

Session: "Sustainable urbanisation: bridging the digital divide, from knowledge to action"

Thursday June 17, 2021

4:00 - 5:00 pm (EDT)



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"Geospatial Applications in Spatial planning & Sustainable Urbanization in Jamaica"

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Acknowledgement

- The contribution of this presentation is due to the commendable efforts of the following Government of Jamaica entities and their willingness to share their achievements:
- National Environment & Planning Agency (NEPA)
- National Spatial Data Management Branch (NSDMB)
- National Water Commission (NWC)
- Planning Institute of Jamaica (PIOJ)
- Urban Development Corporation (UDC)





- Jamaica's Vision 2030 NDP
- National GIS Vision & Mission
- □ CARIGEO Initiative: Jamaica's Support
- Urbanization in Jamaica
- □ NSPIT Platform

- □ Jamaica Next (Third) City
- **Given Streetscape Study: Seymour Lands**
- Potable Water & Wastewater Provision
- Population Distribution & Cemetery Landuse
- GOJ/ESRI ELA: AGOL Platform



National GIS Vision & Mission



Vision

 Geospatial data, products and services are current, available and accessible, to all users to facilitate planning, management and use of the island's resources thereby contributing to sustainable development and economic growth.



Mission

 To coordinate the development and implementation of a national networked GIS inclusive of, comprehensive and accurate spatial data, for land and land related agencies and to develop and provide advice on policy, institutional requirements, legislation and regulations. GOAL 2: JAMAICANS ARE EMPOWERED TO ACHIEVE THEIR FULLEST POTENTIAL

GOAL 3: JAMAICA'S

ECONOMY IS PROSPEROUS JAMAICAN SOCIETY IS SECURE, COHESIVE AND JUST

GOAL 4: JAMAICA'S HAS A HEALTHY

NATURAL ENVIRONMENT

National Vision Statement

raise families, and do business

Jamaica, the place of choice to live, work,

Jamaica's Vision 2030 National Development Plan

Source: Planning Institute of Jamaica (PIOJ)





Source: Planning Institute of Jamaica (PIOJ)



Jamaica's Vision 2030 NDP

- Jamaica's Vision 2030: National Development Plan envisions a nation that is prosperous, being the ideal 'place of choice to live, work, raise families and do business'. The integration and utilization of geospatial technologies into all areas of development will facilitate the creation of a knowledge-based, technologically-enabled and empowered society towards achieving this vision.
- National Outcome 11, therefore speaks to 'making available and accessible geospatial data, products and services to all users, to facilitate planning, sustainable use, management and development of the island's resources.'



Source: Planning Institute of Jamaica (PIOJ)

CARIGEO Initiative: Jamaica's Support



To improve Spatial Data

Infrastructures at the national

and regional levels in the

Caribbean.

- Jamaica is a member state of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) and the regional body -UN-GGIM: Americas.
- Jamaica understands the value of geospatial information and technology towards spatial planning, sustainable national development and importantly, in response to and recovery from the COVID-19 pandemic.
- As such, Jamaica is a very active member state, serving on the CARIGEO Steering Committee, contributing to initiatives that support bridging the geospatial divide, by seeking to empower the countries and territories of the Caribbean to advance the greater use and sharing of geospatial and statistical information to support improved decision making for sustainable national and regional development.



Urbanization in Jamaica

Planning Institute of Jamaica (PIOJ)

Urbanization in Jamaica

Quick Facts

- Jamaica has experienced rapid urbanization for more than a decade
- ¬20% urban population in the 1940's
- Growth rate of ¬10% seen between 1960-1970
- Urban population surpassed rural population by 2001

Trends in Urban Growth in Jamaica, 1943-2030



STATIN 2011; PIOJ 2004

Urbanization in Jamaica

Quick Facts

- ~54% of the population live in urban areas (2011 census)
- This represents ¬1.37 million people
- Projected to reach 58% by 2030



The Jamaican Urban Space

- Most urban spaces are coastally oriented
- All but 3 of the parish capitals are within the coastal zone
- Some of the fastest growing towns are within the coastal zone (e.g Portmore, Old Harbour)

Development Trends

- Expansion/Sprawl
 - Detached units are the most popular dwelling type (84.2%)
- Density and heat island effect
- Absence of green spaces
- Proliferation of informal/unplanned settlements
- Traffic congestion



Jamaica's Vulnerability

- Small Island Developing State (SIDS)
- Located in the Atlantic Hurricane Belt
- Predominantly exposed to hydro-met events
- Vulnerability heightened by climate change



Urban Planning Integral to:

- Green development/growth (harmonizing development with environmental sustainability)
- Smart Growth + Smart Cities (liveability and the efficient use of land; integration of technology)
- Safe Spaces (using design to ensure resilience and human safety)





NSPIT Platform

National Spatial Data Management Branch (NSDMB)

Welcome to the NSPIT Data Portal!

NSPIT is the National Spatial Planning Information Technology Platform of Jamaica.

Here you get an overview of the different data in the NSPIT Platform as well as further information about these data (metadata). You can use various filter and search functions with which you can search for existing data. Many datasets include a WFS link for downloading the data.

Search Data by Title

Search Datasets...

Q

Advanced Search

National Spatial Planning Information Technology Platform (NSPIT)







Double-click to finish drawing

Measure M Draw 0 ab Symbol style: Color: Opacity: > Add text 面 Created layers: **Emancipation Park** Ŵ Q 4 Print







- OpenLayers
- PostgreSQL / PostGIS
- GeoServer
- MySQL





Jamaica Next (Third) City

Urban Development Corporation (UDC)

Urbanization in Jamaica



- Jamaica currently has two cities:
 - Kingston capital, serving as the seat of Government and centre for economic, social and environmental activities.
 - Montego Bay second city and main tourism destination port. Considered tourism mecca of the Caribbean.



Parish Capitals of Jamaica

Source: Lloyd, 2015 (author)

Vulnerability to Extreme Events

- Unplanned cities as well as exposure to natural hazards exacerbates the Jamaican reality as most of Jamaica's built environment is located near or on the coast.
- The major urban centres of Kingston and Montego Bay are coastal settlements and extremely vulnerable to extreme events and the impacts of climate change.
- The costs and losses associated with these events to the resources on which these cities depend, its urban settlements and coastal areas have been significant and will worsen in light of the projected increase in frequency and intensity of these events



Jamaica's Next (Third) City

- The development of Jamaica's Next (Third) City is an ambitious but important action to respond to the impacts and challenges of climate change. A very high priority project.
- Project is in alignment with achieving **SDG 11: Sustainable Cities & Communities**
- It will provide a sustainable, carbon neutral and climate resilient environment that utilizes smart technologies, as well as local and international best practices in its overall development.
- The project is designed to include the implementation of sustainability in all aspects of its infrastructure including **careful water, energy, and other resource management**.
- This will serve to reduce the vulnerability of Jamaica to economic shocks (e.g. the effects of pandemics such as COVID 19) and its cities to natural hazards, thereby creating a city which leads the way in smart infrastructure management, new forms of work and living.



Jamaica's Next (Third) City

- In response to the Government of Jamaica (GOJ) mandate, the Urban Development Corporation (UDC) initiated and with the support of its government and non-government partners, led the process to identify the location for another city which will have minimal risk to natural and climate change induced hazards.
- With the use of a Geographical Information System (GIS) and data from government agencies, a multi-criteria site suitability model (MCSSM) was created to identify areas across the island least vulnerable to natural hazards and sea level rise.
- Three (3) models and a number of sub-models were created. These models analyzed data associated with hazards, protected areas and the built environment.
- A land suitability classification was developed and lands falling within the *highly suitable and suitable* bands were deemed potential areas for urban development.
- These areas were further evaluated in the Horizon Scanning and Foresighting analysis to determine the which were best suited for urban development.



Jamaica's Next (Third) Data Selection



Model Overview



Sub-model Overview





Transportation Model Output





Environmental Hazards Model



Geospatial Application in Third/Next City Project



Extensive geospatial data from many GOJ entities and other sources Utilization of extensive ArcGIS Desktop, web application, mobile application and enterprise tools and solutions accessed under GOJ/ESRI Enterprise Agreement

Generation of **multi-criteria site** suitability model (MCSSM), three (3) models and a number of sub-models.

• The outcomes and final decision will officially be announced by the Most Honourable Prime Minister Andrew Holness



Streetscape Study: Seymour Lands (Seaview Avenue) Using 3D Visualization Tool

National Environment & Planning Agency (NEPA)

Streetscape Study: Seymour Lands

Seymour Lands Location map.

The study area is enclosed by Lady Musgrave Road, Montrose Road, Seymour Avenue, Seaview Avenue, Old Hope Road and Fairway Avenue. Citizens concern

The citizens were concerned that the increased densities of 75 habitable rooms per hectare to a maximum of 125 habitable rooms per hectare will contribute to mobility chaos if the requisite detailed planning is not carried out.

Methodology for the Study

The modelling of the project had two main objectives:

1) Demonstrate how advanced GIS applications can be integrated into NEPA's development planning process.

2) Create a GIS-based 3D model in relation to current zoning standards.





Elements of Streetscape:

- Sidewalks & Curbs
- Street corners
- Trees and landscape strips
- Planters
- Street furnishing
- Benches
- Lighting
- Trash receptacles
- Signage
- Bus shelter
- Bicycle facilities
- Crossing

GIS 3D Modelling

(ArcGIS CityEngine)

SEYMOUR EXISTING LAND USE

SHARE SIGN IN ARCGIS ONLINE HELP



Layers





Building_Footprint_Export_Output









GIS 3D Modelling

(ArcGIS CityEngine)

HELP

Seymour's Land 3D Streetscape Studies





Potable Water & Wastewater Provision

National Water Commission (NWC)





NWC's Geospatial Technology Reliance

- The efforts of the NWC to provide potable and waste water resources to the island of Jamaica, is hinged on the utilization of geospatial information and technology.
- NWC has an ArcGIS enterprise system that relies on complete and accurate data on all it's assets along with geospatial data from external agencies such as STATIN, NLA, NEPA, etc.
- The GIS Unit therefore ensures that:
 - the provision of tools to **perform complete analysis on existing facilities**
 - Solid software and data support for modelling present situation
 - Support for simulating/analyzing the future or present impact of various scenarios on the potable and wastewater network such as:
 - o population growth
 - o disaster management: planning, mitigation and response
 - o impact of system failure



GIS Functional Integration within NWC

- Centralized data storage
- Decentralization of data collection process
- Asset management
- Asset location
- Maintenance
- Production
- Operations
- Leak detection and repairs
- Customer data



GIS System Architecture in NWC





NWC's Geospatial Technology Reliance

- Geospatial support is especially necessary to support the Engineering Department and the Investment and Performance Management Department.
- The Subdivision Approval process relies heavily on the availability of the GIS incorporating the potable and wastewater networks with a number of other critical layers and so minimizes the need for field verification in many instances.
- This has enabled a **significant reduction in time** taken to process applications.









Population Distribution and Cemetery Land use

National Environment & Planning Agency (NEPA)



Location of Cemeteries/Burial Sites in Jamaica

According to data available there are seven approved crematoriums in Jamaica and they are:



GOJ/ESRI Enterprise Agreement: GOJ AGOL Platform





Government of Jamaica





Total Members >3070





Al Ain UNESCO World Heritag... This is a map of the site boundaries (marked in red) and buffer zones (marked in green) around the Al-

Tinson en Aerodrome A STATISTICS

Special Development Area Do... Boundary of Gazetted Tax Incentive Area (Special Development Area-Downtown Kingston 2017)

* ...



IDP Interventions in CRP Com... This map shows interventions funded by International Development Partners in Community Renewal

* ...



HEART Trust/NTA Training - 20... Map of Jamaica showing all HEART Trust/NTA training locations and applications received by the Ager



Assets in CRP Communities This map shows selected assets in Community Renewal Programme (CRP) communities. CRP was



Al Ain UNESCO World Heritag... This is a map of the site boundaries (marked in red) and buffer zones (marked in green) around the Al A



Saint Catherine Wells and Surf... Map shows wells and surface water sources in Saint Catherine. Data shown on map may not reflect

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GOJ AGOL Platform Items



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Maps





Inter_American_Development... This data layer shows IDB interventions in CRP communities through the Citizen Security Justic

Forestry Department_Web_A ...

first draft of forestry reserve map and

recreational parks web application



CRP100 This layer shows the 100 most volatile and vulnerability communities selected under the

World_Bank_Integrated_Com...

This data layer shows World Bank

interventions in CRP communities.

* ...

* ...



Landuse_Map_Cockpit_with_T... first draft of forestry department landuse map for Cockpit Country







Recreational_Assets This layer shows recreational assets within Community Renewal Programme (CRP) communities

* ...



Attraction_Natural_Resource

This layer shows attractions and

natural resources in Community

Renewal Programme (CRP)

SocialInfrastructure This layer shows selected social infrastructure in Community Renewal Programme (CRP) communities

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JAD2001_20190325 This is the Control Point Database as at March 25, 2019. It represents marks created in JAD 2001.

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Control_Point_Map_20171120

This is the Control Point Database as

at July 21, 2017. It represents marks

created in JAD 2001. Orthometric



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JAD2001_20170721 This is the Control Point Database as at July 21, 2017. It represents marks created in JAD 2001. Orthometric

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Jamaica's GIS Achievement & Future

Americas Symposium 2019, in Mexico City:



Jamaica was the only Caribbean country ranked within **the top 25 countries** assessed.

Are we where we want to be ? We have made significant progress & making strides for crime reduction, increased business application and sustainable development through geospatial applications.

New Enterprise Agreement will assist us to get to our goal

Source: Digital Transformation and Geospatial Industry: Trends and Way Forward, Geospatial Media & Communications, 2019





HOUSING, URBAN RENEWAL, ENVIRONMENT & CLIMATE CHANGE



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References



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 - <u>http://goj.maps.arcgis.com/apps/webappviewer/index.html?id=b1cc30b1caa</u> <u>1411180cabcc0c0e560a5</u>
- Route Tracker
 - <u>http://goj.maps.arcgis.com/apps/webappviewer/index.html?id=cae76e766af</u> 34c4b87a558fb91925514