Guidelines for filling out Chapter 5 (Monitoring System) of the "[your country] Capital of Biodiversity"

In this document we give further explanations on how to answer each indicator as well as the rationale for using each indicator. The [number; This number will vary depending upon the selections made in the countries] indicators in this Monitoring System are selected from the 26 indicators of the Singapore Index on Cities' Biodiversity. For your information, the [number] excluded indicators are listed at the end of this document. In the Monitoring System we award 1 point for filling out an indicator with accurate data or an estimation, up to a maximum of 10 points for the whole chapter. No points are awarded for selecting "not available."

In the original **Singapore Index, there is an alternative scoring system** based upon the indicator values, totalling a maximum of 100 points for all 26 indicators. As we have only used a portion of the 26 indicators, the maximum points in our Monitoring System, using the Singapore Index scoring system, tallies just [number]. For each indicator, the Singapore Index scoring system is provided in a blue box. Note that this is the Singapore Index scoring system and is completely separate from the scoring system used in the Questionnaire or the points awarded for answering indicators in the Monitoring Chapter. This Singapore Index scoring system is intended for setting benchmarks for progress only, and has no bearing on a municipality's chance of winning the competition.

Indicator 1: What proportion of your municipality is comprised of natural or semi-natural areas?

Rationale for indicator: Natural ecosystems harbour more species than disturbed or man-made landscapes, hence, the higher the percentage of natural/semi-natural areas compared to that of the total municipality area gives an indication of biodiversity richness.

How to calculate indicator: 100 x (total area with natural and semi-natural ecosystems/total area of municipality)
Natural and semi-natural areas are defined as all areas that are not highly disturbed or man-made landscapes. Some examples of such areas are forests, mangroves, freshwater, swamps, natural grasslands, streams, lakes etc. Parks, golf courses and roadsides are not considered as natural or semi-natural. However, natural ecosystems with dominant native species within parks can be included in the computation.

Where to obtain data for calculations: Possible sources of data on natural areas include government agencies in charge of biodiversity, municipal authorities, urban planning agencies, biodiversity centres, nature groups, universities, publications etc.

How to calculate the Singapore Index score: Based on the assumption that, by definition, a city comprises mainly man-made landscapes, the scoring will be award a maximum score for 20% or greater coverage by natural or semi-natural area.

0 point - 0%
1 point - 1% - 6%
2 points - 7% - 13%
3 points - 14% - 20 %
4 points - 21% or more

Indicator 2: What proportion of your municipality is officially protected?

Rationale for indicator: Protected areas indicate the government's commitment to biodiversity conservation. Hence, the % of protected areas is an important indicator. It is also recognised that the percentage of protected areas in a municipality must commensurate with the proportion of natural ecosystems within a municipality.

How to calculate indicator: Here we consider EU designations such as Natura2000 as well as national designations such as .....to constitute "official protection".
(Area of protected areas with natural ecosystems/total area of the municipality) X 100

Where to obtain data for calculations: Possible sources of data on natural areas include government agencies in charge of biodiversity, municipal authorities, urban planning agencies, biodiversity centres, nature groups, universities, publications, etc.

How to calculate the Singapore Index score: Based on the premise that realistically, any city would afford protection to a maximum of around 20% of its city area, the following scoring system is appropriate:

0 point - 0 %
1 point - 1-4%
2 points - 5-9%
3 points - 10-19%
4 points - 20% and more

Indicator 3: What proportions of your municipality fall into different land-use categories?

Rationale for indicator: This indicator shows how biodiversity richness differs in different land-use types. It is useful as a biodiversity planning tool, to decide which land-use category to focus on for biodiversity enhancement. It would be impractical to calculate the total number of species found in the different land-use categories. Hence, it proposed that this indicator should focus on only one taxonomic group which is ubiquitous across all the land-use categories, i.e. either plants or birds, depending on availability.

How to calculate indicator:

Land-use categories:

A. Impermeable build-up area – bare (e.g., buildings, roads, any part with no vegetation or water, etc.)
B. Anthropogenic greenery and green space – greenery on impermeable surfaces, managed green space (e.g., roof gardens, roadside plantings, golf courses, lawns, urban parks, etc.)
C. Natural greenery – protected areas and natural ecosystems (e.g., all areas with natural ecosystems, national parks, nature reserves, etc.)
D. Artificial water bodies (e.g., reservoirs, artificial lakes, drains, etc.)
E. Natural water bodies (e.g., rivers, streams, lakes, etc.)

Where to obtain data for calculations: Possible sources of data on natural areas include government agencies in charge of biodiversity, municipal authorities, urban planning agencies, biodiversity centres, nature groups, universities, publications, etc.

How to calculate the Singapore Index score:

Weighting **W**	Land-use category	land-use area/total area of city **X**	Score **WX**
1	A		
2	B		
3	C		
2	D		
3	E		
	Total	1	

The score is the sum of each WX calculation, to a maximum of 4 points.

Indicator 4: Number of native plants

Rationale for indicator: It is essential that the native flora and fauna diversity be incorporated as indicators. Three key taxonomic groups that are most surveyed worldwide, i.e., plants, birds and butterflies, have been selected as "core indicators".

How to calculate indicator: Tally native plant species

Where to obtain data for calculations: Possible sources of data on natural areas include government agencies in charge of biodiversity, municipal authorities, urban planning agencies, biodiversity centres, nature groups, universities, publications, etc.

How to calculate the Singapore Index score: Based on our knowledge of the number of species of plants that could be found in cities, we propose the following ranked scoring:

Plants
0 point - 0 species
1 point - 1-99 species
2 points - 100-499 species
3 points - 500-999 species
4 points - 1000 and more species

Indicator 5: Number of native birds

Rationale for indicator: It is essential that the native flora and fauna diversity be incorporated as indicators. Three key taxonomic groups that are most surveyed worldwide, i.e., plants, birds and butterflies, have been selected as "core indicators".

How to calculate indicator: Tally native bird species

Where to obtain data for calculations: Possible sources of data on natural areas include government agencies in charge of biodiversity, municipal authorities, urban planning agencies, biodiversity centres, nature groups, universities, publications, etc.

How to calculate the Singapore Index score: Based on our knowledge of the number of native bird species that could be found in cities, we propose the following ranked scoring:

Birds
0 point - 0 species
1 point - 1-50 species
2 points - 51-100 species
3 points - 101-150 species
4 points - 151 and more species

Indicator 6: Number of native butterflies

Rationale for indicator: As this is an index focusing on biodiversity in municipalities, it is essential that the native flora and fauna diversity be incorporated as indicators. Three key taxonomic groups that are most surveyed worldwide, i.e., plants, birds and butterflies, have been selected as "core indicators".

How to calculate indicator: Tally native butterfly species

Where to obtain data for calculations: Possible sources of data on natural areas include government agencies in charge of biodiversity, municipal authorities, urban planning agencies, biodiversity centres, nature groups, universities, publications, etc.

How to calculate the Singapore Index score: Based on our knowledge of the number of native butterfly species that could be found in cities, we propose the following ranked scoring:

Butterflies
0 point - 0 species
1 point - 1- 50 species
2 points - 50–100 species
3 points - 101-150 species
4 points - 151 and more species

Indicators 7, 8 and 9: Number of native species in chosen taxonomic group e.g. mammals, reptiles, amphibians, freshwater fish, marine fish, carabid beetles, spiders, hard corals, sponges, sea-grasses, bryophytes etc.

Rationale for indicator: As this is an index focusing on biodiversity in municipalities, it is essential that the native flora and fauna diversity be incorporated as indicators. To ensure fairness and objectivity in the index, municipalities can select 3 taxonomic groups that would reflect their best biodiversity.

How to calculate indicator: Tally the native species of chosen taxonomic group

Where to obtain data for calculations: Possible sources of data on natural areas include government agencies in charge of biodiversity, municipal authorities, urban planning agencies, biodiversity centres, nature groups, universities, publications, etc.

How to calculate the Singapore Index score: Scoring systems for all possible taxa are yet to be devised, although we intend to develop scoring systems for many more taxa, based upon the most commonly chosen taxonomic groups in the 2010 competition.

Indicator 10: How prevalent are invasive alien species in your municipality?

Rationale for indicator: Invasive alien species out-compete native species and, thus, threaten the survival of native species. As human settlements are very open to influx of alien species, this indicator measures the status of this threat.

How to calculate indicator: Compare the number of invasive alien species with that of native species in specific taxonomic group (Number of invasive alien species/Number of native species) X 100

Where to obtain data for calculations:
Possible sources of data on natural areas include government agencies in charge of biodiversity, municipal authorities, urban planning agencies, biodiversity centres, nature groups, universities, publications, etc.

How to calculate the Singapore Index score: The scoring is based on the premise that the more invasive alien species that inhabit the city, the more destructive their impact will be on the native species.

0 point - 31% and more
1 point - 21-30%
2 points - 11-20%
3 points - 1-10%
4 points - 0%

Indicator 11: How often do your municipality residents visit public parks and protected areas?

Rationale for indicator: Biodiversity provides invaluable recreational and educational services. It is essential for physical and psychological health.

How to calculate indicator: Number of visits/person/year

Where to obtain data for calculations: Surveys carried out in parks and protected areas

How to calculate the Singapore Index score:

0 point - 0 visit/person/year
1 point - 1-10 visits/person/year
2 points - 11-50 visits/person/year (almost once a week)
3 points - 51-100 visits/person/year
4 points - over 100 visits/person/year

Indicator 12: How often do children (<16 years) visit your parks on an educational basis?

Rationale for indicator: Biodiversity provides invaluable recreational and educational services. It is essential for physical and psychological health. Early education in biodiversity is essential to ensuring that children connect with nature and develop compassion for nature that helps shape them right into adulthood.

How to calculate indicator: Number of visits/person/year

Where to obtain data for calculations: School records, Surveys carried out in parks and protected areas

How to calculate the Singapore Index score:

0 point - 0 visit/ear
1 point - 1 visit/year
2 points - 2 visits/year
3 points - 3 visits/year
4 points - 4 and more visits/year

Note: Only one of the indicators 13 and 14 shall be asked.

Indicator 13: How much park area is available to your citizens?

Rationale for indicator: Biodiversity provides invaluable recreational and educational services. It is essential for physical and psychological health.

How to calculate indicator: Area of parks and protected areas/population of settlement

Where to obtain data for calculations: Municipal authorities

How to calculate the Singapore Index score:

0 point - 0 visit/person/year
1 point - 0.1 – 0.3 ha/person
2 points - 0.4 – 0.6 ha/person
3 points - 0.7 – 0.9 ha/person
4 points - 1 or more ha/person

Indicator 14: What proportion of the residents in your municipality live within 300m of a park or accessible natural/semi-natural area?

Rationale for indicator: Biodiversity provides invaluable recreational and educational services. It is essential for physical and psychological health.

How to calculate indicator: Using a map, draw zones of width 300m around each public park and accessible natural/semi-natural area. Determine the population living within these zones and divide by the municipality's total population size.

Where to obtain data for calculations: Municipal authorities

How to calculate the Singapore Index score:

0 point – less than 20%
1 point – 20-40%
2 points – 40-60%
3 points – 60-80%
4 points – 80% or more

Indicator 15: How many biodiversity-focused public outreach and awareness-raising events are held in your municipality each year?

Rationale for indicator: This indicator will evaluate public awareness of biodiversity. Examples of outreach/ public awareness events include talks, guided walks, seminars, exhibitions, road shows, etc. organised by city officials, schools, NGOs, etc.

How to calculate indicator:
Tally the public awareness events for the preceding year.

Where to obtain data for calculations: City councils, education department, NGOs, etc.

How to calculate the Singapore Index score:
0 point - 0 projects/programmes
1 point - 1-20 per year
2 points - 21-50 per year
3 points - 51-100 per year
4 points - more than 100

Indicator 16: How many of your agencies coordinate on biodiversity matters?*

*this indicator is only applicable to municipalities with populations in excess of 10 000. This limit is in place because settlements smaller than 10 000 may only have a few council staff, some of whom will be in charge of several different sectors. Agencies could include the department responsible for biodiversity, the planning department, the water authority, the transport authority, the development agencies etc.

Rationale for indicator: Institutions are necessary for the effective implementation of projects and programmes, hence, the existence of biodiversity-focused and biodiversity-related institutions will greatly enhance biodiversity conservation in a municipality. Some of the essential institutions include a biodiversity centre, herbarium, zoological museum, botanical garden, zoo, insectarium, etc. It is more important to measure whether the functions of these institutions exist rather than the physical existence of these institutions. Hence, if a herbarium is situated in a botanical garden, then two functions exist in the municipality under one institution.

Many biodiversity issues are cross-sectoral and, and thus involve inter-agencies. The evaluation of inter-agency coordination is an important indicator of the success of biodiversity conservation, more so in a city where it is so compact.

How to calculate indicator: Number of agencies involved in inter-agency coordination pertaining to biodiversity matters

Where to obtain data for calculations: Municipal authorities

How to calculate the Singapore Index score:
0 point - No inter-agency coordination
1 point - At least 2 agencies coordinate on biodiversity matters
2 points - At least 3 agencies coordinate on biodiversity matters
3 points - At least 4 agencies coordinate on biodiversity matters
4 points - At least 5 agencies coordinate on biodiversity matters

Indicator 17: What proportion of the municipality's budget is spent on biodiversity projects?

Rationale for indicator: This indicator evaluates what programmes and projects are put in place to ensure the maintenance and enhancement of biodiversity in municipalities. Computation could include the municipality's manpower budget as well as operational and project expenditure. Projects and

programmes include those pertaining to plant conservation, bird conservation, butterfly conservation, species recovery, biodiversity surveys, biodiversity enhancement projects, etc.

How to calculate indicator: (Amount spent on institutions related to biodiversity and projects/total budget of municipality) X 100

Where to obtain data for calculations: Possible sources of data on natural areas include government.

How to calculate the Singapore Index score: A city's budget comprises several components, of which biodiversity is only one. Hence, a realistic estimate should be accorded, based on land-use proportion.

0 point - 0%
1 point - 1%
2 points - 2%
3 points - 3%
4 points - more than 3%

Indicator 18: Is there an ongoing public consultation process for biodiversity-related issues in your municipality?

Rationale for indicator: This indicator evaluates the existence of public consultation whether formal or informal. It is impossible for any one single agency to carry out all the activities, responsibilities, projects and programmes that have biodiversity implications, hence, it is inevitable that engagement with all levels of the population must be facilitated. These include the municipal officials, the population, private sector, NGOs, etc.

How to calculate indicator: Presence or absence of formal or informal consultation process pertaining to biodiversity-related matters.

Where to obtain data for calculations: Municipal authorities

How to calculate the Singapore Index score:

0 point - No process
1 point - Process being considered
2 points - Process is planned
3 points - Process being implemented
4 points - Process exists

Indicator 19: How many agencies, private companies and NGOs is your municipality partnering on biodiversity-related projects and programmes, with written contractual agreements?

Rationale for indicator: This indicator evaluates the extent of formal partnerships. As it is impossible for any one single agency to carry out all the activities, responsibilities, projects and programmes that have biodiversity implications, hence, it is inevitable that engagement of all levels of the population must be facilitated. These include the municipal officials, the population, private sector, NGOs, etc.

How to calculate indicator:
Number of agencies/private companies/NGOs that the municipality is partnering in biodiversity activities or projects or programmes. Only those partnerships that constitute written contractual agreements may be considered here.

Where to obtain data for calculations: Municipal authorities

How to calculate the Singapore Index score:

0 point - No formal/informal partnerships
1 point - City in partnership with at least 1 other agency/private company/NGO
2 points - City in partnership with at least 2 other agencies/private companies/NGOs
3 points - City in partnership with at least 3 other agencies/private companies/NGOs
4 points - City in partnership with at least 4 other agencies/private companies/NGOs

Indicators of in the Singapore Index that we have not included in the Monitoring Chapter

Indicator: Diversity of ecosystems as defined by the CBD

Rationale for indicator: The number of natural ecosystems found in a city gives an indication of the diverse range of niches for native flora and fauna. Since different ecosystems are found in different geographical regions, any scientifically acceptable terrestrial and marine ecosystems (e.g. forests, freshwater swamps, peat swamps, natural grasslands, rivers, streams, lakes, rocky shores, beach, mud-flats, sand dunes, sea grass beds, corals etc.) can be computed in the calculation of this index.

Variable(s): A simple number that measures the habitats (number present now = index value of 100)

How to calculate indicator: Number of different natural ecosystems found in the city.

Where to obtain data for calculations: Possible sources of data on natural areas include government agencies in charge of biodiversity, city municipalities, urban planning agencies, biodiversity centres, nature groups, universities, publications, etc.

How to calculate the Singapore Index score: Based on the estimation that realistically, any city can accommodate up to around 10 natural ecosystems, within its boundaries, the scoring would be:

0 point - 0 natural ecosystem
1 point - 1-3 ecosystems
2 points - 4-6 ecosystems
3 points - 7-9 ecosystems
4 points - 10 or more ecosystems

Indicator: Freshwater Services

Rationale for indicator: Freshwater is essential for our survival. Good forest cover in our water catchment areas provides water cleansing services. If the city does not have to spend any money on cleaning or filtering their water, then the ecosystem services of the freshwater catchment are good. However, if the ecosystem services of the water catchment are mildly affected, then the cost of filtration could be low. The integrity of the ecosystem services is hence inversely proportional to the cost of replacing it.

Variable(s):

Replacement costs of water catchment services per capita. Either:

a) within the city
b) total water

How to calculate indicator:
Cost of cleaning the water in the city

Where to obtain data for calculations:
The Water Authority of the City

How to calculate the Singapore Index score: The scoring is based on the premise that the less money spent on the cleaning of the water, the higher value of the water catchment services. Each city will have to decide what it considers as low, medium, high and astronomical cost.

0 point - Astronomical cost = uneconomical
1 point - High cost
2 points - Medium cost
3 points - Low cost
4 points - No cost

Indicator: % of vegetation cover
a) in the urban core
b) in the overall area

Rationale for indicator:

Variable(s):

How to calculate indicator:

Where to obtain data for calculations:

How to calculate the score:

How to calculate the Singapore Index score: still to be determined.

Indicator: Amount spent (as %) of city size and population.

Rationale for indicator: The first two sections measured the biodiversity in the city and the ecosystem services provided by the city. This indicator evaluates what programmes and projects are put in place to ensure the maintenance and enhancement of biodiversity in cities. Computation could include a city's or municipality's manpower budget as well as operational and project expenditure. Projects and programmes include those pertaining to plant conservation, bird conservation, butterfly conservation, species recovery, biodiversity surveys, biodiversity enhancement projects, etc.

Variable(s): Spending on biodiversity

How to calculate indicator:
It would make more sense to measure how many projects/programmes are being funded by the city authorities, private funding etc.

Where to obtain data for calculations: Possible sources of data on natural areas include city authorities, private sector, NGOs, etc.

How to calculate the Singapore Index score:

0 point - 0 projects/programmes
1 point - 1-10
2 points - 11-20
3 points - 21-30
4 points - more than 30

Indicator: How many projects/ programmes are being funded by the city authorities, private funding, etc.

Rationale for indicator: The first two sections measured the biodiversity in the city and the ecosystem services provided by the city. This indicator evaluates what programmes and projects are put in place to ensure the maintenance and enhancement of biodiversity in cities. Computation could include a city's or municipality's manpower budget as well as operational and project expenditure. Projects and programmes include those pertaining to plant conservation, bird conservation, butterfly conservation, species recovery, biodiversity surveys, biodiversity enhancement projects etc.

Variable(s): Number of projects

How to calculate indicator: Tally the number of biodiversity-related projects currently being funded by the city authorities or private sources.

Where to obtain data for calculations: Possible sources of data on natural areas include city authorities, private sector, NGOs etc.

How to calculate the Singapore Index score: **still to be determined.**

Indicator: Institutional Capacity: Is there an organisational structure present? If yes, qualify by the ratio of permanent employees per city population.

Rationale for indicator: Institutions are necessary for the effective implementation of projects and programmes, hence, the existence of biodiversity-focused and biodiversity-related institutions will greatly enhance biodiversity conservation in a city. Some of the essential institutions include a biodiversity centre, herbarium, zoological museum, botanical garden, zoo, insectarium etc. It is more important to measure whether the functions of these institutions exist rather than the physical existence of these institutions. Hence, if a herbarium is situated in a botanical garden, then two functions exist in the city under one institution.

Many biodiversity issues are cross-sectoral and, hence, involve interagencies. The evaluation of inter-agency coordination is an important indicator of the success of biodiversity conservation, more so in a city where it is so compact.

Variable(s): Number of institutions covering the essential biodiversity functions (?).

How to calculate indicator: It does not make much sense to measure the ratio of permanent employees per city population. It would be more appropriate to evaluate whether the essential biodiversity related functions are served with institutional capacity.

Where to obtain data for calculations: City councils

How to calculate the Singapore Index score:
0 point - No institutions covering the essential biodiversity-related functions
1 point - 1 institution or function
2 points - 2 institutions or functions
3 points - 3 institutions or functions
4 points - 4 institutions or functions

The institutions or functions could include any of the following: biodiversity centre, botanical garden, herbarium, zoological museum, insectarium, zoo, etc.

Indicator: Rules, Regulations & Policy: Do you have a Local Biodiversity Strategy and Action Plant (LBSAP)#, policy or equivalent? #Are CBD targets, sustainable use considered/accounted for?

If yes:

a) Is it aligned with national strategies and plans;
b) Does it operate within an institutional framework?
c) Existence of regulations & its implementation - [Existence of incentives and disincentives] [Existence of multi-stakeholder consultation systems]
d) Is your city procurement policy biodiversity friendly? (At least 2 products/ sectors to qualify for a "yes") - *LBSAP – Local Biodiversity Strategy and Action Plan

Rationale for indicator: To ensure that there is good governance, sound policies must be formulated. To facilitate the operation of policies, rules and regulations must be put in place. This section evaluates the existence of biodiversity-relevant policies, rules and regulations, in particular their alignment with CBD's initiatives, like the National Strategy and Action Plans (NBSAP).

Four key variables have been proposed for this indicator:
1) Existence of a Local Biodiversity Strategy and Action Plan (LBSAP) for the city or its equivalent
2) The LBSAP is aligned with national biodiversity initiatives like the NBSAP or its equivalent
3) The NBSAP-aligned LBSAP includes two initiatives of the CBD. Some of the CBD initiatives include plant conservation, forest biodiversity, global taxonomy initiative, invasive species programme, etc.
4) The NBSAP-aligned LBSAP includes more than two initiatives of the CBD.

How to calculate indicator: Existence of LBSAP; existence of NBSAP aligned LBSAP; no. of CBD initiatives.
Where to obtain data for calculations: City councils and National CBD Focal Points

How to calculate the Singapore Index score:
0 point - No LBSAP
1 point - LBSAP not aligned with NBSAP
2 points - LBSAP aligned with NBSAP but does not include any CBD initiatives
3 points - NBSAP-aligned LBSAP which includes at least 2 CBD initiatives
4 points - NBSAP-aligned LBSAP which includes more than 2 CBD initiatives