- **human–environment interactions**
- **evidence of change**
- **challenges, opportunities, and responses**

A study of ONE place required
- **within a region**
- **managing a hazard**
- **managing a CC challenge**

A CONTEMPORARY HAZARD should be viewed as one that has occurred this century.

The selection of a REGION study should consider what makes the region unique and different to surrounding areas.

There are variations in the content for these options because of the nature of the content.

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

OPTIONS

STUDY 1: A GEOGRAPHIC REGION

- The spatial dimensions and nature of a chosen geographic region, which may be of local or regional scale
- Unique characteristics of the natural environment, including physical processes and natural cycles influencing the nature of the region
- Human–environment interactions and evidence of change, including change due to international integration, change in relation to climate
- Challenges, opportunities and responses, including changes to natural processes systems and/or environments; impacts of change on people and communities; management to minimise negative impacts; varying perspectives.

  The effectiveness of people and organisations in managing ONE challenge at a selected place, within the region.

STUDY 2: A CONTEMPORARY HAZARD

- The spatial distribution and nature of the contemporary natural hazard
- Characteristics of the natural environment, including the physical processes and cycles influencing the nature and occurrence of the hazard
- Human–environment interactions and evidence of change, including the contribution of human activities to hazard events; change in relation to climate
- Challenges, opportunities and responses, including changes to natural processes, systems and/or environments; impacts on people and communities; management at a range of scales; varying perspectives.

  The effectiveness of people and organisations in managing ONE contemporary hazard event at a selected place.

STUDY 3: CLIMATE CHANGE

- Spatial and temporal characteristics of climate change at a global scale
- Environmental and human impacts of climate change at a range of scales, including impacts on natural processes, systems and/or environments, impacts on people and communities
- Challenges, opportunities and responses, including varying perspectives; mitigation in relation to the rate and magnitude of change; minimising risk through adaptation; resilience and innovation; local, national and global action.

  The effectiveness of people and organisations in managing ONE climate change challenge at a selected place.

MY IDEAS

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

GUEST SPEAKER

CATHERINE KERR, Office of Energy and Climate Change, NSW Treasury Climate Change Adaptation

TOPIC: Climate Change Adaptation

A SUMMARY OF KEY POINTS

The following is a brief summary of some of the insights into climate change adaptation provided by Catherine.

- Action on climate change – mitigation and adaptation focus.
- Australia warming faster than global average of 1.4 degrees since records began in 1910
- Actions have synergies – work together to overcome climate change.
- UN *Adaptation Gap Report* – the world is not doing enough / too slow.
- COP 26 adaptation agenda.

Australia

- A national strategy for just adaptation/ national climate change resilience.
- NSW working on climate change adaptation-strategy released in 2022. Four main priorities with overlap between govt departments:
  - Local govt – climate change grants – $3m for adaptation in place. Eg Cumberland Council's UV Smart Cool Playground project, Disaster and Emergency Management dashboard (Hawkesbury Local Council).
  - Community grants $615k supported 23 grants e.g. Northern Rivers – How on Earth project helping young people overcome climate anxiety, Restoring farmland in Capertee Valley.
  - Adapt NSW **website** and **teacher resources**.

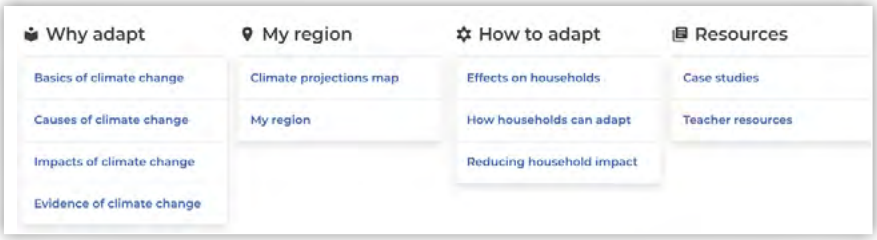
Key insights for students:

- Use Geoff Summerhayes, Bruce Mau quotes.
- Be aware of megatrends.
- Social media of **@atmos @earthrise.studio** to follow for climate change messages.
- Worldviews – becoming ecocentric.
- Increasing demand for environmental jobs – opportunities across sectors, interdisciplinary understanding essential to solve problems e.g., geo, eco, legal.
- Rise of environmental humanities, rise of customer centric design and innovation.

NOTE: SEE THE INFORMATION ON CLIMATE CHANGE ADAPTATION and ADAPT NSW LATER IN THIS EDITION

The ADAPTNSW website is full of resources for teaching about climate change in NSW.
https://www.climatechange.environment.nsw.gov.au/home

See 'Why adapt to climate change?' later in this edition.



GUEST SPEAKER

KAREN O'CONNOR, Fire Shield Mission Lead, Minderoo Foundation

TOPIC: Minderoo Fire and Flood Resilience Missions

A SUMMARY OF KEY POINTS

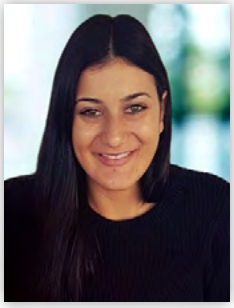
Karen O'Connor provided an overview of the work done by the **Minderoo Foundation** on the topic of natural hazards.

- Minderoo Foundation is a large philanthropic organisation, 20 years old
- Fire and flood resilience – We rise together 'lifting Australia to be the global leader in fire and flood resilience by 2025.

The Black Summer bushfires

- Long lasting health effects.
- Minderoo Foundation built temporary accommodation and worked alongside banks, fire agencies etc. to figure out the scale and scope of the problem.
- 186 million tonnes of carbon were released – which is the same amount of Australia's average annual emissions

- Conservative cost of disaster spending globally is $50b annually – much of this is after the event (97% afterwards).
- Minderoo focus on resilience and preparedness:
  - Mission Model is outcome focused, time bound, high risk - high reward, interconnected, system shift e.g., Kennedy with the moon mission – the 'Moonshot'.
  - Missions: Fire Shield, Resilient Communities, & Healthy Landscapes.
  - Underpinned by resilience



GUEST SPEAKER

RANIA POULLOS, Fire Shield Project Manager, Minderoo Foundation

TOPIC: Minderoo Fire Shield Mission

A SUMMARY OF KEY POINTS

"What if a fire never became a disaster?" https://www.minderoo.org/fire-and-flood-resilience/fire-shield/

The aims of Fire Shield are to:

- Protect and respond to fires in an hour by 2025 using satellite and AI technologies.
- Detect fires early, share information, predict what the fire will do, respond with informed decision making.
- CSIRO Spark – scalable, tailorable and updateable https://www.csiro.au/en/research/technology-space/ai/spark
- Another two 'black summers' in the next decade.
- Re-imagine how we deal with bushfires.
- Cool Australia teaching resources - links with curriculum materials/ PD modules https://www.coolaustralia.org/beyond-the-bushfires-education-resources/

DISCUSSION QUESTIONS

Consider the following focus questions when planning this topic

FOCUS QUESTIONS: HUMAN - ENVIRONMENT INTERACTIONS

- Distinguish between land cover and land use?
- What factors will influence your choice of an option study for this topic?
- Are there concepts and / or content areas you not confident with in this topic?
- What opportunities are there for fieldwork and using spatial technologies?
- Suggest one effective teaching strategy that would suit the delivery of the content and skills.
- Where might this topic fit in a Scope and Sequence for the Year 11 course.
- Record THREE BIG IDEAS you have for this topic.

RESOURCES

BOOKS

MAGAZINES

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WEBSITES

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RESOURCES

PAST GEOGRAPHY BULLETINS

YEAR 11: HUMAN – ENVIRONMENT INTERACTIONS

Land cover change: Deforestation	Volume 54, No2, 2022
Deforestation and Natural Cycles	Volume 53, Special Edition 2021
Creating text using infographics: Literacy skills	Volume 54, No2, 2022
The Amazon burns	Volume 51, No 4, 2019
Wild Australia: After the Fires. Documentary	Volume 53, No 1, 2021
Professional reading: How Drones are being used in Disaster Management	Volume 49, No 3, 2017
Ecological hazard / Biophysical Interactions – Malaria	Volume 48, No 2, 2016
Aboriginal Australia Series. Part 2: Aboriginal Fire Management	Volume 50, No 1, 2018
Natural Hazards: Why the volcanic eruption in Tonga was so violent, and what to expect next?	Volume 54, No1, 2022
The Tonga volcanic eruption has revealed the vulnerabilities in our global telecommunication system	Volume 54, No1, 2022
Tonga. Skills development	Volume 54, No1, 2022

THE GEOGRAPHICAL INVESTIGATION

ALLOCATED TIME: 20 Hours

There is no 'right' approach to integrating the GI into your Scope and Sequence.

Possible approaches to allocation of time could be:

- Staged over 2 terms 1 hour / week
- Staged over 1 term x 2 hours per week OR 1 full week + 1 x Hour / week + 1 full week at the end.
- A concise block of time - 5 weeks

PAST GEOGRAPHY BULLETINS

YEAR 11: GEOGRAPHICAL INVESTIGATION

Success in the SGP James Harte	Volume 54, No3, 2022
Simplifying the science. A guide to collecting fieldwork data for the Year 11 SGP	Volume 54, No1, 2022
Fieldwork Essentials: Preparing for Fieldwork	Special HSC Edition, No 1, 2018
Fieldwork Essentials: Conducting Surveys and Interviews	Special HSC Edition, No 1, 2018
Fieldwork Essentials: Basic fieldwork tools and techniques	Special HSC Edition, No 1, 2018

YEAR 12 FOCUS AREA

GLOBAL SUSTAINABILITY

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:
This is a new area that requires some consideration and research as there are limited published metrics … but it is improving.

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

The focus is on an economic *activity* and although visiting a local enterprise, representative of the global activity can be a relevant aspect for fieldwork, the global context and nature of sustainability strategies for the economic activity should be at the forefront when planning and programming this focus area.

EDITORIAL COMMENT:
The evaluation is for the industry on a global scale. Check availability of information on criteria for evaluating sustainability and global management strategies. The critical analysis of one strategy would include evaluation.

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

GUEST SPEAKER

KAREN DAVIDS, Circular Economy Consultant at MRA Consulting Group / High School & University Geography Tutor

TOPIC: Circular Economy Explained

A SUMMARY OF KEY POINTS

Karen provided a comprehensive overview of the concept of a circular economy and the challenges in scaling up initiatives at a range of scales.

- Production exclusively relies on virgin materials. This needs to change.
- Circular economy means keeping materials in use as long as possible – reuse / repair before recycling. Avoid re-manufacturing.

Principles:

1. Eliminate waste and pollution.
2. Circulate products and materials at their highest value.
3. Regenerate natural systems – look at opportunities such as large-scale composting/ urban farming/ permaculture.

Re- conceptualisation of waste:

1. Re-value – preserving legacies, building community and social purpose.
2. Re-articulate the semantics of waste – resource rather than waste.
3. Re engage – making waste visible – transpositional education:
   - Repair Cafe Sydney North
   - The Bower reuse and repair centre
   - Kimbriki resource recovery
   - The Green Shed – largest reuse in the Southern Hemisphere.

Barriers to scaling:

1. Funding constraints.
2. Physical infrastructure.
3. Political myopia and risk aversion.
4. Resource intensive to establish and maintain.
5. Craft knowledge and skills shortage – linked to structural change.

How do we scale up?

1. Multi stakeholder and multi sectoral approach.
2. Developing metrics.
3. More financial support.
4. Explicitly engage with the term repair and make them targets.

What is a circular economy – https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview

AUSTRALIAN CIRCULAR ECONOMY HUB

EDITOR NOTE: See the article from Australian Circular Economy Hub later in this issue. There are excellent articles and videos on the ACEH website **HERE**

GUEST SPEAKER

ALISON JOSE, Director of the Circular Centre and STSC Sustainable Textile Supply Chain & CEO of Adetex Circular Solutions,
creator of Circlolink Circular Materials Passport via RFiD Threads®

TOPIC: Circularity in the Textile/Fashion Industry

A SUMMARY OF KEY POINTS

Alison spoke on the issue of textile and fashion waste as well as solutions and challenges to addressing the issue at a range of scales. She spoke about the potential of the innovative RFiD threads in addressing the issue.

'We need to do good, not less bad' – William McDonough. *Cradle to Cradle*

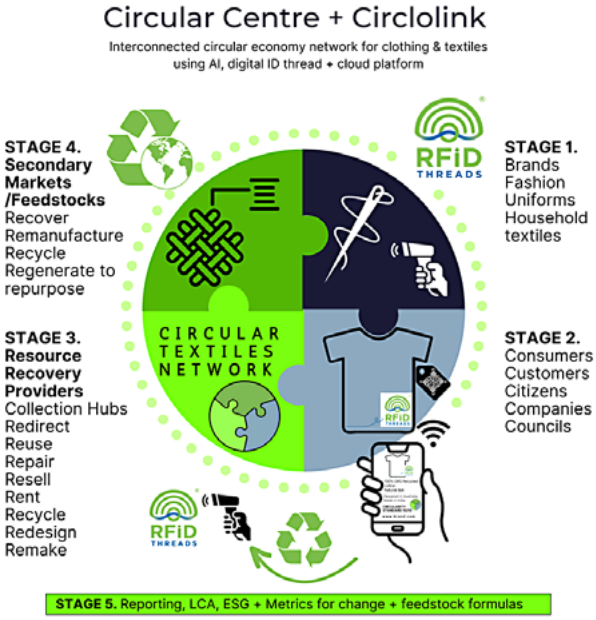
Ideas:

- Design out waste and pollution e.g., stop plastic textiles.
- Integrate first steps e.g., rent, resell.
- Regenerate nature- to generate the metrics – useful for 'criteria' to judge effectiveness of strategy.
- Minimise 'wish cycling' ABC Ghana – dead white man's clothes https://www.abc.net.au/news/2021-08-12/dead-white-mans-clothes/13495096
- Currently only 1% of textiles are recycled..
- Social issue – Rana Plaza collapse https://theconversation.com/years-after-the-rana-plaza-tragedy-bangladeshs-garment-workers-are-still-bottom-of-the-pile-159224
- Sweden – extended producer responsibility
- Needs to fall into the space of it doesn't take too much effort' to capture customers.
- Denim amnesty – General Pants.

Tracing product lifecycles:

RFiD threads – a metal scannable thread that goes onto clothing labels and can track the location of an item throughout its life cycle https://www.trimco-group.com/solutions/rfid.

- Could be used by consumers to make better purchasing choices.
- Connects various stakeholders such as brands and wholesalers and also collects data.
- Winner of global change award 'Nobel Prize for Sustainable Fashion'.
- Not about connecting to the people (it cannot track the person) – the garment is the focus.



GUEST SPEAKER

ALEX WEBB, Senior Communications and Marketing Manager, Oceania at the Marine Stewardship Council (MSC).

TOPIC: Industry Certification in Marine Fisheries

A SUMMARY OF KEY POINTS

Alex spoke about MSC industry certification as a criterion for assessing the sustainability of marine fisheries.

- Criteria for evaluating sustainability.
- Triple threat to ocean fish stocks – pollution, climate change and overfishing.

Marine Stewardship Council:

- Aims to decrease overfishing
- Fishing communities are doing the work
- Certification recognises and rewards fisheries for sustainable practices e.g. tuna.

- Geographic origin tracing relatively new.
- State of the ocean – UN FAO does a certification check every two years.
- Ocean food system - unsustainable practices will lead to further land degradation.
- SDG framework – 14 'life below oceans'.
- In Australia approximately 50% of retail fish is MSC Certified.

MSC Certification = the Blue Tick

- An outcome based standard, it recognises what you need to achieve rather than what you need to do.

  The standard is based on:
  1. Sustainability of stock.
  2. Ecosystem impact – food webs.
  3. Effective management.

- Ocean Stewardship Council fund research and provide grants and subsidies to fisheries.
- From ocean to plate – traces seafood back through the supply chain – chain of custody provided by certification.
- ACCC – recent crackdown on greenwashing.
- Consequences of mislabelled seafood – one-third globally – either for profit or by mistake.
- Building conscious consumerism.
- Building ocean literacy https://www.msc.org/en-au/for-teachers

EDITORIAL COMMENT

MONITORING / EVALUATING / ASSESSING SUSTAINABILITY

Potential criteria:

- SDG targets and indicators
- Footprints – water footprint, carbon footprint, energy footprint
- Circular economy – life cycle mapping, waste audits
- Supply chain analysis
- Labour practices – working conditions / worker health / fair pay
- Social justice and human rights record
- Economic viability
- Industry certification
- Environmental monitoring

DISCUSSION QUESTIONS

Consider the following focus questions when planning this topic.

FOCUS QUESTIONS: GLOBAL SUSTAINABILITY

- **How will changes to Year 12 assessment and HSC Examination requirements affect how you teach the year 12 course and the timing of different topics?**
- **What is the 'new' content in this Focus Area?**
- **What did you learn from the presenters and GTA analysis about measuring and assessing sustainability? (Conference delegates)**
- **Are there content areas you not confident with?**
- **Are there opportunities for fieldwork and using spatial technologies?**
- **Consider where this topic might be placed in a Scope and Sequence for the Year 12 course.**
- **Record THREE BIG IDEAS you have for this topic.**

RESOURCES

BOOKS

MAGAZINES

SOCIAL MEDIA

VIDEO & PODCAST

WEBSITES

SPATIAL TECHNOLOGIES

PAST GEOGRAPHY BULLETINS

YEAR 12: GLOBAL SUSTAINABILITY

Aquaculture,	Volume 52, Special Edition, 2020
Global Tourism update, 2020	Volume 52, No 3, 2020
Wine Industry update	Special HSC Edition, No 1, 2018
Going Bananas	Special HSC Edition, No 2, 2017
Dairy Production using BEESTOP	Special HSC Edition, No 2, 2017
Coffee Production	Special HSC Edition, No 2, 2017
Coffee Interconnections	Volume 49, No 4, 2017
Coffee Biomes	Volume 49, No 4, 2017
Chocolate (Cocoa)	Volume 49, No 1, 2017

YEAR 12 FOCUS AREA

RURAL AND URBAN PLACES

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

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

The studies selected for the rural place, urban place and large city must not overlap.

RURAL – regional centre, rural town, village, remote settlement
URBAN – suburb, urban precinct, urban corridor

If selecting a regional centre as the rural place it is ideal that its location has a rural context.
For example, Newcastle and Wollongong are not generally considered to be rural regional centres.

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

GUEST SPEAKER

ANDREW TOOVEY, Lecturer, UNSW School of Education.

TOPIC: A place within a larger urban settlement

A SUMMARY OF KEY POINTS

Andrew provided very comprehensive investigation into Campbelltown as an urban place within a larger urban place. Andrew included ideas for fieldwork, the use of spatial technologies and the sources of the data he used to support this investigation.

How to use an existing case study with new syllabus:

1. Tips for developing a new case study.
2. Ideas for integrating fieldwork with assessment in Year 12.
3. Integrating spatial technologies with fieldwork.
4. Walk through of a case study.

- Place geography opportunities – refer to scale – council, LGA, Macarthur region, Greater Sydney.
- Appropriate to understand scale and the size and diversity of SW Sydney.
- Google My Maps is an easy to use and access spatial technology tool.
- Physical processes operating at Campbelltown – watersheds, rain shadow, climate variations, Dharawal season calendar, fires plus smoke from nearby regions:
  - Look at the catchment – use Sydney Water for rainfall variability.
  - Use synoptic charts to understand specific weather events.
- Human processes – suburbanisation, urban decay and renewal, spatial exclusion, spatial inequality, urban villages:
  - Suburbanisation – rapid Sydney growth, improvement in transport tech- commuting, growth over time – use ABS data.
  - Housing commission – Claymore, Minto, Airds, Macquarie Fields – failed urban planning; urban decay – state government renewal – consolidation, increased density e.g., Macarthur Station/ Edmondson Park.
  - Spatial exclusion – Macquarie Links vs Macquarie Fields
  - Urban village – Park Central

Links to other places

- Road and rail e.g., East Hills Link
- 'Tap on' data show it is a commuter town … employment links
- Connection between Campbelltown and Port Botany – manufacturing links

Nature of Changes affecting the place

- Infrastructure hasn't kept up with growth e.g., hospital wait times,
- Death of the high street, loss of heritage and urban decay – changed Campbelltown from a country town to a satellite city of Sydney.
- Economic character – Positive e.g., jobs and housing availability. Negative – wait times/ pressure on infrastructure, car parking chaos.
- Social – lack of walkability and long commute times. See Jeff Speck's book *Walkable City*.
- The problem of the last mile – ABC/ UTS study.

Assessment

- Create a photo essay using Google y Maps for fieldwork – pinned to maps

GUEST SPEAKER

LARISSA SHASHKOF, Lend Lease Project Stakeholder and Communications Manager, Communities

TOPIC: Creating sustainable places – Fig Tree Hill

A SUMMARY OF KEY POINTS

Larissa provided very comprehensive investigation into the development of Fig Tree Hill (near Campbelltown) as a sustainable urban suburb.

Overview of location:

- SW Sydney, close to Appin on Appin Rd – Campbelltown area.
- Close links to Campbelltown.
- Land between Nepean and Georges River.
- Character – heritage listed (Mount Gilead Homestead).
- Greenfield site – wheat in 1800's, then dairying until rezoning.

Development:

- Fig Tree Hill will have 1700 homes – low density single dwelling, retail, community and school infrastructure (TB approved).
- Gilead will have 3300 new homes.
- 70% woodland had been removed for agriculture – conserving and replanting needed.
- Lend lease responsible for infrastructure upgrades e.g., new/ bigger roads.
- Hours of testing across site to check for first nations artifacts – point of trade – artifacts from all over Australia identified. Sacred sites protected.
- View lines protected.
- Electric – no gas connection. Incentives to use solar e.g., rebates. 'Looking at' battery storage – community scale. EV charging stations, bike paths connecting through bike paths.
- Landscaping important to reduce urban heat islands, re. wetlands.
- Habitat restoration includes changing the chemical composition of the soil – from pasture to woodland. Removing livestock through fencing helps regeneration. Removal of invasive species, restoring natural watercourses.
- Connections USYD, WSU – insects and regeneration, platypus surveys.
- Biodiversity corridors determined by NSW government.
- Use of technology to track animal movements e.g., dogs getting into conservation areas.

DISCUSSION QUESTIONS

Consider the following Focus questions when planning this topic.

FOCUS QUESTIONS: RURAL AND URBAN PLACES

- What information will you look for when choosing places to study?
- Can you adapt current studies to the new syllabus requirements?
- Where could you embed fieldwork and spatial technologies?
- Consider where this topic will fit in a Scope and Sequence for the Year 12 course.
- Suggest one effective teaching strategy that would suit the delivery of the content and skills for this focus area.
- Record THREE BIG IDEAS you have for this topic

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PAST GEOGRAPHY BULLETINS

YEAR 12: RURAL AND URBAN PLACES

Busting the bands: Mega cities	Volume 52, No 3, 2020
Stage 6 Skills: Dharavi	Volume 52, No 3, 2020
Sydney's Darling Harbour	Volume 51, No 2, 2019
Central Maitland	Volume 51, No 2, 2019
Sydney Olympic Park, Newington, Rhodes and The Waterfront	Volume 52, Special Edition, 2020
Sydney's Green Square	Volume 51, No 2, 2019

ECOSYSTEMS & GLOBAL BIODIVERSITY

45 HOURS

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

EDITORIAL COMMENT:
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 studied.

EDITORIAL COMMENT:
FOR EACH ECOSYSTEM INVESTIGATED BELOW, try to link to this section

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
  - Level of development
  - Culture
  - Indigenous practices
  - Ideology
  - Nature of the economy
  - Land ownership
  - Business interests
  - Government policy
- The role of contemporary research and innovation in the sustainable management of the ecosystem

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:
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.

GUEST SPEAKER

PROFESSOR BRETT SUMMERELL,
Chief Scientist & Director Science, Education and Conservation, Royal Botanic Garden Sydney / Australian Institute of Botanical Science.

TOPIC: Biodiversity Conservation

A SUMMARY OF KEY POINTS

Professor Summerell provided an overview of the challenges facing biodiversity globally and in Australia.

Biodiversity Conservation:

- Problems with biodiversity conservation are a challenge globally.

  Australia
  - Biodiversity hotspots.
  - 85% endemism – a product of Gondwana.
  - Tree diversity significantly higher than in USA.
  - Tropical rainforest significantly impacted by human use – less than 5% remaining however contributes to overall biodiversity in Australia.
- Main biodiversity conservation issues in Australia:
  1. Land clearing – agriculture, mining, and urbanisation.
  2. Invasive species – feral animals, weeds, exotic pests, and disease invasion e.g., horses, cats, weeds, African olive, lantana.
  3. Climate change, temperature extremes, wildfires.
  4. Fragmentation.

Australia:

- Sorry tale of extinction of every level of species – plants, mammals, bird, reptiles, invertebrates, fungi, fish.
- Impacts of large natural hazards e.g., bushfires – Gondwanan rainforest world heritage – 7 billion plants impacted, 367 threatened species impacted.
- Invasive species – *myrtle rust* from Brazil in 2010. Started west of Gosford – now all over the country in just 13 years. 16 species on extinction trajectory as a result.

The future:

- Great time to be a scientist/ geographer – excellent tools e.g., germ plasma/ gene banks/ Mount Annan PlantBank / seed banking. Lots of detailed work is going into collection and storage of biological material.
- DNA and genomic tools are very useful for understanding genetics for cross breeding including finding the best changes that can allow plants to withstand changes in environment
- Plant blindness – important to consider whole ecosystem interdependence 'no plants no future'.

EDITOR'S NOTE

See the information later in this bulletin for links to resources provided by the Sydney Royal Botanic Garden AND Australian Institute of Botanical Science. I highly recommend the Branch Out **podcasts**.

Potential cross topic fieldwork could include visits to Campbelltown and Fig Tree Hill for Urban and Mt Annan Botanic Gardens for Global Biodiversity.

DISCUSSION QUESTIONS

Consider the following focus questions when planning this topic.

FOCUS QUESTIONS: ECOSYSTEMS AND GLOBAL BIODIVERSITY

- What ideas about biodiversity were provided by the expert presenter? (Conference delegates)
- What ecosystems do you currently study and how do the syllabus changes affect your ability to continue with these? (One in Australia, One overseas)
- What factors will guide your choice of a comparative management strategy for each type of Ecosystem?
- How will you embed fieldwork and spatial technologies into the topic?
- Suggest one effective teaching strategy that would suit the delivery of content and skills.
- Where will you look to find information on the role of contemporary research and innovation for each type of ecosystem?
- Record THREE BIG IDEAS you have for this topic.

RESOURCES

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YEAR 12: ECOSYSTEMS AND GLOBAL BIODIVERSITY

Biggest threats to Earth's biodiversity	Volume 53, No1, 2021
Great Southern Reef Case Study	Volume 53, No 4, 2021
Google Site	https://sites.google.com/view/gtanswactgreatsouthernreef/home
Tropical Rainforest Heritage of Sumatra	Vol 53, Special Edition 2021
Kakadu Wetlands	Vol 53, Special Edition 2021
Ningaloo Reef	Volume 52, Special Edition, 2020
Oregon Dunes	Volume 52, Special Edition, 2020