SMART CITIES: OPEN SPACE AND PUBLIC PARKS

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I didn’t come here to tell you the time with your own watch!
Same, Same, But Different?

Toronto, Canada from 84.5 Kilometers
Mumbai Open Space, Parks
Population GTA, 6,418,000.00
Pop. density persons per hectare, 35.00-15.00
Average Age, 39
Percentage of Non-Whites 46%
Males to Females Percentage .90%
Immigration Rate (out of country) 30%
Per Capita Income, $15,000.00
Household Income Average, $75,000.00
Urban Expansion, 2,751.00 sq. k
Employment Rate 95%
Open space per person, 120 sq. m. , pp
Public Parks, 8000.00 ha, 12% of City
Opens Space Req. for New Development 5%—15%

Future Park Expansion 20% of City?

Population, Mumbai, 18,410,000.00
Pop. Density persons per hectare 3,300.00
Average Age, 27
Percentage of Non-Whites 95%
Males to Females Percentage 1.19%
In-migration Rate (inside of country) 963%
Per Capita Income, $2,845.00
Household Income Average, $7,000.00
Urban expansion, 600.00 sq. k
Employment Rate 95%
Open space per person, 1.10 sq. m. - 2.76, sq. m. , pp?
Public Parks, 1,633.67 ha, 0.27% of City?
Opens Space Req. for New Development 15%—25%

Future Public Park expansion, 16% of City?
Yes Very Different......Take Climate For Example

Temperature
Toronto, Ontario
Average Rainfall Amount (mm) and Rainy Days

Mumbai, Maharashtra
Average Rainfall Amount (mm) and Rainy Days

Rain
Snow and Ice
Wind

Toronto

Mumbai

Toronto, Ontario
Average and Max Wind Speed and Gust (mph)

Mumbai, Maharashtra
Average and Max Wind Speed and Gust (mph)
Toronto

Toronto, Ontario
Average Pressure (mb)

Mumbai

Mumbai, Maharashtra
Average Pressure (mb)
Toronto, Ontario

Average Cloud and Humidity (%)

Zoom 1m 3m 6m YTD 1y All

Jan '16 Mar '16 May '16 Jul '16 Sep '16 Nov '16

Cloud (%) Humidity (%)

Toronto, Maharashtra

Average Cloud and Humidity (%)

Zoom 1m 3m 6m YTD 1y All

Jan '16 Mar '16 May '16 Jul '16 Sep '16 Nov '16

Cloud (%) Humidity (%)

Avg. Cloud, Humidity
Toronto, Ontario
Average UV Index

Mumbai, Maharashtra
Average UV Index

Avg. UV Index
Sun Hours and Sun Days
Visibility

Toronto, Ontario
Average Visibility (km)

Mumbai, Maharashtra
Average Visibility (km)
Light Pollution
PHYSICAL SCIENCE VS. GLOBAL CONDITION

Toronto

- Geophysical Risks
- Climate Change
- Biodiversity Loss
- Fresh Water Use
- Land Use Change
- Pollution
- Nitrogen Cycle

Mumbai

- Geophysical Risks
- Climate Change
- Biodiversity Loss
- Fresh Water Use
- Land Use Change
- Pollution
- Nitrogen Cycle


SOCIO-ECONOMIC VS. GLOBAL CONDITION

Toronto

Mumbai


What Exactly is a Smart City?

1. A **smart city** is a developed urban area that creates sustainable economic development and high quality of life by excelling in multiple key areas; economy, mobility, environment, people, living, and government. Excelling in these key areas can be done so through strong human capital, social capital, and/or ICT infrastructure.

   http://www.businessdictionary.com/definition/smart-city.html

2. A **smart city** is an urban development vision to integrate information and communication technology (ICT) and Internet of things (IoT) technology in a secure fashion to manage a city's assets. These assets include local departments' information systems, schools, libraries, transportation systems, hospitals, power plants, water supply networks, waste management, law enforcement, and other community services. A smart city is promoted to use urban informatics and technology to improve the efficiency of services.

   https://en.wikipedia.org/wiki/Smart_city
1. **Smart Open Space** is locally based, long-term open space development and conservation planning to help communities protect their environment, improve quality of life, and preserve critical elements of the local heritage, culture, and economy. Like development, open space can be either planned or haphazard. Well-managed open space programs protect a community's natural green infrastructure, providing places for recreation, preserving important environmental and ecological functions, and enhancing quality of life.

2. A **smart public park** is part of a, sustainable, and social city approach to parks planning and design. It has an important role to play in public space strategies which determining how welcoming and healthy a city is. Public parks operate over many scales which determine a parks' influence in contributing either to the whole city or to local communities. They are characterized by innovation in public space design and use. Turning to technology and new uses for parks will be of greater importance as public parks are incorporated into “green” infrastructure and at the same time fight for funding to meet these infrastructure needs, community contribution to public life and long term upkeep. Parks can act through their structures to promote, ecological functions, sustainability, resilience, social interaction, support economic development and tourism. All of these activities are important in order for public parks to continue providing their services and value to a city.
To actually do this is incredibly complex, in short a very “wicked problem” Why?
We are actually trying to figure out how to do this! So lots of experimentation but it is a mixed a hybrid approach. So here are the conceptual drivers.

1. **Landscape Ecology** – The impact of urban landscapes on Natural landscapes and the methods with dealing with this fragmentation.
2. **Urban Ecology** – The ecological impacts and urban ecological ecotones that evolve related to plants and animals in cities.
3. **New Urbanism** – The reliance on historic vernacular forms to idealize city living, usual low to medium density based on old town, villages.
4. **Landscape Urbanism** – The prioritization of landscape and Open Space as the driver for new urban forms and Park designs.
5. **Ecological Urbanism** – The extension of Landscape urbanism to consider more ecological forces in driving open space and Park Design.
6. **Sustainable Urbanism**. The move to design urban open space and parks as contributors to the environmental health of cities and to rebalance the loss of functioning ecosystems, “Fail Safe”
7. **Resilient Urbanism**, The Design of cities, urban open space and Parks as Green infrastructure to mitigate against chaotic, emergent and sudden catastrophic changes, such as disasters, or slow incremental changes such as Climate Change. “Safe to Fail”
New Urbanism – Landscape Urbanism
Ecological Urbanism – Green Infrastructure

Figure 1: Drivers for Cities Alive This chart maps some of the specific drivers identified in this report over grouping of the key factors affecting and driving the future of the city. Some drivers cross multiple boundaries and some occur outside any of the key groupings. Some drivers also affect each other — where they overlap indicates these relationships. © Arup

Ambitions
- Compactness
- Sustainable Transport
- Density
- Mixed Land Uses
- Diversity
- Passive Solar Design
- Green Building
- Net Zero Energy
- Net + Energy

Measures
- Air quality
- Storm Water
- Carbon and Methane Emissions Waste reduction
- Reuse and recycling
- Household Income
- Percent of people living at or below poverty level
- Health care
Sustainable Urbanism – Resilient Urbanism

**Sustainability** – “FAIL SAFE”?

**Resilience** – “SAFE TO FAIL”?

Images and diagrams illustrating concepts of resilience and sustainability in urban planning.
SMART OPEN SPACE: SUSTAINABILITY AND RESILIENCE

System Dynamics and Change

System Interaction

A-Biotic
Cultural
Biotic
A-Biotic

Rate of Change
SMART OPEN SPACE: SUSTAINABILITY AND RESILIENCE

Environmental Stressors

A-Biotic
Cultural
Biotic
A-Biotic
SMART OPEN SPACE: SUSTAINABILITY AND RESILIENCE

Sustainable Actions

A-Biotic
Cultural
Biotic
A-Biotic
SMART OPEN SPACE: SUSTAINABILITY AND RESILIENCE

Resilient Actions

Catastrophic  ▲

Fluctuating  ▲

A-Biotic

Cultural

Biotic

A-Biotic

Reduced Risk
Poreform takes a cue from an existing cost-effective, site-specific concrete erosion control technology, but reimagines its deployment in an innovative setting. The concrete surface, which is cast between two pieces of polyblend fabric formwork, was originally designed to prevent erosion on river banks and revetments. Poreform seeks to engineer this technology as a flood prevention tool.

This method of fabric-formed concrete surface was pioneered in civil engineering projects because of its ability to channel water and relieve hydrostatic pressure, and because of its ability to be efficiently customized to any site. The two-layers of fabric quilted together are pumped full of concrete on site with minimal waste. Surface drains are around them.

In order to maintain a dynamic topography for the concrete surface, it is structured by either sitting directly on sculpted grade or, where it caps a subterranean basin, draped over a cable structure. A suspended cable grid spans across the surface technology concrete detention basin, while a secondary cable netting is run between the primary cables. The netting then supports the surface during and postinstallation.

Material

When developing innovative infrastructure typologies, concrete is a particularly appropriate material for arid climates where typical vegetation solutions are not viable. The durability, prevalence and limited maintenance to evaporation.

Customizable and Scalable

The Poreform surface can be used in a variety of sites and at varying scales in combination with sub-surface water storage tanks. Because it is cast-in-place, and made from fabric into existing infrastructure at any scale. Aided by hydrological modeling and flood mapping, Poreform can be designed and customized for the specific conditions of any site. Surface area, volume capacity, runoff coefficient, and porosity can all be modulated according to the unique needs of each site.

Transferable

Though designed specifically with Las Vegas in mind, Poreform is an applicable and customizable intervention for any city where flood water needs to be collected quickly and efficiently. The surface system is especially useful in locations where the existing urban context is complex and dense, or where the percentage of impervious surface is very high.

Thorny Devil Lizard

Taking a cue from one biological system that is expert at collecting water during times of scarcity, Poreform is an intelligent surface that mimics the skin of a desert lizard. The Thorny Devil lizard has highly articulated scales that allow it to gather water against gravity and without energy expenditure. Much like the desert lizard, Poreform maximizes the collection surface area and provides channels for water to travel without sewn into the fabric in the factory and the concrete is pumped formwork, it can fit within existing urban conditions and can tap below, Poreform's concrete surface significantly limits water lost.
THE BRIDGING BERM
EAST RIVER PARK

As the berm makes its way along the edge of the park, it widens to provide planting and social space, and narrows to accommodate sports fields and other existing park programs. Ramps and bridges are inserted at frequent intervals on major upland streets in the neighborhood, in conjunction with concentrated green infrastructure enhancements, offering easy and legible corridors to the park. These corridors then culminate in new program elements at the water’s edge, an in-river, fibered Harbor Pool for swimming, a pair of lookout piers, a dedicated fishing pier, a potential ferry or water taxi dock, and more.
DRIFT CITY
ARCHITECTURE'S REACTION TO SEA LEVEL RISE

Hernan E. Bicketta, ‘The Net and the Flood’ rights, a paper from the Helsinki University. The design proposed a new form of an amphibious landscape. The net was designed and built a special structure that could rise over the water. This net would function as a water retention system for the local community. Yet, if the net were submerged, it would allow for the local community to adapt to the effects of climate change. Hernan E. Bicketta proposed to create an amphibious landscape that would allow for the local community to adapt to the effects of climate change.

A city that simultaneously defends, redistributes and adapts to the rising sea. This is a city that materializes in response to the hydrological shifts imposed by climate change. This is a city that mirrors the rise of land and water, then integrates with it. Drift City is a city of the 21st century. It is a mechanism that enables the city to adapt to the changing climate, and a way to live that is sensitive to the fluctuations of water.

The Rising
For the last 25 million years, the earth has participated in an oscillating dance with the immense continents and ice sheets moving the northern hemisphere. This dance entails a constant oscillation between seashore and land as the water discharged in the glaciers gives way to a wide-tidal range resulting in the rise of land. This rise is measured in millimeters and is a slow change, but it is still a significant change in the history of the earth. What is urgent for us today is that water in approaching crisis due to climate change and global warming. We humans are the first, and the slowest, to adapt. We participate in this environmental dance.

For the first time in the history of time, we are facing a truly developed condition, a climate change condition, in which millions of lives, hundreds of billions of dollars, and millions of species are at risk.

This is the situation of rising water, which is the beginning of a new and exciting era of architecture, a new and exciting architecture. The change is no longer an event, but rather a common occurrence. The change is no longer a matter of changing the way we live the environment, but the relationship with water. It is possible to build mechanisms to keep the water out. How can we design these devices? Should we face, screening our homes and cultures from the force of nature? If not, how do we go to it? Can we design a city as an amphibious architecture? Can we build environments that have the ability to adapt or adapt to flooding and water?

Drift City is an amphibious, infrastructural spatial response to the condition of rising sea levels. It is a city that floats. A city that bridges. A city that enganges. A city that transforms. A city that redistributes. A city that reconfigures the complex water balance between water and people. It is a city structured by three operations: defend, retreat, and adapt.

Defend
To defend is to construct a mechanism to keep it floating water levels away from people, buildings and infrastructure.

Retreat
To retreat is to move buildings and buildings away from flooding water levels.

Adapt
To adapt is to allow flooding water levels to enter the spaces of homes and communities, prompting a new relationship between humans and nature.
Rethinking “Smart”, Open Space And Public Parks
Rethinking What We Include as Open Space and Public Parks

1. Streets Are In Fact Some Of Our Best And Most Used Public Spaces

<table>
<thead>
<tr>
<th>Electric Vehicle Charging Stations</th>
<th>Ease of Maintenance Surfaces</th>
<th>Bus Lanes and Transit Prioritization</th>
<th>Intelligent Signage and Traffic Cameras</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support the adoption of electric vehicles</td>
<td>Improve the durability of roads with high-quality materials</td>
<td>Improve the reliability of transit systems</td>
<td>Manage traffic flows and improve safety</td>
</tr>
</tbody>
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<tr>
<th>Boston’s Complete Streets</th>
<th>Bicycle and Car Share Stations</th>
<th>Minimum lane widths</th>
<th>Rain Gardens and other green elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support bicycling and walking activities</td>
<td>Support bike ridership</td>
<td>Improve pedestrian safety</td>
<td>Improve stormwater management</td>
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</tbody>
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<tr>
<th>Permeable Surfaces</th>
<th>Digital Tags and Information Panels</th>
<th>Wide Sidewalks</th>
<th>Street Trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help reduce flooding and improve stormwater management</td>
<td>Integrate with street signs and building facades</td>
<td>Add street trees to create shade and improve air quality</td>
<td>Promote shade and improve air quality</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Smart Meters that allow prepaid cards, payments by mobile phones, and dynamic pricing</th>
<th>Bicycle Lanes and Cycle Tracks</th>
<th>Rain Gardens and other green elements</th>
<th>Street Trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitate efficient use of limited curbside space</td>
<td>Enhance bicycle accessibility</td>
<td>Create habitats for wildlife</td>
<td>Promote shade and improve air quality</td>
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**Bus Lanes and Transit Prioritization**
- Boston’s Complete Streets
- Bus Lanes and Transit Prioritization: Improve the reliability of transit systems and reduce wait times for buses.
- Bus Lanes and Transit Prioritization: Prioritize at intersections to improve the reliability of routes with high passenger demand.
- Bus Lanes and Transit Prioritization: Implement bus-only lanes and transit signal priority to reduce wait times and improve efficiency.
- Bus Lanes and Transit Prioritization: Use intelligent signage and traffic cameras to manage traffic flow and improve safety.

**Intelligent Signage and Traffic Cameras**
- Manage traffic flows and improve safety.
- Use intelligent signage and traffic cameras to manage traffic flow and improve safety.
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- Use intelligent signage and traffic cameras to manage traffic flow and improve safety.
2. The Roof Tops Of Our Cities Provide Opportunities For Public open space, Semi Public Open Space and Urban Agriculture
3. Along, Over, Through and Under Are The New Surface: Folding
Double floor module

Pushed apart to create open space

Pushed down to create vertical access

Vertical access
Mass also becomes access

Green space

Connected Green space
4. Performance Is The New Metric.

Landscape Performance Scorecard

Directions: Score each question below by circling a number. A 1 indicates very poor performance and a 5 indicates very high performance. Circle 2 numbers together to give an intermediate score. For example, circle the 1 and the 2 together to give a score of 1.5.

Conservation Goal: The landscape conserves, maintains, and restores wild biodiversity and ecosystem services

Conservation Questions

C1: Does the landscape contain an adequate quantity and suitable configuration of natural and semi-natural habitat to protect native biodiversity? 1 2 3 4 5
C2: Do natural and semi-natural habitats in the landscape approximate the composition and structure of the habitats historically found in the landscape? 1 2 3 4 5
C3: Are important species within the landscape biologically viable? 1 2 3 4 5
C4: Does the landscape provide locally, regionally, and globally important ecosystem services? 1 2 3 4 5
C5: Are natural areas and aquatic resources adequately buffered from productive areas and activities? 1 2 3 4 5

Production Goal: The landscape provides for sustainable, productive, and ecologically compatible agricultural production systems.

Production Questions

P1: Do production systems respond to demand by internal (local) consumers and buyers, and by external buyers? 1 2 3 4 5
P2: Are production systems financially viable and can they adapt to changes in input and output markets? 1 2 3 4 5
P3: Are production systems resilient to disturbances, both natural and human? 1 2 3 4 5
P4: Do production practices have a neutral or positive impact 1 2 3 4 5

Livelhood Goal: The landscape sustains or enhances the livelihoods and well-being of all social groups that reside there.

Livelhood Questions

L1: Are households and communities able to meet their basic needs while sustaining natural resources? 1 2 3 4 5
L2: Is the value of household and community income and assets increasing? 1 2 3 4 5
L3: Do households and communities have sustainable and equitable access to critical natural resource stocks and flows? 1 2 3 4 5
L4: Are people in the landscape able to adapt to changes in human and non-human (plant & animal) population dynamics? 1 2 3 4 5
L5: Are households and communities resilient to external shocks such as flooding, drought, changes in commodity prices, disease epidemics and others? 1 2 3 4 5

Institutions Goal: Institutions are present that enable integrated, ongoing planning, negotiation, implementation, resource mobilization, and capacity-building in support of the goals of integrated landscape management.

Institution Questions

I1: Is there effective cross-sectoral and cross-boundary planning, monitoring and decision making at landscape scale? 1 2 3 4 5
I2: Do farmers, producers, and communities have adequate capacities to contribute to effective landscape management? 1 2 3 4 5
I3: Do relationships among public and civic institutions support the management of integrated landscapes? 1 2 3 4 5
I4: Do markets provide incentives for the management of integrated landscapes? 1 2 3 4 5
Figure 6.16. Infiltration trench with planted swale collects runoff from parking lot. The potential for phytoremediation of the water is governed by appropriate plant selection.

Figure 6.17. Landscape depression swale for stormwater detention and infiltration. Perforated subsurface pipes are optional where the runoff is conveyed to storage for later use.

Figure 6.18. An alternative method of providing both infiltration and storage is to use manufactured storage cells located under the landscape depression swale.

Figure 6.19. Section through a catch basin with oil and grit separator, combined with infiltration trenches. The runoff is conveyed to infiltration trenches that can be varied in length and storage capacity.
5. The World is Full of Surprises.

Versus

WE NEVER SAW THIS COMING

WE SAW THIS COMING

Titanic Disaster

Modern Urban Design

..... “what is essential is invisible to the eye.” Antoine de Saint-Exupery
7. Small Scale “Surgical Intervention” Is As Important As Master Planning.
8. We need Transformational Approaches, where Green Infrastructure, Sustainability, And Resilience are the Objectives.

9. Cities Need Universities to Access an Untapped Capacity for Innovation. Research and “Pilot” Projects are the Key to De-Risking Approaches to Green Infrastructure, Sustainability and Resilience in Urban Planning and Design

10. Open Space And Parks Are Key Not A “Frill” but a Place To Balance Market, Technology and Innovation.

12. Global Cities Institute, Range of Research Initiatives.

http://www.globalcitiesinstitute.org/
13. School Of Cities, University Of Toronto Emerging Initiative, Going Through The Process Of Consultation And Approval By University Governance.

A trans-disciplinary school that will bring together our existing expertise – over 200 faculty - and provide a consolidated training ground for future experts and leaders.

It will work in partnership with cities and institutions around the globe to develop the deep, interdisciplinary and broad-based understanding of how we shape cities and, in turn, how they shape us and our nations.

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THE CREATIVE PROCESS
Thank you

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