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

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4:00 - 5:00 pm (EDT)
“Geospatial Applications in Spatial planning & Sustainable Urbanization in Jamaica”

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UN-GGIM: Americas
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)
Outline

- Jamaica’s Vision 2030 NDP
- National GIS Vision & Mission
- CARIGEO Initiative: Jamaica’s Support
- Urbanization in Jamaica
- NSPIT Platform
- Jamaica Next (Third) City
- 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.
Jamaica’s Vision 2030 National Development Plan

National Vision Statement
“Jamaica, the place of choice to live, work, raise families, and do business”

GOAL 1: JAMAICANS ARE EMPOWERED TO ACHIEVE THEIR FULLEST POTENTIAL

GOAL 2: THE JAMAICAN SOCIETY IS SECURE, COHESIVE AND JUST

GOAL 3: JAMAICA’S ECONOMY IS PROSPEROUS

GOAL 4: JAMAICA’S HAS A HEALTHY NATURAL ENVIRONMENT

Source:
Planning Institute of Jamaica (PIOJ)
Jamaica’s Vision 2030 National Development Plan

Directly aligned in Jamaica achieving the 17 SDGs
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

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.

To improve Spatial Data

Infrastructures at the national and regional levels in the Caribbean.
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

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...
National Spatial Planning Information Technology Platform (NSPIT)

- Comprised of:
  - NSPIT Viewer
  - NSPIT Data Portal
  - NSPIT Help Portal
  - Metadata Plugin
• 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.
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.
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

Jamaican Third City Data Selection (Multicriteria Site Suitability)

Attractiveness Composite Model (Infrastructural and Socioeconomic Opportunities)
- Transportation
- Utility Infrastructure
- Institutional Infrastructure
- Population Centers and Growth Areas
- Demography
- Housing Stock and Potential
- Mining Areas

Vulnerability Composite Model (Environmental Constraints and Hazards)
- Terrain
- Geology
- Coastal Flooding
- Inland Flooding
- Terrestrial Resources
- Environmental Hazards
- Hydrological Resources
- Agricultural Resources
- Climate Change

Exclusion Zones
- Kingston and Montego Bay
- Cockpit Country

Attractiveness vs. Vulnerability
Model Overview

- Agricultural_Resources_Model
- Climate_Change_Model
- Coastal_Flooding_Model
- Demography_Model
- Environmental_Hazards_Model
- Exclusion_Zones_Model
- Final_Suitability_Model
- Geology_Model
- Housing_Stock_and_Potential_Model
- Hydrological_Resources_Model
- Inland_Flooding_Model
- Institutional_Infrastructure_Model
- Mining_Areas_Model
- Population_Centers_and_Growth_Area
- Terrain_Model
- Terrestrial_Resources_Model
- Transportation_Model
- Utility_Infrastructure_Model
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)
GIS 3D Modelling
(ArcGIS CityEngine)
Potable Water & Wastewater Provision

National Water Commission (NWC)
HOW THE LEAK MAPPING APPLICATION WORKS

- ArcGIS Online
- Collector for ArcGIS
- Operations Dashboard

• General NWC Staff who come in contact with leaks
• Leak Detection Team

Web Application or Operations Dashboard can be accessed by:
• Managers
• Supervisor
• Administrative Staff
• Field Staff

Leak Repair Team:
• Locate and Repair leak
• Update application

Average of 33 leaks reported daily (staff and customers)
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)
Crematoriums in Jamaica

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

1. Madden's Funeral Home
2. Horn Craig’s Funeral Home
3. Blackwood's Funeral Home
4. House of Tranquility
5. Ministry of National Security
6. Jamaica Parish
7. Sam Isaacs and Sons

Location of Cemeteries/Burial Sites in Jamaica

The map shows the six sub-types of cemetery land use, namely:
(i) Religious cemeteries usually associated with churches.
(ii) Public cemeteries owned by government and open to the public.
(iii) Private cemeteries owned by organizations such as the military.
(iv) Ethnic cemeteries owned and operated to support certain ethnic groups and family plots owned by families.
(v) Mass graves, often for victims of disaster.
(vi) Commercial for profit, non-denominational cemeteries examples are Dovecot and Meadowest.
GOJ/ESRI Enterprise Agreement: GOJ AGOL Platform
Total Members >3070

10,000 hosted services
GOJ AGOL Platform Items

Maps
Layers
Scenes
Apps
Tools
Files
Notebooks
Jamaica’s GIS Achievement & Future

Americas Symposium 2019, in Mexico City:

- Jamaica was ranked 9th out of 55 countries within North, South, Latin America and the Caribbean region.
- Jamaica was the only Caribbean country ranked within the top 25 countries assessed.
- Are we where we want to be? No
- 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
Thank You
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