

## Developing landscapes in emerging cities

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### Urbanisation – Impact on green landscapes

- Human populations are shifting to urban areas across the globe
- Urban areas comprises only 3% of globe's geographical area but >50% people live in cities (2010)
- By 2050 about 70% will move to urban areas
- Major concerns for the cities...
  - Depletion of ground water / surface water resources
  - Shortage of skilled manpower to manage the urban landscapes
  - Climate change – Global warming
  - Environmental pollution
  - Invasive alien species

## Current scenario of urban landscape designs

- Higher proportion of exotics
- Intensive inputs
- High maintenance
- Water thirsty landscapes
- Manicured landscape styles
- Artificial looking & typical urban landscapes
- Neglect of natural areas, waterbodies

## Concepts for landscapes in emerging cities – adapting to a changing climate & water constraints

1. Ecological restoration
2. Lake conservation
3. Developing native landscapes
4. Rainwater harvesting
5. Urban open-spaces
6. Sustainable landscapes
  - a. Tree parks
  - b. Xeriscaping
  - c. Native plantation
  - d. Involving the local communities
  - e. Use of recycled liquid and solid waste

## Some sustainable landscape design concepts

- **Landscape urbanism** - Urban planning in which the cities are organised through the design of the city's landscape, rather than the design of its buildings.
- **Natural landscaping / native gardening** - use of native plants, including trees, shrubs, groundcover, and grasses which are indigenous to the geographic area of the garden.
- Reduction of stormwater run-off through the use of bio-swales, rain gardens and green roofs and walls.
- Reduction of water use in landscapes through design of water-wise garden techniques
- Bio-filtering of wastes through constructed wetlands
- Integration and adoption of renewable energy, including solar-powered landscape lighting, roofing with solar panels, Solar trees.

## Some sustainable landscape design ideas

- Landscape irrigation using grey water
- Creating and enhancing wildlife habitat in urban environments
- Energy-efficient landscape design in the form of proper placement and selection of shade trees and creation of wind breaks
- Permeable paving materials to reduce stormwater run-off and allow rain water to infiltrate into the ground and replenish groundwater
- Recycling of as wood, glass, plastic, rubber to create landscape products such as paving stones, mulch and other materials
- Soil management techniques, including composting kitchen and yard wastes, to maintain and enhance healthy soil
- Development of lawn alternatives – Local grasses, creepers and other ground covers

## Xeriscaping

- Water-efficient landscaping
- Need not be 'zero-scaping' or 'Cacti-succulent garden' or 'Natural landscaping'
- Xeriscaping is a method of garden design that involves choosing of plants that can be maintained with little supplemental watering.
- Emphasis is on selection of plants for water efficiency & judicious use of drought tolerant plant species
- Application of mulch material to minimize the water use.
- Can be applied to landscapes of any style.
- Creates a landscape that is sustainable in dry climate.

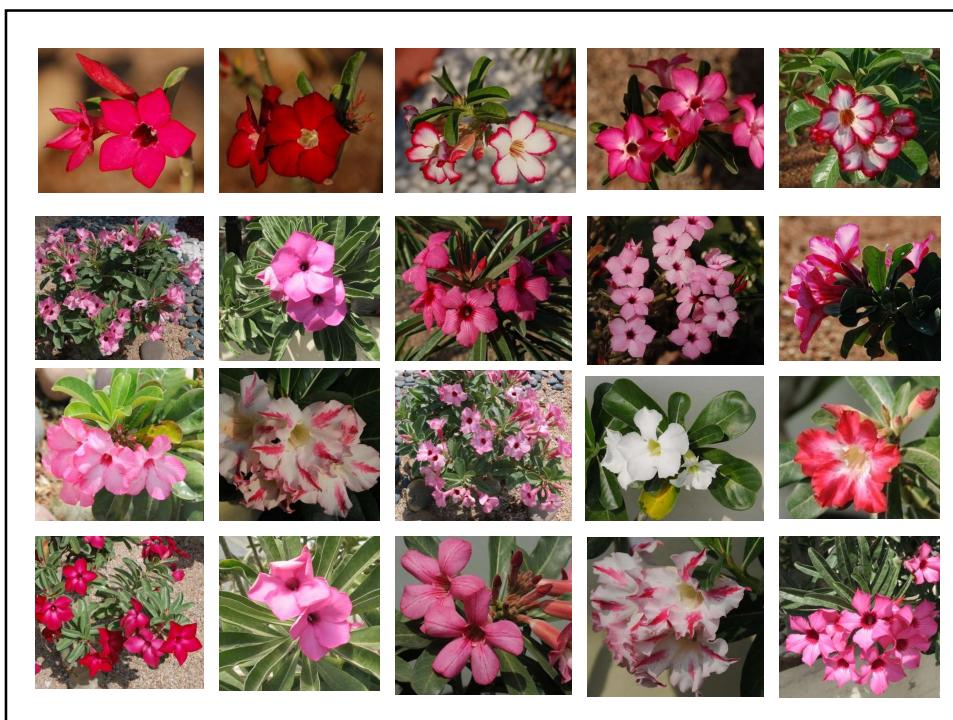
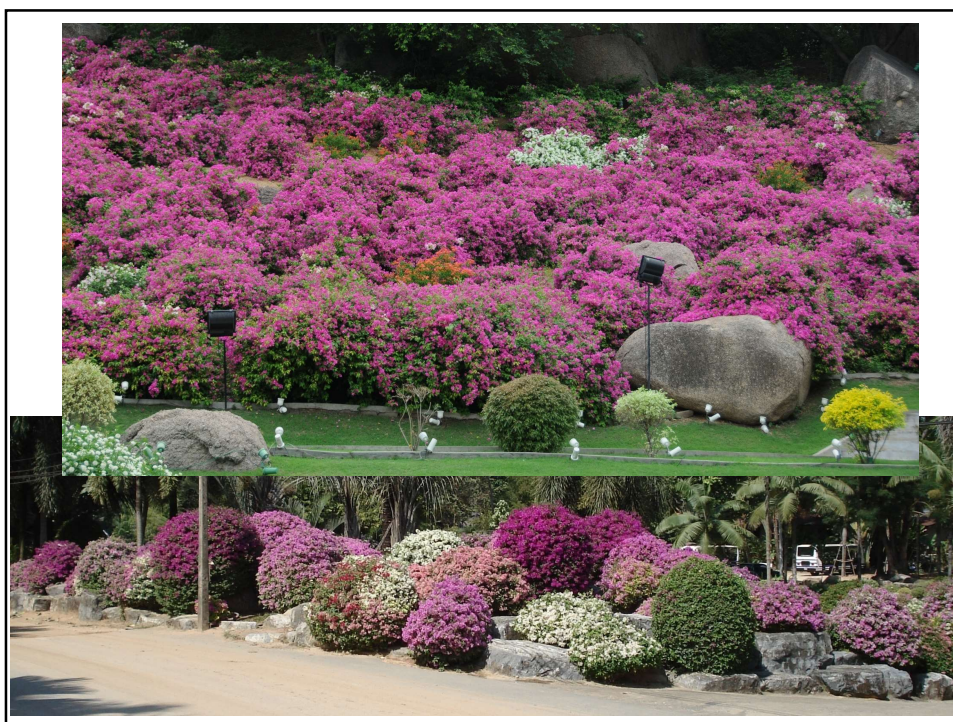




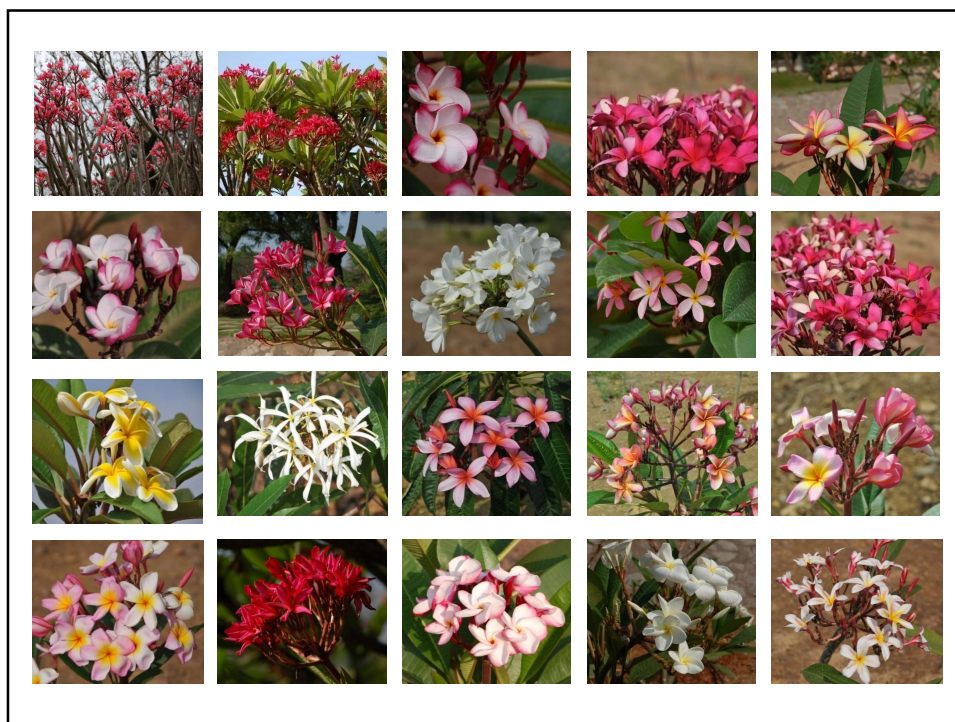
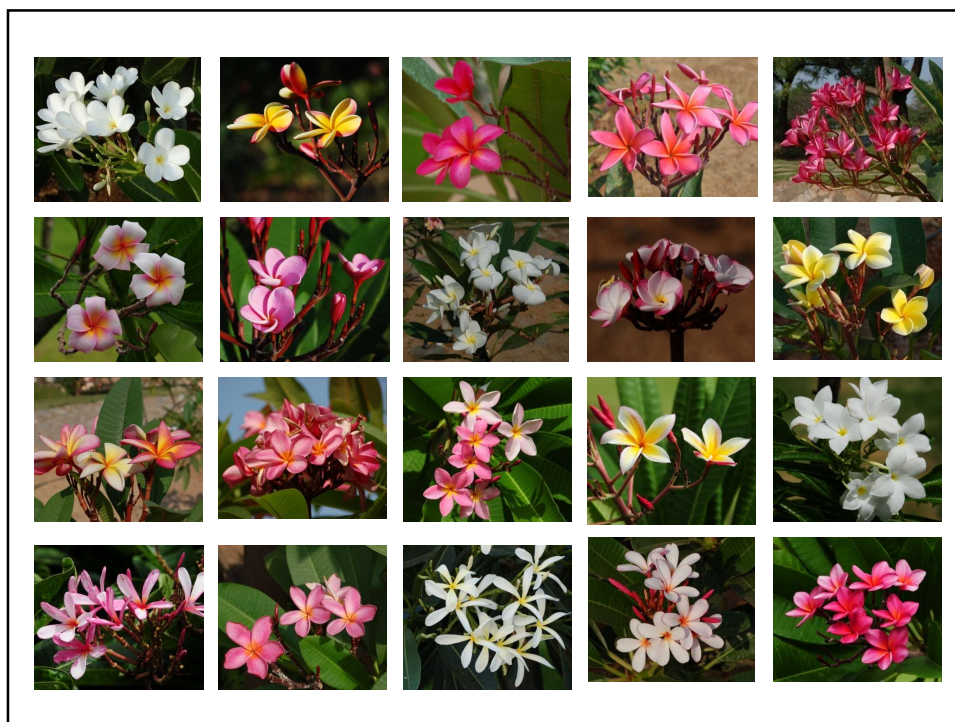


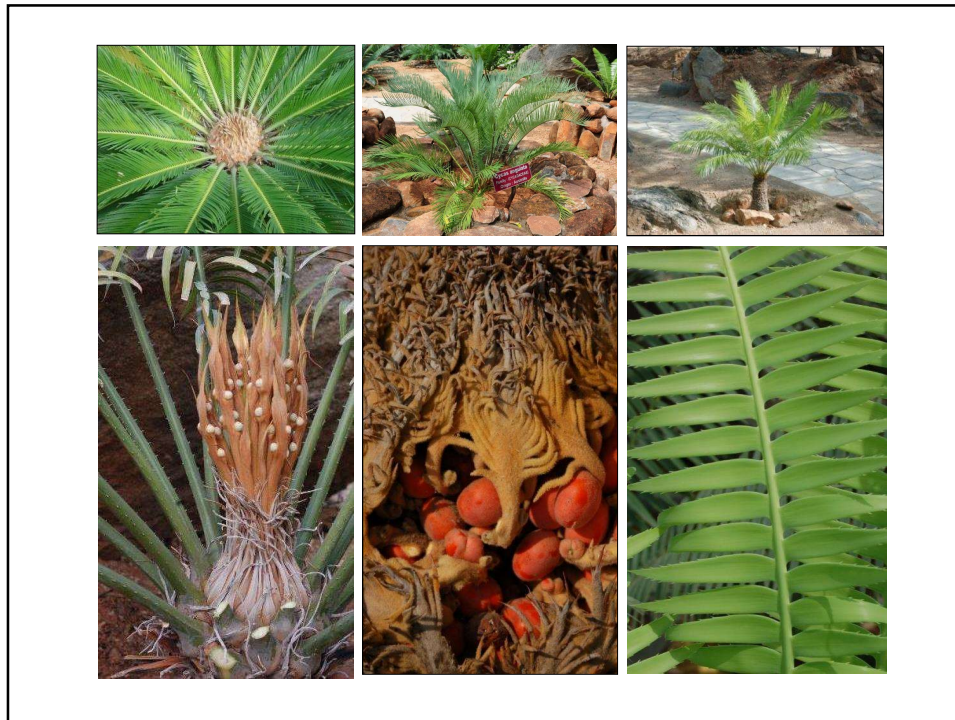














## Designing sustainable native landscapes

- Limited soil amendments
- Selection of suitable hardy indigenous plants
- Using mulch to avoid moisture loss
- Organic way
- Close spacing
- Minimal interference



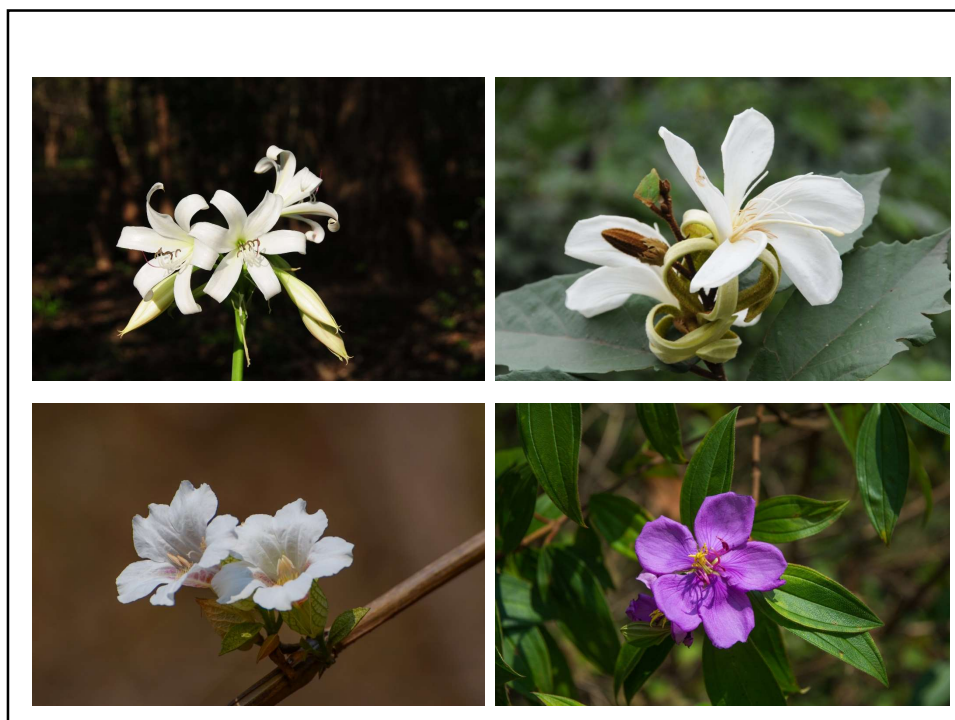
















## City Biodiversity Index

- A self-assessment tool for cities
- Evaluates and monitors the progress of city's biodiversity conservation efforts
- Sets individual baselines.

SINGAPORE INDEX ON CITIES' BIODIVERSITY				
PART I – Profile of the City	Location and size (geographical coordinates (latitudes and longitudes); climate (temperate or tropical); rainfall/precipitation (range and average); including maps or satellite images where city boundaries are clearly defined)			
	Physical features of the city (geography, altitude, area of impermeable surfaces, information on brownfield sites, etc.)			
	Demographics (including total population and population density; the population of the region could also be included if appropriate, and for the purpose of placing it in the regional context)			
	Economic parameters (Gross Domestic Product (GDP), Gross National Product (GNP), per capita income, key economic activities, drivers and pressures on biodiversity)			
	Biodiversity features (ecosystems within the city, species within the city, quantitative data on populations of key species of local importance, relevant qualitative biodiversity data)			
	Administration of biodiversity (relevant information includes agencies and departments responsible for biodiversity; how natural areas are protected (through national parks, nature reserves, forest reserves, secured areas, parks, etc.)			
	Links to relevant websites including the city's website, environmental or biodiversity themed websites, websites of agencies responsible for managing biodiversity			
PART II – Indicators	Core Components	Indicators	Maximum Score	
	Native Biodiversity in the City	1. Proportion of Natural Areas in the City	4 points	
		2. Connectivity Measures	4 points	
		3. Native Biodiversity in Built Up Areas (Bird Species)	4 points	
		4. Change in Number of Vascular Plant Species	4 points	
		5. Change in Number of Bird Species	4 points	
		6. Change in Number of Butterfly Species	4 points	
		7. Change in Number of Species (any other taxonomic group selected by the city)	4 points	
		8. Change in Number of Species (any other taxonomic group selected by the city)	4 points	
		9. Proportion of Protected Natural Areas	4 points	
		10. Proportion of Invasive Alien Species	4 points	
	Ecosystem Services provided by Biodiversity	11. Regulation of Quantity of Water	4 points	
		12. Climate Regulation: Carbon Storage and Cooling Effect of Vegetation	4 points	
		13. Recreation and Education: Area of Parks with Natural Areas	4 points	
		14. Recreation and Education: Number of Formal Education Visits per Child Below 16 Years to Parks with Natural Areas per Year	4 points	
	Governance and Management of Biodiversity	15. Budget Allocated to Biodiversity	4 points	
		16. Number of Biodiversity Projects Implemented by the City Annually	4 points	
		17. Existence of Local Biodiversity Strategy and Action Plan	4 points	
		18. Institutional Capacity: Number of Biodiversity Related Functions	4 points	
		19. Institutional Capacity: Number of City or Local Government Agencies Involved in Inter-agency Co-operation Pertaining to Biodiversity Matters	4 points	
		20. Participation and Partnership: Existence of Formal or Informal Public Consultation Process	4 points	
		21. Participation and Partnership: Number of Agencies/Private Companies/NGOs/Academic Institutions/International Organisations with which the City is Partnering in Biodiversity Activities, Projects and Programmes	4 points	
		22. Education and Awareness: Is Biodiversity or Nature Awareness Included in the School Curriculum	4 points	
		23. Education and Awareness: Number of Outreach or Public Awareness Events Held in the City per Year	4 points	
		Native Biodiversity in the City (Sub-total for indicators 1-10)		40 points
		Ecosystem Services provided by Biodiversity (Sub-total for indicators 11-14)		16 points
Governance and Management of Biodiversity (Sub-total for indicators 15-23)		36 points		
Maximum Total:		92 points		



## Conclusion

- Sufficient budget allocations
- Avoiding high maintenance landscapes
- Limiting the expanse of the lawns
- Tree dominated landscapes
- Selection of right plants
- Xeriscape concepts
- Use of local materials
- Efficient management of urban open spaces & lakes
- Participation
- Biodiversity conservation
- Policy framework





Thank you