

GEL TOPIC 2

2.1 SUSTAINABLE URBAN NEIGHBOURHOODS

Key Points:

- Sustainable development = meets present needs + ensures future generations can meet own needs
- Economic + social sustainability ← population density, small pop. size for interaction
- Environmental sustainability ← protection for nature, waste minimisation/recycling, energy/water-efficient design

What is development?

= economic, social & political process → improves **standard of living**

- Countries classified by level of development based on:
 - **Economic indicator:** GDP per capita
 - **Social indicators:** Life Expectancy & Adult Literacy Rate

What is sustainable development?

= development that:

- Meets needs of present pop. by achieving high standards of living for all
- Ensures ability of future generations to meet own needs
- **3 key aims:** economy, environment, society
- Overfocus on one dimension → others overlooked
 - Eg: govt prioritises economic growth → env. neglected/destroyed → biodiversity loss, deterioration of quality of env. for present + future
- Approach varies by place & time; **not always balanced** — greater emphasis may be placed on one dimension over others depending on place

UN Sustainable Development Goals — 2030 Agenda for Sustainable Development = shared goal: achieve high standards of living + peace for current & future generations

Concepts: **Standard of living** = measure of consumption of goods/services by individual/group. **Economic sustainability** = ensure all humans enjoy prosperous, fulfilling lives + economic progress occurs in harmony w/ nature. **Social sustainability** = ensure societies inclusive & resilient, residents have a voice. **(Urban) Neighbourhood** = sub-division of urban area distinguished by characteristic/quality, residents share commonalities. **Environmental sustainability** = sustainably manage natural resources + urgent action on climate change to support needs of present + future generations

How can urban neighbourhoods achieve economic and social sustainability?

1. Economic sustainability

- ↑ **population density** → support local businesses + keep transport/infrastructure costs low
- Local businesses sustain themselves — sufficient **demand** for goods & services
- Residents take up **employment** at shops → ↑ income → ↑ standard of living [demand goods & services → jobs open to residents → increase in income]
- Transport & infrastructure costs kept low — buildings close together → don't need to travel far → ↓ transportation costs
 - Eg: schools near integrated transport hub → students walk short distance → ↓ transport cost
- Transport infrastructure located closer together → ↓ cost to develop, connecting infrastructure not built over long distances → ↓ transportation costs for residents
 - Eg: bus interchange next to train station → no need for additional infrastructure (roads/bridges) → ↓ cost of development

2. Social sustainability

- Residents feel **included** + have **sense of shared identity** [→ community centre]
- Shared community spaces → promote regular social interactions
- Small population size in neighbourhood → facilitates regular interactions
 - Residents come together → discuss issues → find solutions [discussing about problems + solutions]
 - Builds resilience + positive relationships — open communication, mutual respect, understanding → ↓ misunderstandings/conflicts
- Majority of problems = day-to-day, mundane, resolved locally w/ adequate neighbourhood structure
 - Eg: **Residents' Networks (RN)** in SG — promote neighbourliness + community cohesiveness; each neighbourhood divided into designated zones, residents encouraged to join
 - Regular activities organised at zonal level cater to small pop. size in zone → encourages residents to voice opinions + participate in decision-making

How can neighbourhoods be sustained environmentally?

3 ways:

1. Ample protection for nature **[Government]**
2. Facilities that support waste minimisation & recycling
3. Energy & water-efficient design approaches for buildings/landscapes

1. Ample protection for nature

- Wildlife thrive → urban spaces + human-wildlife coexistence
- Concerted efforts → protect existing native species' habitats/ecosystems + re-establish species that once existed
 - Eg: **NParks** — multiple strategies for safeguarding SG's habitats/ecosystems (species conservation & recovery programmes)
- Biodiversity maximised — wide variety of habitats (street trees, pocket parks, roof gardens) instead of uniform grass areas
- Different varieties/species of plants/trees → adequate shelter & food for wider variety of wildlife → maximises biodiversity
 - Eg: **44 Nature Ways** in SG — connect areas of high biodiversity across SG

2. Facilities that support waste minimisation & recycling

- Conveniently located recycling facilities (blue recycling bins) → encourage residents to recycle
- High enough population density → adequate waste collected/recycled in economically viable manner
- Waste recycling encouraged via neighbourhood-scale recycling activities (residents/town council)
 - Eg: town council puts up posters/banners to educate residents on proper recycling

3. Energy & water-efficient design approaches

- Buildings/landscaping designed energy- & water-efficient → minimise resource use
 - Smart technology & eco-friendly features installed
 - Eg: **HDB Green Towns Programme** — cool paint lowers temps by up to 2°C, ↓ energy consumption
 - Eg: rainwater harvested for block washing (void decks/corridors) → ↓ water consumption
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2.2 ECOSYSTEM SERVICES IN URBAN NEIGHBOURHOODS

Key Points:

- Urban neighbourhoods = ecosystems
- Ecosystems = living communities + non-living environment interacting
- Neighbourhoods can have aquatic & terrestrial ecosystems
- Ecosystem services = **provisioning / regulating / cultural / supporting**

*Concepts: **Ecosystems** = dynamic complex of plant, animal, microorganism communities + non-living env. interacting as functional unit. **Living communities** = communities of living (biotic) things (humans, animals, plants, insects, bacteria). **Non-living environment** = non-living (abiotic) components (rocks, soil, water, sunlight, built env.). **Aquatic** = related to water bodies (rivers, lakes)*

Why are urban neighbourhoods regarded as ecosystems?

- **Ecosystem** = geographic area where living communities + non-living env. interact → "bubble of life"
- Ecosystems vary in size
- Every aspect depends on another, directly/indirectly
- People = integral parts of ecosystems; dynamic interactions exist between people & other parts
- Activities by people → directly/indirectly change ecosystems (+ and -)
 - Eg: man-made concrete canal @ **Bishan-Ang Mo Kio Park** transformed into naturalised river → more organisms thrive (**aquatic**) → wildlife back → ↑ biodiversity

What are ecosystem services?

= benefits brought about by nature to people

- Produced by living communities + non-living env. of ecosystems
- Critical for survival; benefits optimised when env. healthy & thriving
- 4 types: **Provisioning / Regulating / Cultural / Supporting**

What are provisioning ecosystem services?

= tangible resources people get from ecosystems — food, water, wood

- Food = most important; obtained via agricultural activities & fisheries

- Eg: food grown in urban community gardens/edibles on rooftops @ **Tampines' HDB blocks**

What are regulating ecosystem services?

= benefits from regulation of ecosystem processes

- Climate regulation, disease outbreak regulation, flood regulation
- In urban neighbourhood: microclimate regulation, flood mitigation, air/water quality control
 - Eg: **Bishan-Ang Mo Kio Park**

Regulating local climate	Regulating water flows	Regulating local air quality
Trees ↓ surface & air temp via shade; forests can cool areas by generating rainfall (larger scale)	Vegetation cover ↓ surface runoff by retaining water in soil (= water flow regulation); key service from natural land cover	Trees/plants remove pollutants from atmosphere

What are cultural ecosystem services?

= intangible benefits — aesthetic experiences, educational opportunities, recreational activities

- Green spaces → aesthetic appreciation + stress-relieving activities
- Improves physical/mental health, fosters social belonging + group identity → strengthens **sense of place**
 - Eg: **Bukit Timah Nature Reserve** — hiking (recreation) + fieldwork for geography students (education)
- Aesthetic experiences from heritage trees, skyline greenery, community gardens

What are supporting ecosystem services?

= necessary for functioning of ALL other ecosystem services — soil formation, pollination, photosynthesis

- Soil formed when micro-organisms + physical processes decompose organic matter
- Soil = essential for terrestrial ecosystems' health; habitat for billions of organisms; acts as water filter
- Soil formation → ensures human activities (agriculture) can take place
- Wild bees → crop pollination → crops reproduce → food for animals/humans
- Photosynthesis → plants absorb CO₂, release O₂ → maintains Earth's O₂ content → ensures other ecosystem services can function

2.3 COMMON HAZARDS IN URBAN NEIGHBOURHOODS

Key Points:

- Urban neighbourhoods have potential hazards → negative consequences for residents
- Common ones: **Fire hazards** / **Air pollution hazards** / **Traffic hazards**

*Concepts: **Hazards** = processes, phenomena or human activities that may cause loss of life/injury, property damage, social & economic disruption, or env. degradation. **Air pollution** = presence of contaminant/pollutant substances in air that don't disperse properly → interfere w/ human health/welfare or produce other harmful env. effects*

What are hazards?

= process, phenomenon, or human activity → loss of life, health impacts, property damage, social & economic consequences

- Classified as **natural** or **man-made**
- Natural eg: earthquakes, volcanic eruptions
- Man-made eg: traffic hazards

What are fire hazards and their impacts?

- Occur in residential & non-residential areas
- Common causes: unattended cooking, faulty electrical appliances/wiring → ignite flammable materials
 - Eg: **2021** — 358 cases of fires due to unattended cooking in SG
 - Eg: ↑ fire cases involving **Personal Mobility Devices (PMDs)** — typically residential

Impacts:

1. **Health impacts**
 - Burn injuries if unable to evacuate → disabilities/deaths
 - Eg: **2021** — 3 fire fatalities, ~200 fire injuries in SG
 - High CO/CO₂ levels → CO poisoning → headache, dizziness, weakness, confusion → loss of consciousness/death; harder to escape
 - Acid gases → permanently damage respiratory system
 - Smoke inhalation → breathing difficulties, suffocation → death

2. Property damage

- Destroys commercial/residential properties → economic losses (goods, furniture, documents destroyed)
- Further costs incurred after fire — repair & rebuild damaged properties

What are air pollution hazards and their impacts?

= presence of contaminating/polluting substances in air that don't disperse properly → harmful env. effects

- Common causes:
 - Burning vegetation → CO₂ + other pollutants released
 - Eg: **first half 2019** — ~555 vegetation fires in SG (56% ↑ from 2018, drier/hotter weather) → slight deterioration in air quality
 - Industrial & motor emissions → ↑ car ownership/usage → vehicles produce nitrogen oxides, CO, other pollutants

Health Impacts:

- Respiratory infections, heart diseases, lung cancer
- Nitrogen dioxide emitted in high vehicle traffic areas → ↑ risk of asthma in children
- PM2.5 (particulate matter <2.5 micrometres) — soot, smoke, dust, liquid droplets → produced in urban neighbourhoods → ↓ lung function in older adults; can enter bloodstream, lodge deep in lungs

What are traffic hazards and their impacts?

- Common causes: speeding, red-light running, drink-driving (irresponsible motorists)
 - Eg: **2021** — 969 speeding-related accidents; 153 accidents caused by drink-driving

Health Impacts:

- Serious injuries → disabilities/loss of life
 - Eg: **2021** — 100 traffic accident fatalities in SG; 8 caused by drink-driving
- Elderly pedestrians & motorcyclists → high % of accident victims (injuries/death)

2.4 BUILDING SUSTAINABLE URBAN NEIGHBOURHOODS

Key Points:

- Built sustainably through: **environmental stewardship, disaster risk management, community resilience**
- Env. stewardship ← volunteerism, public-private partnerships
- Disaster risk management ← ↓ exposure to hazards, ↓ vulnerability, improve preparedness, monitoring/warning systems
- Community resilience ← strengthen relationships, ↑ hazard awareness, develop residents' ability to organise & equip themselves

*Concepts: **Adaptation** = process of making adjustments to actual/expected hazards to moderate harm or take advantage of beneficial opportunities. **Environmental Stewardship** = actions by individuals/groups to protect, care for, or responsibly use env. to pursue env./social outcomes. **Volunteerism** = providing time & skills for benefit of others/causes, not for financial benefit. **Disaster Risk** = likelihood of damage to properties, injuries, loss of lives from disaster in given period; product of interaction between hazard, exposure & vulnerability. **Exposure** = situation of people/belongings located in hazard-prone areas. **Disaster Risk Management** = applying plans/actions to prevent new risks, reduce existing risks, manage disaster risks → strengthens resilience. **Community Resilience** = ability of community to resist, adapt, recover from disaster impacts in timely/efficient manner. **Vulnerability** = conditions (physical, social, economic, env.) that ↑ susceptibility of people/belongings to hazard impacts*

What is environmental stewardship?

= actions by individuals/groups to protect, care for, or responsibly use env. to pursue env./social outcomes

- Practised by individuals, orgs, govts
- Actions should: conserve natural resources; preserve existing natural env.; repair damages & reverse negative impacts by humans
- Achieved through 2 ways:
 1. **Promoting volunteerism** among residents — share knowledge on importance of healthy ecosystems → residents more aware of what they can/should do to responsibly use/protect env.
 - Eg: **NParks** promotes volunteerism via ground-led initiatives — **Friends of the Parks** → participants gain community ownership/stewardship
 2. **Partnership between public & private sectors**
 - Different stakeholders → different perspectives/resources/expertise → crucial to come together
 - Eg: urban neighbourhoods produce large waste amounts → residents + public/private stakeholders play role in efficient/sustainable waste recycling process
 - Eg: **NEA** engages residents on importance/how/what to recycle; residents ensure proper recycling, public agencies ↑ awareness/education, private stakeholders provide recycling facilities

What is disaster risk?

= likelihood of damage to properties, injuries, loss of lives from disaster in given period

- Product of interaction between **3 factors**:
 - **Nature of hazard** — characteristics of the hazard
 - **Vulnerability** — physical/social/economic/env. factors ↑ susceptibility
 - **Exposure** — situation of people/belongings in hazard-prone areas
- Cannot consider factors in isolation — interaction of ALL factors determines disaster risk

What is disaster risk management?

= plans/actions to prevent new risks, reduce existing risks, manage disaster risks → strengthens **community resilience**

- Strategies aim to reduce: neighbourhood's **exposure** to hazards + **vulnerability** of people/properties
 - Eg: SG's comprehensive disaster risk management plan — main agency = **Singapore Civil Defence Force (SCDF)**; Town Councils cooperate w/ govt agencies on public safety/disease prevention

SG's strategies focus on:

1. Improving residents' emergency preparedness (natural + technological hazards)
 - Eg: **SCDF Community Emergency Preparedness Programme (CEPP)** — key lifesaving skills, emergency procedures
2. Implementation of monitoring & warning systems
 - Eg: **SCDF Public Warning System (PWS)** — network of sirens at strategic points → warns public of imminent threats (natural/man-made disasters)

What is community resilience?

= ability of community to resist, adapt to, recover from disaster impacts in timely/efficient manner
Developed by:

1. **Strengthening relationships among residents + raising hazard awareness**
- Disaster risk management plans effective/sustainable only w/ widespread support + long-term participation from residents
 - Residents encouraged to know neighbours → depend on each other during emergency
 - Eg: **People's Association (PA)** — community activities fostering positive relationships (active ageing, emergency preparedness, community sports — bring diff. ages/backgrounds together)
 - Eg: community resilience evident during **COVID-19** — residents helped each other (mask/food distribution)
 - Neighbour relations highly diverse — may occasionally be problematic

2. **Developing residents' ability to organise themselves + equip w/ resources**
(resist/adapt/recover)
- Inclusive planning process — community leaders, civil society orgs, govt
 - Residents actively participate in projects → better understand risks/adaptation options to communicate to planners/govt
 - Eg: **Community First Responders (CFRs)** — support govt in search & rescue, relief work, educate public on first-aid/basic firefighting
 - Eg: **CFR (Fire)** — alerted to minor rubbish chute/bin fires → help put out → SCDF optimises resources for higher-priority cases
 - Eg: **Total Defence framework** — all-round response to threats; everyone has part to play individually/collectively → strong, secure, cohesive nation
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KEY WORDS/PHRASES — TOPIC 2 (memorise!)

- **Standard of living** — measure of consumption of goods/services
- **Economic sustainability** — prosperous/fulfilling lives + economic progress in harmony w/ nature
- **Social sustainability** — inclusive & resilient societies, residents have a voice
- **Environmental sustainability** — sustainably manage resources + urgent climate action for present & future
- **Ecosystem** — dynamic complex of living communities + non-living env. as functional unit
- **Ecosystem services** — benefits nature brings to people
(Provisioning/Regulating/Cultural/Supporting)
- **Hazard** — process/phenomenon/human activity causing loss of life, damage, disruption
- **Air pollution** — contaminants in air that don't disperse properly, harm health/env.
- **Adaptation** — adjustments to hazards to moderate harm/take advantage of opportunities
- **Environmental stewardship** — actions to protect/care for/responsibly use env.
- **Volunteerism** — time/skills for others' benefit, not financial
- **Disaster risk** — likelihood of damage/injury/loss of life (hazard × vulnerability × exposure)
- **Exposure** — people/belongings located in hazard-prone areas
- **Vulnerability** — factors ↑ susceptibility to hazard impacts
- **Disaster risk management** — plans/actions to prevent/reduce/manage disaster risks
- **Community resilience** — ability to resist/adapt/recover from disaster impacts