

Geography: Units 3 + 4 Notes

MAPPING:

Site: Physical characteristics of the land on which a feature is located.

- Height above sea level
- Slope of the land – may include landform types
- Drainage patterns or features like rivers
- Natural vegetation

Situation: The location of a feature in relation to other significant features, both cultural and physical. (i.e. longitude/latitude, direction & distance from things nearby, its position along a road/railway))

- Latitude & longitude
- Distance and direction from settlements
- Distance and direction to coast or nearest river
- Accessibility to major transport routes
- Position as identified by it's regional or national significance

Gradient: The steepness of a slope (expressed as a fraction or a ratio)

Gradient = Rise / Run

Rise: Vertical interval (difference in height).

Run: Horizontal distance. Both must be put into metres.

If it is a fraction such as (57/950), you would then divide 950 by 57, and the gradient would become (1:16.67 ~ 1:17)

Scale: Larger scale = smaller map. Smaller scale = larger map.

Natural Feature: A feature that occurs naturally on Earth's surface (i.e. landforms, rivers, lakes and native vegetation)

Cultural Feature: Human made or modified features (i.e. buildings, bridges, roads, orchards and towns)

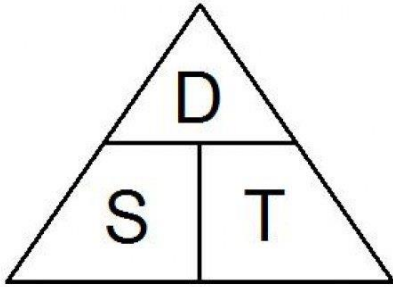
Contour Lines: These will be the same throughout the entire map.

Latitude and Longitude: Latitude is the angular distance north and south of the equator (always 'S' in Australia). Longitude is the angular distance east and west of the Prime Meridian (always 'E' in Australia). Latitude stated first, followed by longitude. If the map is in Australia, latitude is the smaller reading and longitude is the larger reading.

Area:

1. Determine in which grid square(s) the feature is located.
2. Estimate the amount of each grid is occupied by the feature.

Speed/Distance/Time: Measure the distance between the two points. If you are finding time, divide the speed by the distance to find time. If you are finding speed, multiply the distance by time (in km/hr)



Slope: Uniform slope is when contour lines are evenly spaced. Concave slope is when contour lines are widely spaced at the bottom and more closely spaced towards the top. Convex slope is when lines are closely spaced near the bottom (base) and more widely spaced towards the top.

Constructing a Sketch Map:

1. Sketch maps need to be drawn free hand using a pencil. Colour can be added after all features are included and annotated. Depending on the question, features can be labelled and/or included in a legend.
2. Determine the scale at which the sketch map is to be drawn.
3. Use the grid squares on the topographic map to assist in locating features more accurately
4. Draw in the most significant or identifiable features first. This could include a major transport link; drawing in roads could be useful as it helps define the edges of areas.
5. Draw in the remaining features that the question stipulates.
6. Include all mapping conventions – title, legend, north point and scale.

UNIT 3 OVERVIEW:

Environment (Biophysical Environment): Refers to the natural living (biotic) and non-living (abiotic) elements of the Earth's surface and in the atmosphere, and also includes any aspects of the Earth's surface that has been changes by humans.

Natural Biome(s): A community of life forms that have adapted to a large natural area. These biomes are often named after the most common vegetation in that area due to their climate conditions.

Classifications:

Terrestrial:

- Polar
- Tundra
- Forests
- Grasslands
- Desert

Aquatic:

- Wetlands
- Marine

Anthropogenic (Human) Biome:

Biomes that have been created as a result of sustained (continued) human interactions with natural environments and ecosystems that sees these environments changed.

Includes: Dense Settlements, villages, croplands, rangelands.

Land Cover Change: The changes that have taken place in/to natural environments due to a variety of natural or human induced causes.

Ecosystems: A community of living organisms (biotic) and non-living (abiotic) features that interact with each other in a specific environment.

Can be indefinite sizes, from micro (puddle or log), messo/medium (lakes) to large (biomes).

Ecosystem Dynamics: Interactions and flows from one organism to another.

Most important flow = flow of energy (Food chains/webs)

Other flows: Nutrients and Carbon.

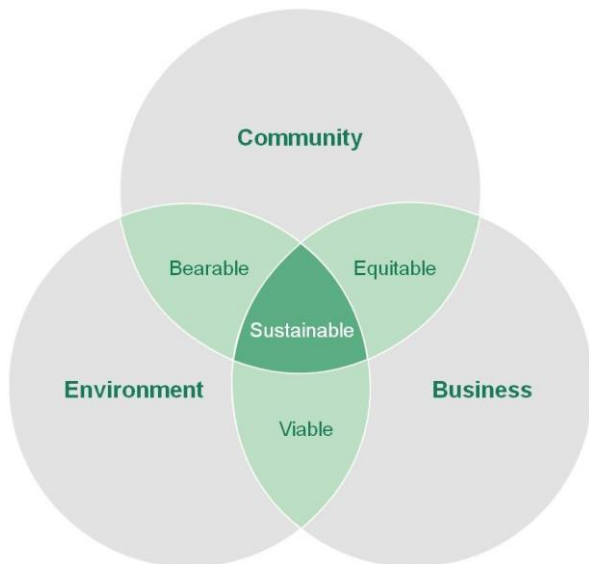
Ecosystem Structure: Abiotic Solar Energy & Water → Producer → Consumers (1st – 4th order) → Decomposers.

Biodiversity Loss: The decrease (loss) in the number, type and variety of living organisms in an environment.

Climate Change: The long term or permanent shift in some or all parts of the weather conditions (rainfall, temperature, atmospheric composition and conditions) experienced in an area. It must occur over a prolonged period of time. Usually decades to centuries.

It involves the Earth's climate changing from periods of warming to (interglacial) to periods of cooling (glacial) and can occur due to natural or anthropogenic (human) causes.

Sustainability: Meeting the needs of current generations without compromising the needs of future generations through simultaneous environmental, economic and social adaptations and improvements.



Anthropogenic Processes that have Impacted on Land Cover Change:

World Population Growth:

World population has grown rapidly between 1900s and 2000s.

Has come about due to high fertility rates, medical advancements, lifting of population restrictions...

Advances in Technology:

Industrial revolution – Began in 1700s in England. Involved the movement away from human labour and the use and development of machinery.

Soon spread across Europe, Americas and Asia.

Not all countries have had the same level of development. (MDC's and LDC's...)

Affluence:

Having a great deal of money and wealth.

Higher level of wealth = Higher demand for resources

Processes of Land Cover Change:

Deforestation: Action or process of clearing forests or large areas of trees in order to make the land available for other uses.

3 main ways: slash and burn, clear cutting, selective logging

Occurring in: Brazil, Indonesia.

Expansion and Intensification of Agriculture:

Expansion: Increasing the amount of land cover used for agricultural activities

Intensification: Increasing maximum output or production of crops and animals on smaller areas of land.

Occurring in: South America, Asia, USA...

This can lead to....

Land and Soil Degradation: The deterioration of quality and health of the soil in a particular area. Includes deterioration of physical state, chemical composition and biotic elements.

Occurring in: Sub-Saharan Africa, Asia, Brazil, AUS, USA

Rangeland Modification: Rangelands (large natural areas of predominately grasses) are changed by humans to make them more suitable for grazing and raising animals or changed by the impact of animals.

Occurring in: USA, Africa, Australia

Irrigation: The artificial application of water to the land or soil for agricultural purposes through the use of diverting streams, flooding areas, or use of pumps and sprinklers from ground water.

Occurring in: Along rivers in Northern India, China, Egypt, California, Australia.

Land Drainage and Reclamation:

Drainage: Removal of water from an area of land.

Reclamation: Process of creating new land from oceans, rivers, lakes, wetlands...

Occurring in: Netherlands, Asia, Singapore, Ireland, Perth

Growth of Urban Settlement (Urbanisation): Increase in population living in urban areas.

Occurring in: USA, Canada, AUS, Germany.

Growth of Industry and Mining: To keep up w/ demand large scale mines are being built or expanded.

Occurring in: AUS, China, USA, Russia.

Impacts of Land Cover Change:

Loss of Biodiversity:

Mainly due to agricultural and urban activities. Deforestation is resulting in a loss of habitat and therefore biodiversity. This has an impact on...

The Water Cycle:

Changing the natural flow and storage of water impacts dramatically on the natural cycle of water from the atmosphere to the ground and back again, the amount of water in the cycle and the quality of the water. This has occurred as a result of:

- Damming
- Changing the Earth's surface/vegetation (Increasing runoff, erosion and sediment disposition)
- Irrigation (Causing run off and algal blooms)
- Deforestation (reducing transpiration, raising water table)
- Polluting water ways
- Overusing ground water

Soil Erosion and Degradation:

Greater demand for agriculture creates LCC to allow for agricultural land. Impacts on soils in a number of ways:

- Less fertile and nutrient rich topsoil
- Compaction of soils
- Salinity (Dryland and irrigation induced)

Regional Climates and Urban Heat Island:

LCC, particularly deforestation and changes to the water cycle have large impacts on regional climates and in creating the urban heat island effect:

- More CO₂ in atmosphere as a result of less trees
- Removal of vegetation and the replacement with a built environment results in the urban heat island effect. These absorb and radiate more heat.

Aquatic and Marine Environments:

Human activities have had an impact on the quality and flow of water.

- Runoff of fertiliser and manure causes algal blooms and decreased levels of oxygen in the water.
- Ocean acidification as a result of increased CO₂
- Damming rivers stops the flow of sediment and nutrients and changes water temperature

Loss of Ecosystem Services:

LCC has resulted in the loss of ecosystem services. Ecosystem services are the benefits that humans derive from ecosystems:

E.g. Ecosystem Services from Forests:

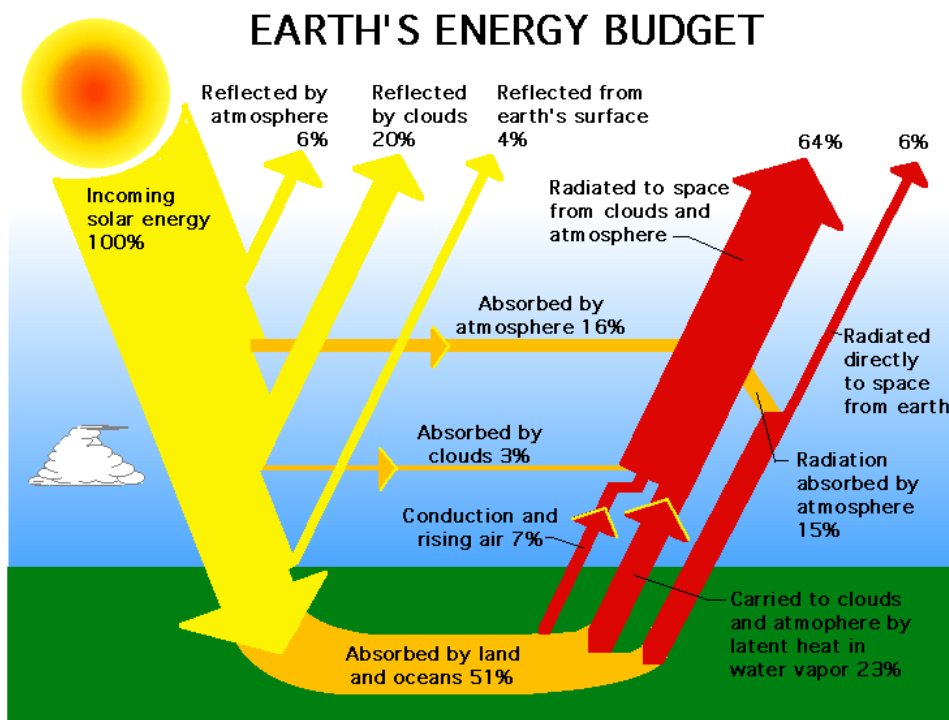
| Resources | Cultural Services | Regulatory Services |
|---|---|---|
| <ul style="list-style-type: none">- Timber- Medicinal- Food- Paper | <ul style="list-style-type: none">- Tourism- Recreation- Education- Indigenous Value- Spiritual Value | <ul style="list-style-type: none">- O₂ Production- CO₂ Reduction- Reduction of flooding- Biodiversity maintained- Habitats for fauna- Prevents soil erosion. |

DEPTH STUDY 1 – GLOBAL CLIMATE CHANGE:

Heat Budget + Greenhouse Effect:

Heat Budget: The balance between heat energy reaching the Earth as short wave radiation (insolation) with the amount of heat energy emitted by Earth back into space as long wave terrestrial radiation.

- Heat budget provides Earth with its temperature
- Earth average temp is 15°C
- This temperature is caused by differences between long and short wave radiation, this is heavily influenced by the Greenhouse effect.

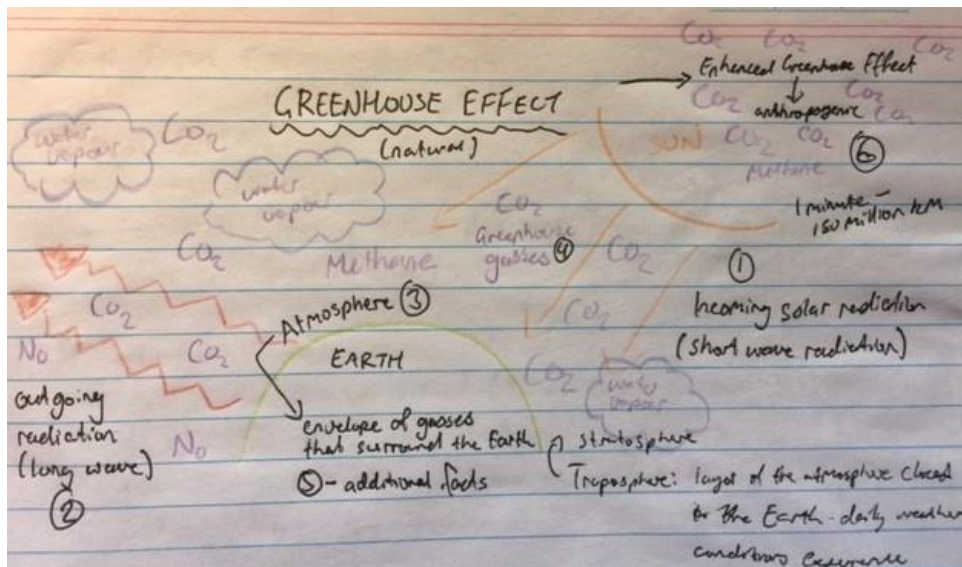


Key Terms/Elements:

- Insolation: Incoming solar radiation (short wave)
- Albedo: The reflective ability of a surface
- Conduction: Transfer of energy in the form of heat from one object to another through direct contact.
- Convection: Continuous cycle of heated particles in the atmosphere rising and then cooling and sinking.
- Evaporation: Change of state from liquid to gas due to heat energy
- Latent heat: Quantity of heat absorbed by a substance undergoing change of state.
- Absorption: Taking in of heat energy
- Terrestrial Radiation: Heat energy radiated from the lithosphere (land masses)

Greenhouse Effect: The natural warming effect that occurs in the lower atmosphere of the Earth that is created by the absorption of heat energy by greenhouse gasses.

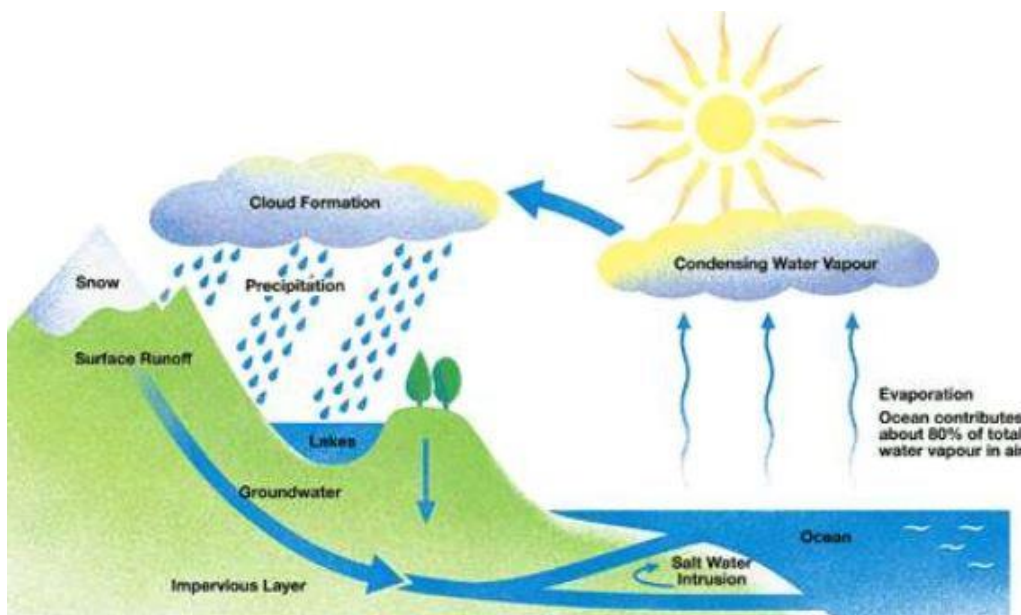
- Occurs as long wave radiation emitted from Earth tries to leave the Earth's atmosphere, in which some does, but most is radiated back to Earth by greenhouse gasses.
- These gasses include: Carbon Dioxide, water vapour, methane, and nitrous oxide.



Hydrological Cycle:

The continuous movement of water between all of the different spheres of the Earth – the atmosphere, biosphere, cryosphere, hydrosphere and the lithosphere – in the form of either liquid, water vapour, snow or ice.

It is driven by the forces of solar energy and gravity.



Key Terms/Elements:

- **Evaporation:** Change of state from liquid to gas due to heat energy
- **Transpiration:** The evaporation of water from pores in plants leaves
- **Evapotranspiration:** Combined Evaporation from the Earth's surface, water bodies and plants.
- **Condensation:** The process of water changing its physical state from solid to liquid.
- **Precipitation:** Process of water, in the form of rain, snow, sleet or hail, falling from the sky
- **Sublimation:** Transition of a substance from a solid to gas phase
- **Infiltration:** Water soaking or seeping into the ground.
- **Capillary action:** Movement of water through a channel in a substance (e.g. water through soil)

Interactions between heat budget and hydrological cycle to influence Earth's climate:

- Energy from the heat budget is required to initiate the process of evaporation within the hydrological cycle. Water rises and cools to form precipitation
- Energy from the heat budget is required for transpiration. Adds to total water in the atmosphere
- Oceans along the equator absorb large amounts of insolation from the heat budget that creates warm ocean currents. These currents allow for greater amounts of evaporation and therefore higher levels of precipitation in these areas
- Formation of clouds in the hydrological cycle directly affects the amount of insolation being reflected back directly into space, as part of the cloud-albedo effect. Clouds absorb ~3% of insolation, playing an important role in balancing amount of heat energy in Earth's atmosphere.
- As water vapour changes state from liquid to gas during condensation it releases latent heat energy. Aids the heat budget through the transfer of heat back into space.

Evidence of Climate Change – Geological Time:

Ice Core Samples: (Proxy Source)

- Bubbles trapped within the ice capture the gas concentration of our well mixed atmosphere while the ice itself records other properties including a window into 800,000 years of past climates
- Scientists bore into ice sheets and remove an ice core
- These cores have layers in them that form throughout the years
- Revealed 8 previous glacial cycles
- Ice cores can tell scientists about temperature, precipitation, atmospheric composition, volcanic activity and wind patterns.

Evidence of Climate Change – Recent Human History:

Direct Sources: Satellites, Weather Balloons, Weather stations.

What they are telling us:

- Increasing global temperatures
- Changes to atmospheric composition
- Changes to rainfall patterns
- Shrinking ice caps
- Changes to ocean temperatures (and rising sea level)
- Increase in frequency and severity to natural hazards.

DEPTH STUDY 2 – LAND COVER CHANGE:

How human activities need to adapt to climate change:

Desalination: (Urban Settlements/Industry)

- Climate change has resulted in the SW becoming drier
- Process of removing salt and other minerals from sea water
- Issues: Large amounts of power to run, waste products in ocean
- Pros: Does not deplete groundwater/dams

GM Crops: (Agriculture)

- Altered to make crops resistant to pests, insects and diseases
- Heat and drought tolerant
- Salt tolerant
- Can stand weather extremes
- Drought tolerant wheat and barley in Australia

Global Mitigation for CC:

- IPCC Report 2014
- Paris Conference 2015:
 - UNFCCC
 - Limiting global warming to less than 2° pre-industrial levels
- Kyoto Agreement 1997:
 - Treaty to reduce GHG emissions
 - Sets binding and legal targets for 37 developed countries

Australia's Mitigation Strategies for CC:

- Renewable Energy:
 - Wind, Solar, Hydro...
- Carbon capture and storage:
 - Capturing CO2 and storing it to reduce GHG emissions
 - Gorgon Carbon Dioxide Injection Project
 - Largest program
 - Capture CO2 from gas processing facility
 - Barrow Island
 - Otway Project
 - CO2 in depleted gas reservoir
 - Since 2008
 - Victoria

Addressing LCC:

Local/Regional RESTORATION – Beeliar Wetlands:

- Started in 1985
- Each year 5000 to 10000 endemic plants are established
- Annual watering program
- Removal of introduced pests and weeds
- Ongoing maintenance
- 5.5 hectares successfully restored to original state since 1985.

Local/Regional REHABILITATION – Alcoa Mine site:

- Bauxite crushed and turned into alumina
- Willowdale and Huntly mine sites
- 650 hectares of forest land is cleared, mined and rehabilitated each year
- Before mining is done environmental surveys are taken. Provides information of fauna in the area, potentially identifying endangered species
- Mining process:
 1. Clearing
 2. Topsoil removal (Used for rehabilitation)
- Rehabilitation process – Alcoa aims for 100% species return
 1. Pre-ripping and landscaping
 2. Soil Return
 3. Contour ripping
 4. Seeding
 5. Planting by hand
 6. Fertilising
 7. Monitoring and management

Mitigation Strategies for LCC:

Forest Management Plan 2014 – 2023

- Main Strategies:
 - Use of reserves
 - Restricting future LCC
 - Eliminating introduced pests and diseases
- Covers 2.5 Million hectares
- Aims to mitigate future LCC by:
 - Placing areas of biological importance into reserves, conservation areas and national parks
 - Limitations and restrictions on urban and rural activities in the area
 - Eliminating introduced pests, weed species and diseases

Impacts of LCC:

1. Loss of biodiversity and habitat
2. Soil erosion and degradation
3. Changes to regional climate
4. Degradation of marine/aquatic environment
5. Impacts on the water cycle

Programs designed to address the impacts of LCC:

Silviculture: Use of forest and woodlands to meet the needs of society in a sustainable way.

Managing the ecosystem services that the forest gives us.

- **Processes:**
 - Thinning to promote growth
 - Gap creation/clearfell
 - Prescribed burns.
 - Habitat conservation.

Alternative approach to LCC:

Western Shield and Captive Breeding Program:

- Animal conservation program
- Protecting native animals by controlling foxes and feral cats
- Baiting with 1080 poison.
- Also involved in captive breeding programs for threatened native species.

UNIT 4 OVERVIEW

Rural Places: Any places which are not part of an urban area which is associated with primary industries such as agriculture and mining

Urban Places: Densely populated areas that are associated with secondary or tertiary industries such as manufacturing, processing and the provision of services.

Human Wellbeing: State of being comfortable, well and happy

Internal Morphology: Arrangement of the functions and land uses within a place

External morphology: Shape created by outer edge of an urban place

Urban Processes: Processes that operate within an urban or rural area that change the internal and external morphology of a place.

Processes of Urbanisation and implications for world population growth and human wellbeing:

Urbanisation: Increase in the proportion of people living in urban areas of a country as people move from rural to urban areas

Processes:

- **Pre-Industrial (Agricultural Era) 1500-1750**
 - Urban places in walled areas and castles (mainly defence)
 - Settle instead of nomadic lifestyle
- **Industrial 1750-1970**
 - Large scale mechanism occurred with technological advancements
 - Dramatically accelerated urbanisation
 - Led to overcrowding
- **Post-Industrial 1970-Present**
 - Post War mass urbanisation due to transport (car)
 - De-industrialisation in some urban areas (due to offshore labour)

Implications for Population Growth:

- World population growth has increased dramatically
- Result of medical advancement and improvements in technology
- Different rates – More in developing countries

Implications on Human Wellbeing:

- Advancements in technology allow for clean and accessible fresh water
- Sanitation and sewage infrastructure
- Medical advancements
- Welfare
- Reducing poverty, illness and inequality

Economic and Environmental interdependence:

Economic:

- Agricultural products for local global markets (Rural → Urban)
- Forest products
- Mining
- Energy production

Environmental

- Sea change and tree change
- Flow of waste from urban to rural (dumping)
- Rural has ecosystem services for urban areas

Factors influencing location of rural and urban places:

Historical:

- Britain discovering Australia. Creating settlements
- These settlements grew and influenced location of surrounding cities
- Initial location is capital cities

Cultural:

- Society prefers coastal cities
- Willingness to travel resulted in spread away from urban areas
- Ensure services are adequate distance
- People do not want to be next to conflicting land uses (noise, smell)

Environmental:

- **Topography: (Shape of the land)**
 - Flat/gently undulating coastal planes influence location as they are easier and cheaper to develop
 - E.g. SW W.A
 - Steep rugged slopes restrict urban development
- **Fertile Soil and Agriculture:**
 - E.g. Rich alluvial soil along Murray River accounts for higher population density of inland urban and rural places in VIC and NSW
 - E.g. Swan River and Swan Valley

- **Hydrological Features:**
 - High population densities found along rivers. – Initially for use and fresh water
 - Also applies for agriculture
 - Coastal locations chosen due to access
- **Climate:**
 - Adequate rainfall and moderate temperatures
 - Arid-Semi arid have lower population densities

Economical:

- Rural places (especially for agriculture) are located on coastal areas for access to ports and environmental factors
- Agricultural regions are located away from urban areas due to the need for extensive and cheaper land
- Discovery of gold in regional locations influenced development of towns and cities. (also result of discovery of iron, diamonds and coal...)
- Locations of Ports for exports also influenced locations for shipping and mining processes.

Urban Sprawl:

Low density outward growth of urban areas into the surrounding areas and natural ecosystems.

Contributed to characteristic/function of urban areas by:

- Layout being low density (single double storey detached). Heavily car dependant
- Changing function of these areas from rural to urban

Invasion and Succession:

Invasion: Where a type of function/land use moves into another functional zone area.

Succession: When the invading factors have substantially replaced the previous land use of the area.

Leads to: Urban blight, Urban shadow effect.

Contributed to characteristic/function of urban areas by:

- Abandoned and blighted structures due to uncertainty of future invasion. Lowers property value
- Change in function from agriculture to urban

Renewal:

The large-scale development of urban or rural areas by the government as part of planning schemes.

Contributed to characteristic/function of urban areas by:

- Changing functions of place from industrial to residential and special purpose
- New urban structures are developed to attract tourism and people to area

Planning:

Government regulations, zoning and policies put in place that creates change and patterns to functional zones in urban and rural areas.

e.g. Buffer Zones, renewal...

Contributed to characteristic/function of urban areas by:

- Grid structure of CBD for accessibility
- Transport links that influence location of zones and shape of city
- Rezoning areas for other functions
- Buffer zones to separate area

Land Use Competition:

Where different functions of land use compete for the same use of an area which is ultimately determined by the value of the land and the ability of the land use to make a profit.

Contributed to characteristic/function of urban areas by:

- Creating vertical zonation/high density characteristics in areas
- Creating patterns of internal morphology across different rural and urban areas

Inertia:

The tendency of an activity or function to remain in a location and resist being moved despite having no economically viable advantages.

Can be **historical** or for **industrial/commercial** reasons.

Contributed to characteristic/function of urban areas by:

- Having historical buildings found within and around new dynamic structures
- E.g. Perth Mint

Agglomeration:

The grouping together of different or related land use functions in rural and urban places in order to benefit from each other's operations or share common infrastructure.

Contributed to characteristic/function of urban areas by:

- Grouping industrial functions together
- In rural areas services and agricultural based business located together

PERTH – URBAN CHALLENGES

Urban Sprawl:

Definition: The expansion of urban populations away from the central urban areas to low density and usually car dependent communities

Why is it a challenge: Car dependency. Lack of services

Solutions: High-Medium Density housing

Nature: Low density urban development primarily for residential functions, into the outer rural-urban fringe. (i.e. growth towards the edges of a region)

Scope/Extent:

- City wide challenge as the PMA is the most stretched out cities in the world (150km North to South) Rockingham to Alkimos
- 317 people per km². Lowest population density of any major city in Australia
- Each year 851 hectares is cleared for new developments within PMA

Causes:

- Population growth
- Expansion of transport networks (Freeway)
- Attraction of the RUF (Cheap first homes)
- Government policies (1970's Corridor Plan, First homeowners grants)

Implications:

- **Social:**
 - Longer commute times
 - Stress
 - Loss of productivity
 - Traffic congestion
- **Economic:**
 - Money spent to provide services, power, gas (Infrastructure)
 - Construct transport routes
 - Fuel/car costs
- **Environmental:**
 - Conflict (rural and urban functions)
 - Rural functions being pushed further away
 - Removal of natural vegetation
 - Loss of biodiversity

Planning Strategy:

Directions 2031: A spatial framework and strategic plan that establishes the vision for the future growth of the PMA. It provides a framework to guide the planning of housing, infrastructure and services to accommodate the growing population of Perth.

Strategies promoted by Directions 2031:

- **Land use zones/zoning:** Subdivisions (Changing R-codes)
- **Infill:** Greenfield and brownfield developments
 - Greenfield: Corimbia (Landsdale)
 - Brownfield: Whitegum Valley (Formerly Kim Beazley School)
- **Consolidation:** Increasing urban density
 - Occurs in older suburbs closer to the CBD with small houses and large blocks of land (Tuart Hill, Dianella, Morley...)
- **Redevelopment/renewal:** Brownfields
 - Subiaco Oval Redevelopment

Traffic Congestion:

Definition: High usage of roads leading to slower speeds and increased commuting times.

Why is it a challenge: Increased commuting times. Increased pollution.

Solutions: Public Transport

Nature: When the flow or movement of vehicles using a road network exceeds the capacity of the road, causing congestion at consistent and predictable times and places

E.g. Morning and afternoon peak hour traffic

Scope/Extent:

- Perth experiences extensive recurring peak hour traffic congestion in the morning and the afternoon every weekday starting at 5:45am to 9am and 3:30pm to 7pm
- Experienced on the Kwinana and Mitchell Freeway from approximately Hodges Drive in the North and Russel Road on the Kwinana and along all main roads leading in and out of the CBD or connecting to the Freeways.

Causes:

- Population growth and increased vehicle ownership
- Limited and ineffective public transport
- Urban Sprawl
- CBD Dependence
- Random Congestion

Implications:

- **Social:**
 - Loss of family time
 - Increased stress
 - Increased car accidents
- **Economic:**
 - Lost productivity and missed work costs \$12B per year
 - Loss of business due to late/missed appointments
- **Environment:**
 - Increase in GHG emissions due to slowed traffic

Planning Strategy:

Transport @ 3.5 Million: A plan that links to the Perth and Peel @ 3.5 Million plan. It aims to connect the major activity centres and encourage transit oriented development.

Achieved through road and rail improvements such as:

- **Perth Freight Link (Roads):**
 - Provides a link between industrial areas of Kewdale and Welshpool with the Fremantle port
- **Metronet (Rail):**
 - Forrestfield Airport Link (Rail):
 - Links airport and Forrestfield to current midland line
 - Extension of Joondalup line to Yanchep
 - Ellenbrook line

Urban Processes:

- **Urban Blight**
 - **Definition:** Poor quality, deteriorating urban structures in inner city areas
 - **Example:** Deteriorating house in East Perth
 - **Why:** Invading functions. Commercial and industrial
- **Invasion**
 - **Definition:** Where one type of function / land use moves into another functional zones area
 - **Example:** Residential housing invading cemetery.
 - **Why:** Desirable land close to CBD

- **Inertia**
 - **Definition:** The tendency of a function / activity to remain in a location and resist being moved –even if the location is no longer economically viable and all advantages are gone. Can be historical or commercial/industrial.
 - **Example:** East Perth Cemetery
 - **Why:** Historical and ethical reasons
- **Urban Renewal**
 - **Definition:** Is the large-scale redevelopment of urban or rural areas by the governments as part of planning schemes
 - **Example:** Elizabeth Quay
 - **Why:** Make city more attractive, increase land values.
- **Urban Redevelopment**
 - **Definition:** Small-scale individual projects initiated by private landowners or developers.
 - **Example:** Apartments
 - **Why:** Desirable land close to CBD
- **Aggregation**
 - **Definition:** A group of similar and related land uses that are located in the same area in order to achieve an economic benefit.
 - **Example:** Stores are Cockburn Central. Hay and Murray St Mall
 - **Why:** Economic advantage. Competition

NEW YORK – URBAN CHALLENGES

Traffic Congestion:

Nature: Traffic congestion occurs when the flow or movement of vehicles travelling along road networks comes to a complete stop.

Scope/Extent: The extent of traffic congestion is recurring in and around Manhattan and along all road networks leading in and out of Manhattan.

NYC experiences recurring traffic congestion as over 1.8 million people travel into Manhattan each day for the typical working day (9-5). There are over 3.6 million round trips per day with 1/3 of these occurring via cars, trucks or taxis. Traffic congestion lasts between 12-14 hours each weekday.

Causes:

- Ineffective public transport
- Population growth
- Population density
- Trucks and freight
- CBD reliance
- Poor access and planning

Implications:

Social:

- Loss of family time
- Increase in health issues (car exhaust etc.)
- Increase in stress levels
- Increase in car and pedestrian accidents
- Noise pollution in inner areas
- Slow response for emergency services

Economic:

- Lost productivity and travel cost from congestion costs over \$6 billion per year
- \$2 billion in wasted fuel and operation costs
- \$4.6 billion in lost business
- \$3-4 billion in lost economic output

Environmental:

- Increase in the amount of GHG from cars due to slowed traffic and greater amount of time spent on the road (188g CO₂/km)
- NYC traffic is responsible for over 25% of its GHG emissions.

Planning Strategy:

OneNYC 2050 (2014)

Strategies Promoted by OneNYC:

- **Increasing Bicycle Networks/CitiBike**
 - NYC aims to create 50 miles of bike lane per year
 - Expand CitiBike coverage to 70Sq Miles by 2023
- **Congestion Charges (Proposed)**
 - Congestion charges discourage people from driving and choose a
 - more sustainable option

Housing Provision:

Nature: When there is a shortage of housing and therefore prices are extremely high

Scope/Extent: The average cost of an apartment in Manhattan is \$3.6 Million, while the average rent is approx. \$3000 per month.

The average salary is only approx. \$86 000

Causes:

- Population growth
- Population density
- Increasing land values
- Increasing construction costs

Implications:

- Homelessness – More than \$60 000 in the city are homeless
- Rent burden – 55% of all households are rent burdened

Planning Strategy:

OneNYC 2050 (2014)

Strategies Promoted by OneNYC:

- Create and preserve 300,000 units of affordable housing
- Generate 100,000 good paying jobs
- Create a network of quality open spaces
- Develop previously unused or overlooked land in order to create large scale housing units with access to transport, services and employment

DEFINITIONS:

Abiotic

- The non-living components of an ecosystem

Adaptation

- Alterations / adjustments in response to a changed environment

Anthropogenic biome

- An ecosystem that is man-made / human biome

Anthropogenic climate change

- Long term changes to climatic trends driven by human activities e.g greenhouse gases

Atmosphere

- The body of air which surrounds our planet that is 79% nitrogen and 21% oxygen

Atmospheric circulation

- The large scale movement of air on earth

Biodiversity

- The type, number and variety of living organisms within an environment

Biodiversity loss

- A decrease in species, genetic and or ecosystem diversity

Carbon cycle

- The continuous movement of carbon compounds between the land, oceans, atmosphere, and living organisms

Carbon sequestration

- The process by which carbon dioxide is removed from the atmosphere and stored in solid or liquid form

Climate

- The long-term average weather conditions for a location, calculated over long periods of time e.g monthly or seasonally

Climate change

- The long-term permanent shift in weather conditions (temperature, rainfall, humidity, composition)

Coriolis effect

- When winds are deflected from a straight path into a curvature nature due to the rotation of the earth

Desalination

- The process of removing excess salt from and other minerals from water to obtain fresh water for consumption or irrigation

Ecosystem

- A community of plants and animals and their physical environment interacting together

Ecosystem services

- The benefits obtained from ecosystems e.g food, water, oxygen and nutrient cycling

Endemic species

- A species that is unique to a specific location

Enhanced greenhouse effect

- An increase in the natural greenhouse effect caused by increasing GHG emissions due to human activities

Ferrel cell

- Lie between Hadley and polar cells between 60-70 degrees north

Geo-sequestration

- The capture and storage of carbon dioxide typically in underground reservoirs

Greenhouse gases

- A gas in the atmosphere that absorbs and emits radiation e.g CO₂, water vapour, methane, nitrous oxide and ozone

Hadley cells

- Largest cell in circulation extending from equator to 30-40 degrees north and south and is thermally direct circulation – consequence of earth surface temperatures

Heat budget

- The balance between the heat energy reaching earth's surface and the amount emitted from earth to space

Infiltration

- The process of ground water soaking into the ground

Land cover change

- The changes that have taken place in natural environments due to natural or human induced causes

Mitigation

- The actions put into place to reduce the severity and effects of a phenomena

Monoculture

- The agricultural practice of producing a single crop, plant, or livestock species

Natural greenhouse effect

- The process by which radiation from the Earth's atmosphere warms the planet's surface

Polar cells

- The smallest cell in atmospheric circulation which extend between 60-70 degrees north and south to the poles

Preservation

- Strategies that attempt to maintain natural environments that have not been altered by humans

Rehabilitation

- Repairing the services that ecosystems provide thus repairing its level of productivity

Restoration

- The act of restoring land cover back to its original state due to anthropogenic or natural causes

Site

- The physical characteristics of the land

Situation

- The location of a feature in relation to other significant features

Sustainability

- Meeting the needs of current and future generations

Urban heat island

- An urban area that is significantly warmer than its surrounding rural areas

Weather

- The short-term conditions, e.g temperature, humidity, wind, rainfall, of the atmosphere at a given place and time