Singapore

Topic 1.1 Small Island City State - Natural Characteristics of Singapore

1. Size and elevation of Singapore

- Limited natural resources
- Low lying islands
  - No more than 15m above sea level
  - Highest point > Bukit Timah Hill 164m
- Small landmass
  - 700 sq km^2
  - 63 offshore islands
  - Different purposes and characteristics
    - Residential - Housing, retail and amenities
    - Industrial - Oil refineries
    - Military - Pulau Tekong > Training
    - Recreation > Sentosa > Tourism

2. Climate

- Tropical equatorial climate
  - High temperatures
    - Lowest temp: 23-25°C
    - Highest temp: 31-33°C
  - High precipitation throughout the year
    - 3012mm in 2022
    - 167 days of rain on average
    - Heavy + Thunder
- Southwest + Northeast Monsoons
  - Northeast (Nov to March)
    - Winds travel across the South China Sea > More rainfall
  - Southeast (June to Sep)
    - Winds travel across Sumatra from Indian Ocean > Less rainfall

3. Ecosystems in Singapore

- Contains many ecosystems > Highly diverse and complex interactions > Land and coast based
  - Land
    - Singapore's four nature reserves > Protected under Parks and Trees Act (Bukit Timah Nature Reserve (NR) , Central Catchment NR, Labrador NR, Sungei Buloh Wetland Reserve)
    - Dominant ecosystem: Tropical rainforest
      - Species and structural diversity high
      - Continuous canopy > Little sunlight reach ground > Ground covered by leaf litter
      - Common species of plants > Lianas + Epiphytes
  - Coastal ecosystems

        - Marine and coastal biodiversity conserved as part of SG's heritage
        - Intertidal areas
            - Rich marine life exposed to air x2 a day due to semi-diurnal tides
            - Habitats include rocky shores, sandy beaches, and seagrass meadows
        - Mangroves
            - Type of wetland > Serves as food source + nursery for fish + protect coastlines from from storm damage
        - Coral reefs
            - Near the islands south of SIngapore
            - Support more than 250 species of heard corals from 55 genera, over 200 species of sponges, 120 species of reef fish and many other organisms

Topic 1.2 Small Island City State - Human Characteristics of Singapore

1. Economic characteristics

- Diversified economy > Rely on a variety of sectors for economic growth
    - Manufacturing
        - Make products from raw materials using raw labour + Machines
    - Services
        - Provide services to people or other businesses rather than make products

2. Social characteristics

- Open and globalised country
    - Strategic location > Attract many immigrants > Diverse backgrounds + Ethnic languages
    - English is the official language of the nation + Primary language of instruction

- Singapore is very densely populated > 7,688/sq area in 2022
- Singaporeans are avid users of technology with mobile penetration rate of over 158.8% > Number of mobile subscriptions over number of users

3. Political Characteristics

- Government consists of
  - Executive > Administers the law
  - Legislative > Makes the law
  - Judiciary > Practice the law in courts
- SG can have power to make its maintaining law and order, manage its economy, participate in international organisations
  - One of the founding member of ASEAN > Formed on 8 Aug 1967 > Aim to build strong, prosperous and rules-based region
  - Active contributor to global initiatives particularly in the United Nations
- International scene
  - Contributed to UN Convention on the Law of the Sea (UNCLOS) > Agreement that helps countries manage oceans by establishing a set of rules
  - Member of the World Trade Organisation (WTO)

Topic 1.3 Small Island City State - Singapore's Vulnerabilities

1. Limited land and natural resources

- Difficulties in achieving sustainable urban development
  - Small size > Challenging to cater to all needs > Optimised fully to ensure current and future needs met
  - Juggle with competing demands > Cater to economic, social, environmental needs
  - E.g. Dover Forest

        - Zoned for residential use in 2020 > Sparked concerns and appeals from nature enthusiasts
        - Plan was revised to set aside western half to be forest + eastern half for residential
- Vulnerable to food, water and energy insecurity
    - Singapore part global environment with risks such as climate change, unpredictable geopolitical and diverse outbreak
    - Lack of resources > Vulnerable in terms of food, water and energy resources

2. Limitations can lead to...

- Food insecurity
    - 90% of food is imported > Dependent on others + Vulnerable to food shortages
    - E.g. Singapore imports 34% of chicken supply from Malaysia (live chicken)
        - Faced a shortage in 2022 when Malaysia halted export into SG
- Water insecurity
    - Dependent on four sources (Local catchment, imported water, NEWater, desalinated water)
        - Difficult to build new reservoirs for rainwater
        - Difficult to create new reservoirs as major estuaries already dammed
    - Demand expected to double over next 40 years
- Energy insecurity
    - No domestic fossil fuels resources
        - Natural gas imported through pipelines from neighbouring countries or in liquid form (LNG)
    - Lead to highly exposed to fluctuations in prices due to global demand and supply shocks

        - E.g. Demand increase after Covid-19 & supply disruptions after Russia —Ukraine conflict > Energy price increased > Make electricity more ex

3. Changing demographics

- Decreasing birth rate
    - Declined over past decade > TFR at 0.87, lowest > Below replacement of 2.1
    - Later marriages and childbearing > Median age of 1st time mothers rosed from 28.5 in 2000 to 31 in 2020
    - Local population decreases > More reliant on people from other counties for manpower
- Ageing population
    - Increase life expectancy and low TRF > Median age of citizens rise
    - Makes Singapore vulnerable as more resources must be allocated to care for the aged
- Increasingly diverse society
    - People living in Singapore made up of Singapore citizens, new citizens, PRs, international students, migrant domestic workers and other foreigners
    - Diverse society > More disputes amongst people > Cause misunderstandings or disagreements

4. Economic issues

- Labour shortages
    - Migrant workers and foreign talent form part of the workforce
        - E.g. Foreigners
            - Migrant workers from South India, Bangladesh and China working in Singapore's construction industry
            - Professionals, managers, executives and technicians (PMETs) from various parts of the world

    - Small population > Lack of foreign workers > Unable meet demands of growing economy in tech and healthcare
    - Lack of workers > Companies cannot fill job openings > Economy less economy
- Economic slowdown
    - SG heavily involved in international trade > Exposed to fluctuations in global demand and external economic shocks > Economic slowdown
        - E.g. Economic slowdown during 1998 Asian Financial Crisis, 2001 recession due to dot-com bust, 2009 Global Financial Crisis
    - Ageing population + Reliance on workers > Economic slowdowns > Result in long recovery time
        - Resources needed to care for the aged > Fewer resources are available to aid in economic recovery
        - Lack of local workers to aid recovery > Companies lose interest in Singapore
            - Unable to provide sufficient labour as many left after crisis

5. External shocks and global uncertainties

- Economic uncertainties
    - Record fiscal deficits globally > Lead to concerns about the ability of gvt to manage debts > Lower investment
    - Geopolitical tensions between countries affecting international trade and supply of goods & services
    - E.g. [1997-98'] Asian Financial Crisis
        - Close ties to other Asian countries > Suffered financial loss
        - 62,000 unemployed in 1998 compared to 34,000 in 1997
- Social uncertainties
    - Social make-up of Singapore may change > Result in social issues related to equality, inclusiveness, and QOL

        - Rapid tech change > Pressure on ageing population > Widening skill gap
- Pandemics
    - COVID-19 pandemic > Disrupted global economic activities > Shocks in economy
    - Business involved in international travel and tourism, retail and food services were most affected
    - GDP growth with 6% decrease in 2020
- Environmental uncertainties
    - Climate change > Uncertainty
    - Countries collective efforts to decarbonise are not adequate > Env. deterioration and climate-related disasters severe
        - 30% island less than 5m below sea level > Face threat of sea level rise
            - E.g. Sea level rise by 1m by 2100 > Flooding of low-lying coastal areas and freshwater source

Topic 1.4 Small Island City State - Singapore's Resilience

1. How does Singapore survive?

- National crises
    - Singapore overcomes national crises
        - Tapping on expertise, social unity, financial wealth and diplomatic relations
        - Ensuring ministers and stat boards work together > Strengthen responsiveness challenges
    - E.g. [2013] Worst haze episode
        - NEA provided updates on air quality, MOH provided guidance on protection, PA worked with grassroots organisations to give out masks
- Economic recessions

    - Responding to lower economic output and unemployment
    - E.g. [1997] Asian Financial Crisis + [2008] Global Financial Crisis
        - Government lowered operational costs for biz & provided support to households
        - Lowered telecom costs and rents
        - Commercial and industrial properties received tax rebate of up to 40%
- Pandemics
    - Survived pandemics like [2003] SARS, [2009] H1N1 and [2019] COVID-19
    - E.g. COVID-19
        - Multi-ministry task force set up > Direct and coordinate responses
        - Protocols, safe management and border measures rolled out > Minimise impact > Singaporeans to be vigilant
        - National reserves used for measures (vaccines and family support)

2. How does Singapore adapt?

- Robust infrastructure and systems to tackle emerging challenges
- "Food basket" to improve food security
    - Importing food from many different countries > Reduce dependence on single supply
        - E.g. More than 90% of foods imported but diversified sources to 170 countries and regions
    - Growing local > Disruption in supply > Local produce serve as crucial source
        - E.g. Jurong Fishery Port halted production during COVID-19 > Local fisheries like Eco-Ark and Fish Farmer raised production
    - Growing overseas > Support local companions to grow overseas > Imported back home > Overcome land, water, energy and manpower constraints

        - E.g. Local farms ventured to Barramundi Asia in Australia + Sky Greens in China & Thailand
- Strengthen coastal protection and storm water management > Manage sea level rise
    - E.g. BCA commissioned a [2013] Coastal Adaptation Study > Better understand impacts of sea level rise
- Aims for low carbon future > Net-zero emissions by 2050 > Reduce impact on climate
    - E.g. Gradually increasing carbon tax from 2024
        - Revenue used to buffer impacts + Support decarbonisation efforts

3. How does Singapore thrive?

- Strive towards low-carbon future > Net zero by 2050
- Focus on building a liveable and sustainable city > Balance with economic development
    - Competitive economy
        - People enjoy employment and economic security
        - Attracts global investments and talents > Economic prosperity
    - High quality of life
        - More densely populated > Deliberate efforts to create a stronger sense of place & community
        - Revitalise waterways and park connectors (recreation)
    - Sustainable environment
        - Prudent resource management + Sustainable urban planning
        - Clean air, water and green cover + Industrial, commercial, housing needs met
- Assures foreign investors that Singapore is well-run and a pleasant place for biz
    - E.g. Environmental consideration > Factored into decision-making

- LKY observed NE and SW monsoons could carry polluted air into island > Industries located west of SG

Topic 2.1 Opportunities and Challenges - Impacts of Climate Change on Singapore

1. Climate Impacts on Singapore

- Rising sea level
  - Low-lying islands > Impacted by rising sea levels and melting of ice caps
    - 30% of land less than 5m above sea level
  - Sea levels in Straits of Singapore had been rising at 1.2mm to 1.7mm per year between 1975-2009
    - Sea levels could rise by up to 1m in 2100 > More flooded easily esp. periods with high rainfall
- Increasing daily mean temp
  - Environment become more humid > More discomfort caused
  - E.g. Temp rising
    - Between 1972 to 2014 > Annual average temperature rose from 26.6°C to 27.7°C
    - Singapore's could go up by 4.6°C by 2100 w/o climate action
      - More warmer days and nights
    - Increase likelihood of heatwaves (temp 35°C or higher 3 days in a row)
- Changing weather patterns
  - Rainfall during wetter months rise, drier months falls experience more dryness
    - Heavy rainfall increase in frequency and intensity
  - E.g. Rising rainfall
    - Annual rainfall total since 1980 been rising by 67mm/decade
    - Annual average risen from 2192mm in 1980 to 2727mm in 2014

        - Number of days exceeding 40mm increased by nearly a day every 10 years

2. Challenges due to climate change

- Urban heat island effect
    - Cause by replacement of natural land cover with buildings, roads, pavements > Absorb and retain heat
    - Air-con systems, cars and factories emit heat > Raise surface temperatures
    - High humidity levels worsen situation > Perspiration evaporates less readily > Vulnerable to heat exhaustion
- Floods
    - Drainage system unable to cope with more intense rainfall > Occurrence of flash floods
        - Occur during wetter months (Nov to Jan)
    - Very little response time > Likelihood of sever damage during flash floods
        - E.g. [2010] Orchard > Damage to buildings like Lucky Plaza and Liat Towers
- Vector-borne diseases
    - Widespread in tropics where SG is located
    - E.g. Dengue fever
        - Cause by virus transmitted to humans from bites from Aedes mosquitoes
        - Warmer temp > Shorten eg incubation > Larger Aedes population
- Threat to biodiversity
    - SG home to numerous species of native plants and animals > Warmer and drier environments > Habitats harmed
        - E.g. Sea temp increase lead to 10% loss in coral reefs
- Threats to food and water security

- Food security under threat > 90% food is imported
- Climate change > Water insecurity arise
  - Lack of natural water sources > Period of drought > Reliability affected
  - E.g. Imported water
    - From Johor, Malaysia > Supply more than 1/2 of water needs
    - [2016] June & [2019] Sep > Water levels in Johor's Linggiu Reservoir dropped by 33% & 50% respectively > Affected supply

3. Opportunities created to adapt to climate change

- Innovation in land reclamation
  - Cope with sea level rise > Minimum reclamation level rise from 3 to 4 metres
  - New methods > Polders used for first time in 2021 > Pulau Tekong
- Innovation in coastal management
  - Protect coastline > Safeguard infrastructure + Req enhancement to adopt to potential impacts of flooding
    - E.g. Jurong Island > Reclaimed from low-lying islands > Protected using geo-bags, seawalls and mangroves
- Innovation in health reselience
  - Focuses on lowering risk of dengue transmission > Climate change justifies the trialling of non-traditional approaches
    - E.g. Male Wolbachia-Aedes Mosquitos
      - Released at hotspots > Reduce dengue spreading mosquitoes
      - Mate with male > Eggs of female mosquitoes wont hatch > Population decline > Curb transmission
- Investment in high-tech farming
  - Heavily encouraged to provide 30% of food supply locally by 2030
  - Overcome constraints > Industry needs to be highly productive + Use climate resilient tech

        - Maximise space utilisation, reduce water usage and adaptable to varying climates
    - E.g. Local farms
        - Citiponics runs farm on roof-top garden > Use water efficient vertical growing tech in Ang Mo Kio
- Investment in water tech
    - Climate change threatens imported water > Achieve self-sufficiency > Vital
    - Increasing production of desalinated water and NEWater even though energy intensive
    - E.g. Exploration of new methods
        - New energy-efficient desalination technologies like electro-deionisation > Use electric fields to extract dissolved salts
            - Could also be used for producing NEWater

Topic 2.2 Opportunities and Challenges - Impacts of Tectonic Hazards on Singapore

1. Impacts of tectonic hazards in Singapore

- Near Pacific Ring of Fire but have favourable geographic location + Intentional efforts to reduce hazards > Reduce vulnerability
- Singapore's distance from plate boundaries
    - Not located close > Closest is the Sunda Megathrust > More than 500km away
        - Tremors weak > Experienced on high floors & certain parts of SG
        - Swaying on some occasions + Major damage improbable
    - E.g. [2012] 8.6 EQ in Indonesia
        - Resulted in series of 2 to 3 minute-tremors in Singapore
- Presence of the Indonesian archipelago

    - Protected by it > Acts as a barrier to giant waves generated from undersea volcano and tsunamis
    - SG only experience tsunami when 9.0 magnitude recorded in Indonesia/Philippines
        - Waves only projected to be less than 0.7m above sea level + Slow speeds > Damage limited
    - E.g. [2004] SG not affected by Indian Ocean Tsunami
- Distance from volcanos
    - SG hundreds of kilometres away from nearest volcano
        - Hazards (pyroclastic flows, lahars) can't reach SG
    - E.g. Mt. Semeru, Indonesia
        - Volcanic eruption which was about 1000km from SG > Produced hot cloud avalanche & heavy ash fall > Damage limited 5km of mountain

2. Challenge due to plausible occurrence of tectonic hazards

- Land sinking post-EQ causes sea level rise in surrounding areas > SG is also vulnerable
    - E.g. [2004] 9.2 Sumatra-Andaman EQ, Thailand
        - Climate change + Effects of EQ > Rise in sea level by more than 10cm
- **Mega earthquake that arise on same fault line has its effects:**
    - Places on stronger, more resistant rock > Less affected by tremors
        - Central, northern, western areas > Stronger igneous granite rocks
        - Southern and eastern areas > Weakest rocks
    - Places built on reclaimed land > More prone to liquefaction > Destruction of buildings & infrastructure
        - 22% of Singapore's total land is reclaimed for development
        - Land used for commercial and residential needs
        - Affect locations like Marine Parade housing estate and Changi Airport

- Low relief of SG > Susceptible to coastal flooding from tsunami
- **Threats of ash clouds from eruption**
  - Cause health problems > Eye irritation, acute respiratory symptoms (cough & runny nose)
    - E.g. [1991] Mt Pinatubo > Covered SG in fine volcanic ash > Cases of skin irritation and coughing
  - Ash disrupts the economy
    - Ash in the air > Visibility reduced > Grounding of planes
    - Affect daily operations, activities and generation of income
    - Ash can also enter into engine of aircraft > Melt & re-solidify within engine > Compromise performance of aircraft
    - Dangerous > Flights cancelled > Drastically affect aviation industry

3. Opportunities created to mitigate and adapt to tectonic hazards

- **National Preparedness Plans**
  - SCDF has implemented preparedness plans
    - Coordinates actions taken by agencies (NEA and SPF) + Conduct regular exercises > Familiar
    - Installed public warning systems > 300 sirens > Alert people about threats
    - Affected communities quickly access shelters in buildings & train stations
  - Under law > All new houses > Shelters incorporated into development
  - Educate public about national preparedness plans through outreach programmes
    - E.g. Community Emergency Preparedness Programme > Equips participants with life-saving skills > Important
- **Usage of technology to monitor tectonic plate movements**
  - Better prepare SG for any hazards

        - E.g. NEA > Uses a network of seismograph stations > Provide continuous data on ground movements + Tsunami early warning systems
    - Globally > Monitoring of tectonic plate movements > Indian Ocean Tsunami Warning System > Facilitate exchange of information
        - Up-to-date info > Available on internet using web-based tools & platforms
            - E.g. NEA regional EQ and tsunami alert information on MyEnv app
    - Earth Observatory of Singapore (EOS) (Research institute at NTU) > Explored other tech to collect data
        - Infrasound monitoring system > Monitor low frequency waves for volcanic eruptions > Enable quick assessments of explosivity & potential risk of ash
- **Partnerships with countries on disaster response & recovery**
    - SG participate actively in international & regional cooperation on disaster response & recovery as member of UN and ASEAN
        - Bring countries together > Support UN Office for Disaster Risk Reduction in implementing Sendai Framework for Disaster Risk Management
    - Operation Lionheart team (>80 staff by SCDF) > Work round-the-clock > Respond to request for aid relief
    - Cooperates with ASEAN nations through ASEAN Coordinating Centre for Humanitarian Assistance
        - Formed after Indian Ocean tsunami in 2004
        - Facilitate and coordinate collective action among SEA nations during disasters > Provide early warning and hazard analysis
    - Non-profit organisation > Create oppor for r/s building & cooperation among disaster management professionals

Topic 2.3 Opportunities and Challenges - Impacts of Tourism Activity in Singapore

1. Impacts of tourism activity

Legend: Orange - Counterpoint (Challenges)

- Economic impacts
  - Tourism > Positive impact in SG
    - Spend most on shopping, entertainment, sightseeing
    - Support jobs in tourism sector
  - E.g. [2015-19'] Pre-Covid > International visitor arrivals grew 27% year-on-year
  - Tourism vulnerable to disruptions by natural disaster, disease outbreak, economic downturn and other crisis > Deter ppl from travelling
    - E.g. COVID-19 > Exposed dependency on tourism > Hit a low of 2.7m visitors & tourism receipts shrank to 4.8B in 2020 from 27.7B in 2019
- Social impacts
  - Strict law enforcement > Widely publicised > Deters violent crimes against tourists
  - Tourism > Justify preservation of historic places in stiff competition for land
    - E.g. Kampung Lorong Buangkok > Integrate last remaining village to park connector > Oppor for guided tours
  - Historic places redeveloped for tourism > Challenge to balance interests of different stakeholders
    - E.g. [1990s] Chinatown
      - Redevelopment > Criticised for putting too much emphasis on Chinese elements > Neglect multi-ethnic residents
- Environmental impacts
  - Efforts boosted by environmentally conscious tourists > Look for more sustainable options
  - Tourism > Justify environmental conservation

        - E.g. Singapore Tourism Board (STB) > Promote Bukit Timah NR as primary rainforests areas in SG
    - Eco-tourism development > Creation of new nature-based attractions like GBTB > Reduce carbon emissions
    - Raise concerns among environmental groups > Probable impact on NR
        - E.g. [2016] Nature Society > Raised concerns about addition of new nature based attractions to complement SG zoo
            - Highlight potential loss of secondary forests & disruption to wildlife movements

2. Challenges affecting tourism development

- Regional competition
    - Singapore respond to intensifying regional competition to continually benefit
    - Many tourists from nearby nations > Sought by many other price-competitive destinations
        - E.g. Thailand > Rank 8th globally in international tourist arrivals > [2018] Visitors outspent those in SG in Bangkok by $3.5B
- Discerning visitors
    - Increase appeal to increasingly discerning visitors (millennials) > Remain competitive
    - Millennials grow alongside economic growth in Asia > Contribute to large part of Asian expenditure on travel & **generally..**
        - Avoid travel agents who offer standard packages
        - Seek out to authentic user reviews
        - Concerned about environment > Require insight about direct and indirect environmental impacts > Mitigate climate change
    - Providing extensive information through variety of online sources > Plan for individualised exp at low prices

        - Important for tourists to be encouraged to share status updates, upload photos and comments on online media > Generate authentic content

- Aging population
    - Manpower constraints > Rising median age + Restriction on foreigners
        - Slow growth of workforce > Difficult for biz to recruit workers
        - Tourism dependent on on foreigners to fill jobs > Less attractive to locals
    - Face challenges of redesigning jobs > Meet career aspirations of Millennials
- Resources constraints
    - Pose challenges to plans for sustainable development
    - Ensure that basic needs of locals (housing, water, energy) met before tourism development
        - E.g. [2021] Plan review by URA > Estimated > x2 houses to meet demand
- Threats from global uncertainties
    - Continuous ongoing challenge
    - SG safe from most natural disasters > Volcanic eruptions > Affect air and maritime travel > Reduce visitors
        - E.g. [2020] Taal Volcano eruption > Large air cloud produced > Flights cancelled
    - War/large-scale conflict > Directly deter people in affected areas from travelling > Reduce visitors
        - E.g. [Feb 2022] Russian invasion of Ukraine > Prevented high-spending Russian from entering SG

3. Opportunities created to mitigate and adapt to impacts of tourism activity

- Benefits from a growing Asia

    - Growing Asian economies from sustained economic development of China & India > More people able to travel
    - Boosted investment flow in tourism sector, transport infrastructure and digital services
        - E.g. [2020] AirAsia > Launched super app > Provide convenient access to comprehensive range of services > Seamless travel experience
    - Complement SG's pursuit of regional tourism > Attract tourism as part of their travel to different countries in Asia
- Partnership with stakeholders to spearhead place-making initiatives
    - Capture growth > Promote SG to new visitors while re-engaging those who have visited before
        - E.g. Singapore Tourism Board (STB)
            - Adopt innovative branding & marketing campaigns (SingapoReimagine)
                - Engage biz & locals > Bring back visitors after loosened measure of COVID
            - STB partner with communities > Create awareness
                - [2020] Funded and marketed for Hawker Day Out > Event organised by Chinatown Complex Hawkers' Association > Promote hawker culture
- Trialing sustainable solutions
    - Provide opportunities for solutions + Develop skilled workers and growth
        - Appeal discerning tourists + Contribute to commitment towards UN Sustainable Development Agenda
            - E.g. Sentosa > Reduce use of fossil fuels, conserve mangroves and offering environmentally friendly options
        - Development of skilled workers supported by STB

        - E.g. [2020] Tourism Careers Hub > Online platform > Convenient access to job advice & info abt variety of courses
    - Solutions address the well-being of tourists
        - E.g. STB organised a wellness festival > Feature 10 days of activities and holistic well-being

Topic 3.1 Sustainable and Resilient Singapore - Importance of Sustainable Development of Singapore

1. Importance to Singapore

- Sustainable development
    - Competitive economy: Attracts investments & employment opportunities
    - High quality of life: Foster community spirit & active participation
    - Sustainable environment: Clean and healthy & excellent air and water quality

2. Importance to Singapore's economy

- Constantly improve biz environment & supporting systems > Attract investments and economic growth
    - Economy remains relevant & competitive > Keep investments despite competition and limited resources
    - Brings employment opportunities > Sectors in different industries set up by overseas companies
- [1960s] Shell > Built SG's 1st oil refinery > Growth in job creation + Expertise, knowledge and skill
- [1970s] Attract global MNCs as vehicles > Achieve growth through manufacturing
- [1990s] SG tapped on rise of modern services (IT, finance and entertainment)

3. Importance to quality of life in Singapore

- Strong community spirit > People grow closer through motivation > Care for environment

    - Engagement fosters community spirit > Build inclusive society > Progress
    - Get communities to work together for present and future generations
    - E.g. [1971] Tree Planting Day
        - Community-based green movement > Sense of national pride & identity
- Gvt facilitate active participation > Engage population > Review policies to meet evolving needs
    - Foster shared values and commitments > Create high QOL and sustainable envt.
    - E.g. Singapore Green Plan 2030
        - Whole nation do our part > Build city of green possibilities together

4. Importance to Singapore's environment

- Balancing economic and environmental protection important
    - Clean & healthy envt. > Inclusive and equitable distribution of resources to all
        - Everyone entitled to clean streets, good plumbing, fresh air > Prevent poor health
        - First-world standards for air & water quality > Attract business > Retain talents + Appeals to tourists > Economic growth
    - Lack of clean environment > Affect food production
        - E.g. [2015] Fish farms > Changi & LCK > Lost thousands of fish in plankton bloom
    - Poor air & water quality > Averse economic and social impacts
        - E.g. [2015] Transboundary haze
            - Cost SG $1.8B > Decline of tourists numbers
            - Restrictions on outdoor activities > Lowered productivity
            - Disrupt daily activities like schooling and working > Unhealthy

Topic 3.2 Sustainable and Resilient Singapore - Singapore's Approach to Sustainable Development

1. Building resilience

- Increase SG's capacity to survive, adapt and thrive, now and in the future
  - Emergency preparedness & ability to recover after crisis
  - E.g. Post independence Singapore > Adopt & manage issues (sovereignty, defence, economic growth)
    - Establish MFA and People Defence Force > Secure borders
      - Expanded SAF > Mandatory conscription > National service [1967]
    - Singapore rapidly industrialise economy > Attract foreign investment + education > Stay relevant
- Ongoing process
  - Resilience efforts are past and present actions > Built upon by future actions > Handle challenges (future)
  - E.g. Water resources
    - Address scarcity > Harvest rainwater + Searching for alternative till today
      - [1970s] Growing population + Expanding economy > Look to other sources > Commissioned 1st water recycling plant
      - [2003] Many years of research, development & advancement of membrane tech > NEWater introduced

2. Integrated master planning

Legend: Orange - Definition

- Structured framework with a clear vision & shared outcome for gvt agencies
  - Trade-offs to be discussed
  - Decisions able to serve nation's interests
- Benefits:

    - Focus on resilience building > Convenient decisions not always good in long-term
    - Identification of possible future problems > Develop ready solutions
- Adopts a long-term approach
    - Ensure sustainable developments + Current & future needs are met
        - Identify different demands for land use & review best option for land development
        - Feedback from stakeholders + public considered
    - E.g. Marina Bay
        - [1970s] Created to meet basic economic & infrastructural needs > Transformed into location that balance work, play, culture and commerce
- Aims to balance development
    - Balance economic, social and environemntal development > Sustainable SG
        - Provide SGreans with employment opportunities + Clean and green environment
    - E.g. Marina Bay
        - Emphasis on environmental aspects > Bay area retained > Create picturesque waterfront
        - [2008] Completion of Marina Barrage > Separate fresh water from sea water
            - Tool for flood control & place for water-based activites
        - Nature park, GBTB > Developed from 100 hectares of land > Recreation for the masses
            - Created more vibrant SG + Liveability

3. Dynamic urban governance

- Adopts comprehensive approach > Coordinate policy planning & implementation > Involve different stakeholders
- Political leadership sets clear direction
    - Singapore Green Plan (SGP) 2030
        - Nation-wide movement > Support sustainable development > Jointly led by 5 agencies
        - Helps reap synergies > People & resource from agencies combine > Achieve common goal
- Detailed, through systems & processes from public service & governmental institutions
    - Singapore public service > Well-thought systems & processes > Based on accountability, transparency, incorruptibility
        - Public Service Division (PSD) > Promote global governance, running public org & meet citizen's needs
        - SG able to maintain high level of trust & confidence in gvt (domestically & internationally)

Topic 3.3 Sustainable and Resilient Singapore - Singapore Effort's in Sustainable Development

1. Singapore's environment and climate resilience efforts

- Cleaning and greening Singapore
    - [Since 1960s] Continual cleaning & greening > Prevents unclean physical environment > Affect social and economic growth
    - Play important role > Ensure city pleasant, liveable & sustainable
        - Gvt. implements public health laws > Regulate vehicle emissions & develop sewage systems
    - Dotted with abundant green spaces
        - Build integrated network of parks, open spaces & water bodies > Promote social & environmental sustainability

        - E.g. City in Nature pillar of SGP 2030 > Develop 200 hectares of new park by 2026
- Mitigation efforts
    - Green buildings > Improve energy & water efficiency, reduce waste and promote sustainable materials
        - E.g. Green Building Masterplan > Encourage building owners & tenants > Become energy efficient
    - Using cleaner energy > Contribute to efforts
        - E.g. [2021] Use of natural gas & solar energy
            - Natural gas > Clean fossil fuel > Accounted for 95% of electricity generated
            - SG invested in new solar tech > Deploy floating photovoltaic systems > Reduce dependency of fossil fuels in water treatment
- Adaptation efforts
    - Building on water and food reselience > Help SG cope with climate change
        - E.g. Water resilience
            - Invested into R&D in reducing energy needed to desalinate water and produce NEWater
            - Highly diversified imported food sources > Avoid disruption in global supply chains

2. Singapore's economic resilience efforts

- Deepening & diversifying international connections
    - Attractive location for MNCs & start-ups > Competitive economy > Cope with global economic uncertainties
    - SG's linkage w overseas partners > Create business opportunities in new markerts
        - E.g. EDB, Enterprise Singapore (ES), Global Innovation Alliance (GIA) > Connect to overseas partners

        - Strengthen capabilities of businesses
- Strengthen business capabilities to innovate & cope with changes
    - Investments in R&D > Aimed in creating new areas for growth
    - E.g. Quantum Technologies & ST Engineering > Developed AI enabled security tools > Produce encryption codes that are unbreakable
- Encourage to take up new skills
    - Tech replace routine task > SGreans pick up skills > Enable us to be effective on the job
        - E.g. Universities & polytechnics > Launched more than 500 skills-based courses

3. Social resilience efforts

- Developing skills throughout life
    - All play integral role > Encouraged to go beyond achieving academic qualifications > Pick up new skills
    - E.g. SkillsFuture national movement > Provide SGrenas with opportunity to engage in lifelong learning
- Mobilising communities in preparedness measures for emergencies
    - E.g. Total Defence Framework
        - Aims to engage all in building strong, secure & cohesive nation
        - Involve fulfilling NS duties and volunteering in Civil Defence activities > Remain united > Overcome
- Creating shared spaces
    - Bring people together from all walks of life > Foster r/s
    - Govt. regularly invites community to offer input
        - Create greater sense of ownership
        - Inclusive society + Strong social support from all
    - E.g. [2016] SGFuture Engagement

        - Consult people of all ages and bg on their hopes + future > Explores different views and ideas to address challenges in SG

Topic 3.4 Sustainable and Resilient Singapore - Singapore's Considerations for Sustainable Development

1. Singapore's environmental concerns

- Life-support systems of the global environment & nature in providing ecosystem services
    - Ecosystems services:
        - Provide nutritious food & water
        - Regulate disease & climate
        - Support pollination of crops & soil formation
        - Provide recreational, spiritual & cultural benefits
    - Ensure system continue supporting life on Earth > Consider how to protect environment + Sustain ecosystem functions
        - Human activities (agriculture, fishing, rearing livestock etc) > Benefit from ecosystem services & influence them
        - How SG can develop sustainably > Dependent on global envt & nature at large
    - E.g. Climate Change
        - Increase in mean temp > Worsening UHIE > Affect economic development & liveability
        - [1980-2020] Annual mean rose from 26.9°C to 28.0°C > Use of air-con > Increase energy consumption
- Limitations of SG's physical environment & possible threats (transboundary haze & climate change)
    - Limited land space + Densely built-up urban landscapes
        - Restrict island-wide adoptation of alternative energy source (solar & wind)

        - E.g. Renewable energy
            - Insufficient land for solar panels > Now test on rooftops + reservoirs
            - Frictional drag of building > Wind speed low > Limit potential for wind power
    - Vulnerable to regional scale threats (haze) > Worsened by climate change
        - Forests fires affects SEA nations regularly
        - E.g. Haze usually caused by fires in Sumatra, Indonesia during SW monsoon > Palm oil companies burn forests

2. Economic considerations

- Harness the ability of society to advance economy
- Ability to advance our economy
    - Sought to achieve economic growth > Enable high QOL without compromising environmental sustainability
    - E.g. Jurong Island
        - Created by merging 7 different smaller islands via reclamation
        - Support growth of petrochemical industry without affecting QOL > World-class destination for oil refining
        - Transformed into sustainable energy & chemicals park > Bio-based fuels produced > Plastics recycled into materials for chem manufacturing

3. Social considerations

- Commitment & contribution from stakeholders: Individuals, community, businesses, institutions
    - Government created programmes > Involve different stakeholders > Respond to greater public interest & awareness of sustainability issues
        - E.g. JTC Cooperation

        - [2021] Set up $6M fund support researchers & business > Develop clean energy solutions
        - NEA set up 3P partnership approach > Involve People, Private & Public sectors > Address challenges
    - Government respond to constructive feedback & suggestions > Lend support & modifying plans when needed
        - [2002] Reclamation of Chek Jawas (intertidal flat in Pulau Ubin) > Deferred > Campaign from nature lovers and conservations

4. Singapore's political considerations

- Good governance
    - Political leadership > Key to balancing three pillars of sustainability
    - Involve leading clear vision & communicating the vision effectively > Earn support
        - Pioneering vision: Clean air, safe drinking water, sanitation, quality healthcare, good education, lush greenery, safety
    - Political willpower > Sufficient resources dedicated to develop sustainably in competing needs
        - E.g. Monetary reserves
            - [2020-22'] Used $40B during COVID-19 pandemic
            - Key defence in times of crisis > Enable government to make decisive & effective response to pandemics & crisis
- Commitment to development plans
    - Requires long-term leadership > Committed to long-term plans
        - Plans that consider vulnerabilities to external shocks & global uncertainties
        - E.g. SGP 2030 strengthen commitment to UN's 2030 Sustainable Development Agenda & Paris Agreement
    - Singapore seeks to achieve net-zero carbon emissions by 2050 even tho SG is an alternative energy disadvantage island city-state

- Carbon tax being raised to $25/tonne in 2040, $45/tonne in 2026 and $50-80/tonne by 2030

!!!Note/Disclaimer: Content is strictly based off textbook. Cover picture is also taken by myself. Notes were previously personalised so there can be some inconsistencies especially with abbreviations (governmental organisations). Hope these notes help! All the best for your exams :D