



Sustainable Development Goal 11 and a New Urban Agenda for Caribbean Small Island Developing States: Policy, Practice, and Action

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Many Caribbean Small Island Developing States face the daunting task of fulfilling the United Nations Sustainable Development Goals by 2030. As signatories to the United Nations Sustainable Development Goals, their governments committed to embark on a roadmap to achieve sustainable development within this time frame. In this context, Caribbean Small Island Developing States have embraced Sustainable Development Goal 11 in pursuit of creating inclusive, safe, resilient, and sustainable cities as articulated in various governance, spatial, socio-economic, and environmental policies. Notwithstanding this commitment, a tension exists between policy and practice. Several barriers to policy implementation have stymied efforts to make progress in fulfilling Goal 11. Enabling the impact of sound policy through well-informed practice is pivotal, if these states are to make advancements in ensuring that their population has access to basic services and live in safe, resilient, and sustainable cities without leaving any citizen behind. This paper firstly seeks to critically review existing policies and practice that impact on the attainment of Sustainable Development Goal 11. It highlights the drivers of unsustainable urbanization that are undermining progress in achieving this key sustainable development goal. In keeping with the United Nations declaration of a Decade for Action, this paper secondly makes recommendations for action that are fundamental to putting Caribbean Small Island Developing States on a trajectory leading to the fulfillment of Goal 11. It specifically recommends strategic actions within the context of a New Urban Agenda that are relevant to Caribbean Small Island Developing States that are encountering similar challenges. The experience of Trinidad is drawn upon to provide a narrative of gaps between policy and practice, and to distill key actions for attaining SDG 11 by 2030 and beyond.

Keywords: SDG 11, new urban agenda, urban governance, urban sustainability, small island developing state

INTRODUCTION

In the small island developing states (SIDS) of the Caribbean transforming cities to become inclusive, safe, resilient, and sustainable is challenging and calls for innovative action. While urbanization is known to spur economic growth, rapid urbanization is outpacing a commensurate increase in livelihood opportunities, affordable land and housing, basic urban services, and infrastructure (Angel, 2012; McHardy and Donovan, 2016). Young persons are leaving rural areas and migrating to urban settlements. The push factors are fewer jobs, less income, and limited access to better housing and social services in rural areas and the pull factors include perceptions of more opportunities for higher paying jobs, securing adequate housing, and improved access to social facilities in urban centers. Trends confirm migration of people from rural to urban areas is associated with rising inequalities across urban and rural areas and within cities. Rural-urban migration along with immigration from other countries in the Region and South America will likely make it an urban future. This forecasted trend is based on projections that as much as 80% of the Caribbean's population will live in cities by 2050 (Donovan and Turner-Jones, 2017). Despite policies aimed at solving persistent housing shortages, containing burgeoning informal settlements, meeting basic needs such as access to reliable potable water, improving transportation services and reducing joblessness in urban areas, Caribbean governments face the reality that policy implementation can be daunting when confronted with limited economic resources, human and technical resource capacity (Mycoo, 2018b). These issues are further complicated by climate change and disaster risks which pose even greater threats in achieving urban sustainability (Gencer et al., 2013; Intergovernmental Panel for Climate Change, 2018; Mycoo, 2018a,b; Gohar et al., 2019). With 10 years left to achieve Sustainable Development Goal 11 (SDG 11), Caribbean SIDS will need to accelerate action in spite of a complex and highly politicized governance landscape. They will also need to fastidiously work toward ameliorating economic shocks associated with COVID-19 which may derail efforts to stay on track in meeting SDG 11.

Participants at the Habitat-III meeting convened in Ecuador in 2016 agreed with the Quito Declaration, which acknowledged that globally, countries were far from attaining the goal of sustainable cities and called for the international community to adopt a New Urban Agenda (United Nations, 2017). An emerging consensus among stakeholders at this meeting was that countries had opportunities to exploit the advantages of urbanization to accelerate transformative sustainable development. A New Urban Agenda (NUA) was regarded as essential in forging more robust planning and governance of cities to terminate the vicious cycle of poverty and social inequality. The NUA was viewed as a reformed approach to putting countries on a pathway toward creating more inclusive, safe, resilient, and sustainable urban settlements (United Nations, 2017).

Post 2016, Caribbean policymakers are examining what role a New Urban Agenda can play in fulfilling SDG 11 and what are the key components of this agenda that are actionable to put their

countries on track in meeting SDG 11 and its main targets by 2030 and beyond. The operationalisation of a Caribbean relevant New Urban Agenda to fulfill SDG 11 requires more rigorous study. Given this research gap, this paper seeks to review policy and practice and to recommend actions for achieving SDG 11 using a New Urban Agenda in a Caribbean SIDS context (See **Figure 1** showing geographic location of Caribbean SIDS).

This paper uses Trinidad as a case study. SIDS across the globe have diverse characteristics and Trinidad is no exception. It is unique in economic wealth and differs from many of its neighbors in land mass, level of urbanization, demographically, economically (See **Table 1**). Unlike other SIDS, the country's earlier economic fortunes derived from oil and petrochemical exports, provided ample opportunities to plan inclusive, safe, resilient, and sustainable urban settlements. Despite these differences some islands may benefit from the mistakes and lessons learnt from Trinidad's challenges in spatial planning and policy implementation in their effort to attain SDG 11.

The paper first reviews Trinidad's national urban policy framework to determine if it reflects SDG 11. It then investigates whether in practice urban policies are being implemented, and if there are barriers to implementation, how do these undermine the achievement of SDG 11. The Greater Port of Spain Metropolitan Region (GPOSMR) is the focus of review as it faces challenges in providing housing and affordable land, in containing informal urbanism and addressing water and sanitation, traffic congestion and environmental degradation which impact on the achievement of SDG 11. These issues are common in the cities of both large and small Caribbean islands but differ in terms of scale. A central question is how can the transition from underdeveloped rural areas to rapidly expanding urban centers be managed while achieving inclusive urbanization? This paper presents recommended actions for fulfilling SDG 11 in alignment with a New Urban Agenda, aspects of which may be transferable to Caribbean and Pacific SIDS.

CASE CONTEXT: GREATER PORT OF SPAIN, TRINIDAD

Trinidad and Tobago is a twin island state, but the policy review below will focus on the geographically and demographically larger island of Trinidad. The island is roughly 4,768 km² in land area and has a population of 1.4 million (See **Table 1**). By 2050, ~72% of the population will live in urban areas (Alkema et al., 2013). A rapid rate of urbanization as population growth accelerates will result in significant urban land cover increases between 2000 and 2050 (Angel et al., 2010) as the pressure grows to convert rural land for housing and economic development. In Trinidad, most of the urban population is concentrated in an urbanized corridor which lies below the main mountain ridge and valleys and runs east to west. This corridor encompasses the capital, Port of Spain and a number of secondary urban centers that constitute the Greater Port of Spain Metropolitan Region.



FIGURE 1 | Geographic Location of Caribbean SIDS.

REVIEW OF URBAN POLICIES AND PRACTICE

Urban Governance

The legislative framework to guide policy and practice in urban governance has been revised, yet it remains difficult to operationalise. The Trinidad and Tobago Planning Act, Chapter 35:01 of 1969 and the Public Health Ordinance Chapter 12 No. 4 of 1940 were amended several times but did not fully address the numerous challenges of contemporary planning matters. Subsequently, legislative reform was undertaken with the passing of the Planning and Facilitation of Development Act (Government of Trinidad and Tobago, 2014). A feature of the new Act (2014) is devolution of power between central and local government to undertake spatial planning and execute urban projects. Despite these legislative and revised governance arrangements local government input into the operationalisation of SDG 11 has been handicapped by limited devolution in decision-making and concomitant resources to implement proposals for sustainable urbanization at the regional and community levels.

The Town and Country Planning Act (Government of Trinidad and Tobago, 1969), which is still in use, stipulates a 2-month period for giving notice of the decision on development applications. In practice, determination of planning applications exceeds the statutory period and the lengthy approval process is impacting on urban governance which is in turn undermining

the attainment of SDG 11. For Greater Port of Spain, ~2,084 applications were received in 2014 and 2,315 in 2015, of which 6 and 5% were approved, respectively within the legal timeframe (Mycoo and Bharath, 2016). This low percentage of approvals confirmed that the planning agency was severely hampered by human resource constraints to process a large number of applications within the 2-month statutory period. Additionally, studies revealed it takes 16 procedures and 253 days to obtain all building permits needed (Inter-American Development Bank, 2017). Delays in the decision-making process frustrate investors and ultimately erodes fulfillment of SDG 11. Developers become impatient and proceed with building activity without receiving the necessary approvals. Illegal development then violates site development guidelines and other pertinent public health and safety regulations. The promotion of safe, resilient, and sustainable urban settlements is further undermined by weak monitoring and enforcement capacity of the TCPD.

National Urban Policy Framework

The national urban policy framework was prepared in accordance with the Town and Country Planning Act Chap 35:01. The National Physical Development Plan of 1984 provided a settlement hierarchy of urban and rural settlements and regional development strategies geared toward a balanced settlement pattern and strong rural and urban linkages (Government of Trinidad and Tobago, 1984). A review of the national physical development plan conducted by planning

TABLE 1 | Characteristics of Anglophone Caribbean SIDS.

Island	Land mass (km ²)	Population size (persons)	%Urban population	Main economic sector
Antigua and Barbuda	440	96,286	30	Tourism
Bahamas	13,878	385,640	84	Tourism
Barbados	431	286,641	45	Tourism
Belize	22,965	383,071	45	Agriculture
Dominica	750	71,625	66	Agriculture
Grenada	348.5	111,454	39	Tourism
Guyana*	214,969	779,004	61	Agriculture and Mining
Jamaica	10,992	2,900,000	54	Tourism
St. Kitts and Nevis	269.4	52,441	32	Tourism
St. Lucia	617	181,889	18	Tourism
St. Vincent and the Grenadines	389	110,210	50	Tourism
Trinidad and Tobago*	5,131	1,400,000	72	Petroleum and Petrochemicals

Source: *Alkema et al. (2013), UN-Habitat (2015), McHardy and Donovan (2016).*

*The urbanization data for Guyana and Trinidad and Tobago are official estimates but these may be undercounted.

consultants in 2012, revealed that the national spatial strategy was unsuccessfully implemented. Four main findings pointed to failed plan implementation which reduced urban sustainability (Mycoo, 2018b). One such finding was the proliferation of squatter settlements throughout the country, but especially in urban and peri-urban areas. The landless poor settled in sensitive watersheds and coastal lands or on vulnerable sites already prone to flooding and landslides. Another finding was that nearly half (46%) the land deemed suitable for agricultural purposes was converted to housing. This contributed to urban sprawl and weakened the country's food security. A third discovery was the high vulnerability of approved private sector and state sponsored housing located on flood prone, impermeable, poorly drained coastal plains. While state-built housing between 2000 and 2011 impacted positively on reducing the housing shortage, the location of these projects was driven by the availability of state-owned land rather than through coordinated land use and transportation planning (Rajack and Frojmovic, 2016). This trend also resulted in urban sprawl and negative environmental externalities. A fourth finding was the high occurrence of "dormitory" settlements as residents continued to work in the capital city of Port of Spain, while living in peri-urban and suburban areas of GPOS. The primacy of the capital city was evident despite efforts to decentralize services through the creation of growth poles and new towns from the 1980s onwards. A proliferation of dormitory suburbs combined with urban sprawl contributed to long commuting hours, traffic congestion, associated air pollution, and eroded the opportunity to achieve low carbon urbanization and sustainable urbanization.

The National Spatial Development Strategy (NSDS) of Trinidad and Tobago was prepared in 2013 and drew upon the review of the country's first National Physical Development

Plan conducted by planning consultants in 2012. The NSDS provides a strategic national framework to guide the formulation and implementation of spatial planning policies, principles and planning proposals, as well as key infrastructure and investment decisions from 2013 to 2023. Unlike its predecessor- the NPDP, the NSDS has no statutory approval to date. Nevertheless, the Town and Country Planning Division utilizes the NSDS to plan at the national level and to inform planning policies at the regional and sub-regional levels. The NSDS is structured around four main themes which are consistent with SDG 11: sustainability; building strong and resilient communities; sustainable prosperity; and sustainable infrastructure. It identifies rural and urban development zones and promotes healthy communities as integral to achieving strong and resilient communities. An integrated approach to spatial and socio-economic development was suggested by the NSDS in the preparation of urban plans and policies.

Apart from the NSDS, urban policy is articulated in both regional and local area plans which are consistent with the national policy framework for urban development. In 2012, spatial development plans were completed for 14 municipalities and each of these plans articulated policies and projects for urban areas that reflected the key objectives of SDG 11. Although lacking in statutory approval the plans are being utilized to ensure that SDG 11 targets are met.

As the following sections of the paper show, the NSDS has not been able to reverse some of the planning shortcomings with reference to SDG 11 as a result of a gap between policy and practice.

Safe and Affordable Urban Housing

According to data a backlog of housing exists, and it has been problematic for the state to deliver sufficient housing within urban settlements to make them inclusive, safe, resilient, and sustainable. Unequal access to housing and urban land is a spatial expression of inequality.

Demographic shifts provide some explanation for the changes in housing demand among urban inhabitants. The city of Port of Spain experienced a population decline of 14.5% from 2000 to 2011, while other urban and peri-urban areas tripled in population growing by 41.5% during that same period (McHardy and Donovan, 2016). Urban housing demand has increased exponentially as a result of intra-urban and inter-urban migration of population in and around the GPOS area and other fast-growing urban centers in the settlement hierarchy.

A shortfall in housing delivery has plagued successive governments despite varying measures taken to close the gap between demand and supply. The 2000 Population and Housing Census showed that there was a demand for 90,000 housing units over a 20-year period. The Housing Development Corporation (HDC) projected the housing deficit would double its increase to 225,000 dwelling units, with a predicted annual increase of 14,000 units which is even greater than earlier projected estimates. Approximately 160,000 applications for housing were reported by the HDC in 2016 reflecting an increase of 67% from 2009 (McHardy and Donovan, 2016). Empirical evidence confirmed that with a growing number of applications from 2005 to 2016,

the state sector was unable to construct enough housing units to satisfy demand.

The inability of low-income households to access urban housing is a manifestation of economic inequality. The urban poor cannot gain access to housing on the formal market because of inflated urban land values, urban unemployment and/or under-employment. A lack of income disqualifies such households from accessing housing loans. In 2014, 50% of the national population were low-income earners (Government of Trinidad and Tobago, 2017). Approximately 60% of applicants on the HDC's application list in 2014 had a joint monthly income of TTD\$9055 (USD\$1,393) or less and were unable to service a mortgage at the prevailing rate due to insufficient income (Rajack and Frojmovic, 2016). Housing prices rose faster than wages between 2010 and 2013. A mismatch between supply and demand for affordable serviced land/housing in suitable locations was evident (Rajack and Frojmovic, 2016). The house-price to wages ratio in Trinidad and Tobago was 10:1 for the last two decades and reached a peak of ~20:1 between 2006 and 2007 (McHardy and Donovan, 2016). Many poor urban households have therefore resorted to informal housing built on state and private lands.

Public housing also remains unaffordable for low-income households because of cost overruns and delays. Presently, the HDC is constructing public houses at an average cost of TTD\$1.3M (USD\$200,000) at a completion rate of 16%, in comparison to the private sector which builds high quality three-bedroom houses for between TTD\$500,000 (USD\$76,923) and TTD\$900,000 (USD\$138,462) and has a 95% completion rate. In spite of the high success rate of private developers to deliver housing, they are unwilling to build houses for low-income families even if project subsidies are offered (Inter-American Development Bank, 2017). This is due to: (i) a shortage of land; (ii) indirect government subsidy programmes that discourage private suppliers; (iii) complicated land subdivision and housing approval processes; (iv) cultural factors and traditional practices that impose relatively high standards on housing for low-income persons; and (v) the perception on the part of the private sector that earnings in this market segment are not attractive enough (McHardy and Donovan, 2016).

Innovative financing arrangements have been employed by the state to assist households in obtaining housing, but persons living below the poverty line cannot access such finance. Mortgage financing companies such as the Trinidad and Tobago Mortgage Finance Company (TTMF) provide loans to applicants at an interest rate of 2–7%. The interest rates are applied to government and private housing and is based on the combined income of a household of up to TTD\$11,000 (USD\$1,692) per month for mortgage loans up to TTD\$932,580 (USD\$143,474). The TTMF also works with the Land Settlement Agency to supplement transaction rates to persons being regularized on squatter sites.

A major constraint to achieving safe public housing is that the government has on occasion selected sites deemed unsuitable by the Town and Country Planning Division. Bypassing the technical advice of the planning agency and the Drainage Division has led to the building of state housing on vulnerable

flood prone sites. Many urban households have suffered flood damage and the urban poor have had to apply for state assistance to offset damage and loss.

Although over the last three decades state spending allowed for a high number of public housing complexes to be built in GPOS for low-income groups, many of these units were distributed to the middle class because of poor targeting policies and practices of the housing authority. Additionally, based on a policy of inclusivity and social equity the government did not evict households in arrears. Low cost recovery efforts resulted subsequently in fewer units built by the state for the urban poor. The state eventually reduced construction of houses and shifted its attention to squatter regularization projects by the mid-1980s which has since resulted in a backlog of unmet housing needs.

Informal Urbanism

The level of informal urbanism is very high which has significant implications for achieving SDG 11 (Mycoo, 2018b). An estimated 85,000 squatter households currently exist with over 396 squatter sites located on state lands. Approximately 55,000 (65%) of squatter households occupy state lands and 30,000 (35%) squatter households have encroached on private lands (Rajack and Frojmovic, 2016). Applying a conservative average household size of six persons in these settlements, it can be extrapolated that ~37% (510,000 persons) of the country's total population of 1.4 million persons may be squatting. Earlier estimates revealed that this figure maybe higher. For example, in 2003 ~47% of households in Trinidad and Tobago had improper title, and the percentage of households in possession of certificates of title has not dropped drastically since then. As the main urban corridor, GPOS contains almost a quarter (22%) of the country's squatter households. Settlement upgrading, poor tenure records, haphazard settlement structures, and low-quality infrastructure make reconstruction complex and expensive in Trinidad.

Drivers of the proliferation of informal urban settlements include limited affordable housing for the urban poor, inflated urban land values, and escalating rents in the formal sector. In an effort to ensure inclusive urban settlements, the state has made provision for the urban poor to have access to land and shelter through its regularization and infrastructure upgrading policies. During the 2015 fiscal year, the Land Settlement Agency (LSA) utilized its full allocation of TTD\$26m (USD\$4m) in assisting beneficiaries of the Residential Lots Programme termed "Land for the Landless" to purchase lands at subsidized rates and for the implementation of the Resettlement of Squatters Project (Government of Trinidad and Tobago, 2016). Infrastructural upgrading within squatter sites costs the state on average TTD\$32,500 (USD\$5000) per lot. Regularization of informal settlements accounted for 22% of the country's budget for the period 2015–2016 and the projected cost to regularize all squatter sites in GPOS was an estimated TTD \$1.8b (USD \$272m).

Paradoxically, the state is a contributing agent to environmental degradation. State benevolence toward squatting sends a perverse incentive toward land grabbing in ecologically sensitive watersheds and coastal zones. Illegal land occupation in fragile ecosystems is incentivised by Trinidad's existing law of adverse possession and squatter regularization policies. It is

noteworthy that, despite increased state expenditure, the LSA is still unable to curb the increase in informal urbanism. Additionally, the state does not bulldoze illegal houses and evict squatters settled on state lands. A key driver of state land invasion is the state's benevolence toward informal urbanism which has encouraged its growth (Mycoo, 2018b).

Informal urbanism translates into built development occurring outside the statutory planning framework. According to the United Nations Human Settlements Programme (UN-Habitat) (2012, p. 80) "traditional urban planning fails to recognize the way of life of the majority of inhabitants living in rapidly growing and largely poor informal cities. That indirectly contributes to social and spatial marginalization." In effect, the Town and Country Planning Division cannot steer illegal housing away from vulnerable sites and toward safe locations in accordance with SDG 11. In Trinidad, many informal urban settlers gravitate to hazard prone lands such as hillsides that are susceptible to landslides and low-lying coastal areas that are vulnerable to sea level rise and flooding associated with climate change. Researchers of SIDS have stated that while climate change is a critical issue, it is ill-advised to deflect attention "away from underlying political conditions of vulnerability toward the nature of the physical hazard itself" (Kelman, 2014, p. 120; Pugh, 2017).

The health of residents living in informal urban communities is under threat from warmer temperatures, increased humidity and extreme weather events resulting from climate change (Mycoo, 2017). Vector borne diseases such as dengue, Zika and chikungunya thrive in densely populated urban areas lacking in water and sanitation facilities, drainage infrastructure, solid waste management, and vector control services. With the COVID-19 pandemic urban informal settlements are severely challenged because of overcrowded living conditions, inability to practice social distancing and the lack of water services (UN-Habitat, 2020). Diseases pose a problem in Trinidad where under half of the population living in informal settlements in GPOS is reliant on septic tanks. In addition, informal dwellers live in overcrowded conditions and have limited access to potable water and public drainage. Despite the government's efforts to ensure access to affordable land and shelter through regularization and *in-situ* upgrading of informal urban settlements, the proliferation of these settlements has undermined the state's capacity to ensure the health and safety of informal urban dwellers in accordance with SDG 11.

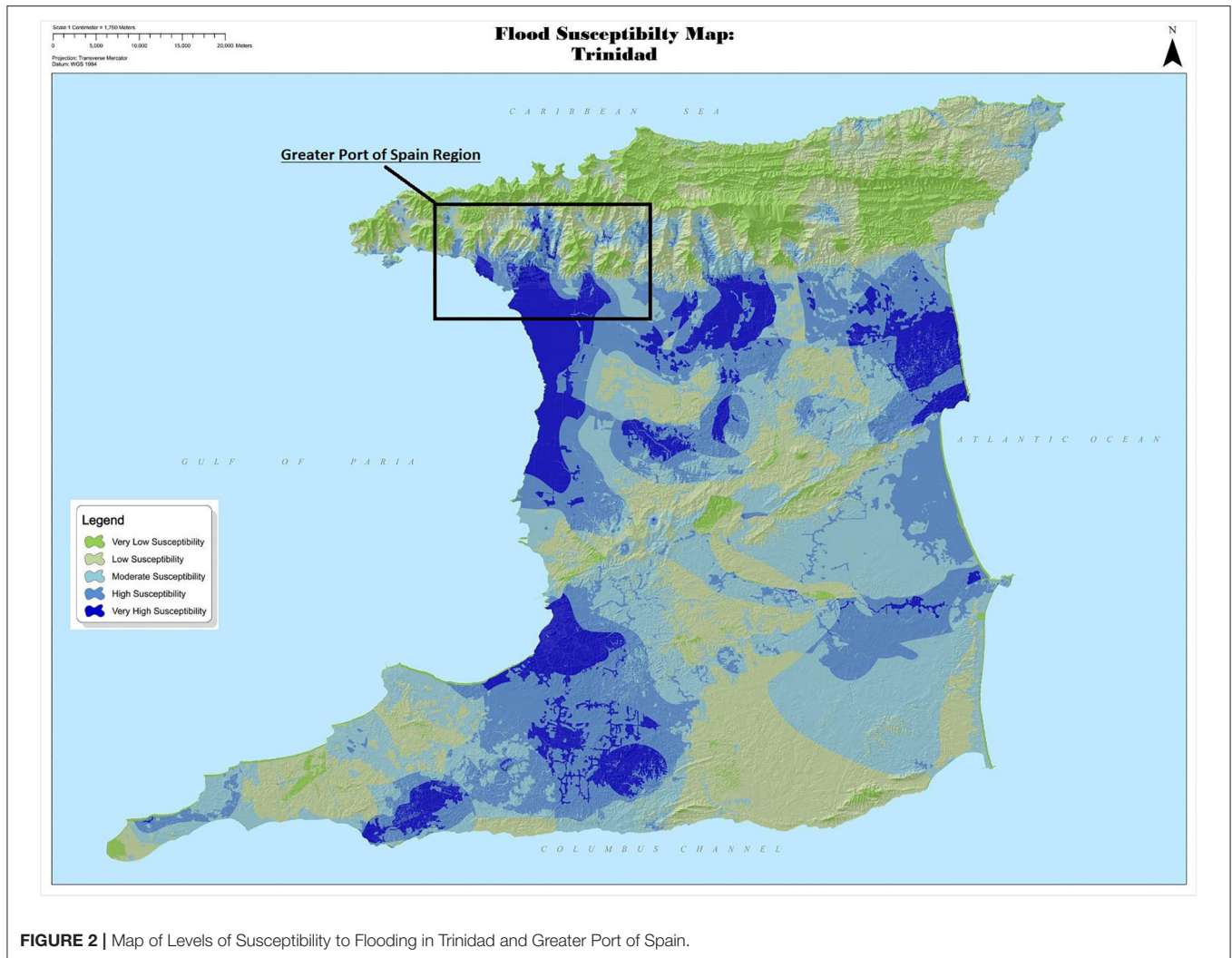
Environmental Sustainability and Planning Policy

Several planning and environmental policies exist to make cities safe, resilient, and sustainable, but enforcement remains a challenge. The Hillside Development Policy of Trinidad, endorsed by the state in 1976, restricts built development above the 91 m (300 feet) contour line and on slopes in excess of 10 degrees to protect watersheds. In practice, the policy was not rigorously enforced in the 1980s and well into the 2000s. Evidence of this was the encroachment of housing on steep slopes which were to be left under natural vegetation according

to the policy guidelines. Since 2010, the policy has been relaxed to allow development up to the 152 m (500 feet) contour line in areas more than 10 degrees in gradient (Government of Trinidad and Tobago, 2010). Land developers pressured the state to relax height restrictions to open up lands in valleys for further urban development. This policy change has had negative consequences because although 60% of Trinidad's dense forest cover has survived urbanization (United Nations Environmental Programme (UNEP), 2015), built development in steep sloping areas once under forest cover, has triggered rapid surface water run-off. Encroachment of informal urbanism into hillside areas has further exacerbated hillside denudation. Recent studies have confirmed that small scale deforestation in watersheds significantly increases flood risks in Trinidad and progressive increase of flood damages starts below 85% forest cover (Brookhuis and Hein, 2016). **Figure 2** shows levels of susceptibility to flooding for the entire country and highlights the Greater Port of Spain Region which is located below the main watersheds that have been denuded by construction activity associated with approved housing and informal settlements. The map shows that the coastal capital city and the urbanized valleys have a very high susceptibility to flooding.

The island's coastal zone is vulnerable to climate change as an estimated 50% of Trinidad's original wetland was destroyed by land reclamation according to satellite imagery. Mangrove depletion occurred although the country is a signatory to the Ramsar Convention, which is an international accord for the conservation and wise use of wetlands of international importance. A significant percentage of wetland removal was undertaken to accommodate urban infrastructure, housing, hotels and port development (Mycoo, 2020). As a consequence of wetland loss, the country's urban and industrial assets located predominantly along the coast are vulnerable to climate change impacts such as mean sea level rise, storm surge, and coastal flooding. The many laws and policies impacting on coastal and marine areas give rise to as many as 29 institutions having a defined legal and/or policy role in aspects of coastal and ocean management (Ramlogan, 2013). An additional setback faced by enforcement agencies is the lack of sanction levels that offer a strong deterrent to breaching laws. These low financial penalties have contributed to the lack of enthusiasm on the part of agencies for bringing court actions to enforce the law (Ramlogan, 2013). Achieving SDG 11 will be more challenging because policies aimed at coastal zone management and climate change adaptation, are either not being efficiently implemented, or enforced. A newly established integrated coastal zone management unit holds much promise (Hassanali, 2015).

The weak monitoring and enforcement capacity of Town and Country Planning Division and the Environmental Management Authority is another constraint to the achievement of environmental sustainability in urban areas. Developers and households often disregard site development standards such as site coverage, building coverage and setback distances which help minimize run-off and flooding. This is a trigger for flooding in urbanized valleys of Trinidad (Chadee and Sutherland, 2014). Additionally, engineering standards designed to regulate land clearance, cutting of slopes or quarrying are violated.



On-site and off-site drainage standards are not adhered to if construction occurs outside the formal regulatory framework, as is the case in informal settlements. Environmental impact assessments required by the Environmental Management Authority for development in environmentally sensitive areas are not enforced in informal urban land settlements. Urban settlements that violate site development standards and are in contravention of the Hillside Development Policy have exacerbated climate change impacts such as flooding (Mycoo, 2020). Political interference in approving large scale urban projects with a high potential to cause significant environmental degradation has reduced technical advice from both the planning and environmental management agencies. The asymmetrical environmental governance system has weakened public engagement in decision-making.

Green Cities

The NSDS (Government of Trinidad and Tobago, 2013) reviewed the patterns of development within the urban and rural interface and reiterated the need for public open green spaces to promote sustainable urban development. Due to urban sprawl, land

grabbing, and the proliferation of informal development within the GPOS, the availability of land reserves and/or land to be converted to open green space is scarce (Government of Trinidad and Tobago, 2013).

The town planning agency's Guide to Developers and Applicants for Planning Permission (Government of Trinidad and Tobago, 1988) speaks to the provision of open green space with specific guidelines to ensure the accessibility and functionality of the space optimally services people. In total, GPOS area 1.6% of open green space. The Guide to Developers (Government of Trinidad and Tobago, 1988) stipulates that 40 m² of open green space per unit is required for large residential areas and a minimum area of 450 m² for recreation grounds, coupled with the World Health Organisation's (2013) recommendation of 9 m² of green space per inhabitant. The current allocation of open green space within the GPOS area, by subsection and as a whole, is inadequate.

In 2013, concerns were raised by the Environmental Management Authority about the major loss of green space in GPOS because it contributed to severe and frequent flooding events in over-concretised urban areas. Global warming

and significant levels of concretised urban areas amplified temperatures causing an urban heat effect, where in the absence of trees and open spaces, the ambient temperature of the urban areas is now excessively high. Without trees and open spaces, carbon sequestration and other natural coping mechanisms are greatly reduced. Additionally, poor air quality directly affects the health of the GPOS population and particularly those persons living in densely populated settlements without green spaces.

Urban Water and Sewerage Treatment Services

This mandate is the delivery of a safe, reliable and efficient water supply to satisfy the demand. At the national level 95% of the population in 2020 has access to potable water, but at the national and urban levels water supply is unreliable for the majority of domestic consumers. WASA's data revealed that over the last two decades not much improvement in service reliability has been achieved. In 1994, an estimated 45% of the national population received a 24-h service each day of the week and in 2016 this rose to 46%. In 20 years there was only a 1% increase in the percentage of population receiving a daily 24-h supply. The level of unaccounted for water is 50% stemming from pipeline leakage and illegal connections (Mycoo, 2018a).

A major objective of Trinidad's water policy based on the Annual Rateable Value (ARV) pricing method is that of equity which is consistent with SDG 11. In theory, the flat rate is linked to property values so as to vary consumption charges with the income of the consumer. The use of flat water rates as a method of achieving equity has difficulties in practice. WASA's fee structure is highly regressive, in that the percentage of income paid in water rates, declines with rising income levels. Currently water rates do not reflect the ability to pay and therefore the equity principle promoted by advocates of the flat ARV-based water charge is compromised. Low-income consumers are paying more as water rates have been unadjusted to ensure greater cross-subsidization between different classes of residential consumers. Additionally, households living in informal settlements are highly subsidized and pay TT\$34 (US\$5.55) per quarter for the use of a standpipe. Illegal household connections to water distribution lines do not result in disconnection by the water utility. This practice represents state paternalism to address inclusivity and equity. Trinidad's water policy reflects the view that water is a social rather than economic good and pricing reflects a socio-political stance as opposed to an exclusively economic motivation. Nevertheless, continued political influence on the strategic decisions of WASA and its dependency on state subventions to offset operating costs for over half a century has left successive generations with an unreliable water supply (Mycoo, 2018a). Inter-generational and intra-generational inequity is a feature of poor water governance that remains unresolved.

A key finding in reviewing WASA's policy and practice is that the use of the ARV-based rate as opposed to pricing based on volumetric consumption established through metering results in high levels of wastage by domestic consumers. Low water rates combined with non-metered water consumption do not encourage conservation by households and compromises

TABLE 2 | Spatial Inequalities in Water Service Provision in GPOS.

Water supply schedule	Diego Martin/% of total population	Port of Spain/% of total population	San/Juan Laventille/% of total population	Tunapuna/% of total population
Potable water supply within greater port of Spain				
24 h/7 day	70	90	80	20
120–167 h per week	-	10	20	40
84–119 h per week	20	-	-	40
48–83 h per week	10	-	-	-

Source: Data collected from WASA in 2017.

water security. Wastage among domestic consumers who are unmetered is a concern especially at a time when freshwater resources are threatened by drought, sea level rise and pollution. High levels of water wastage runs counter to SDG 6 on the sustainable management of water resources and as Gohar et al. (2019) note, water security is a critical issue facing SIDS given climate change and increasing droughts they face now and in the future.

Spatial inequalities also exist because for several decades WASA concentrated water improvements in the more urbanized parts of the country. Approved urban hillside settlements and informal urban settlements located on elevated sites have an unreliable potable water service because WASA booster pumps breakdown frequently. Within GPOS there are inter-urban variations in the reliability of water provision. The capital city has the most reliable service with 90% of its population receiving water 24 h of supply seven days a week. Some urban settlements in GPOS receive between 70 and 90% of an uninterrupted supply while in others only 20% of the population receives a regular service. See **Table 2** for spatial inequalities in water supply in GPOS.

Urban households that experience rationing rely mainly on truck-borne water delivery provided by the water utility. Rainwater harvesting has not been a popular measure adopted to address shortages in urban areas. The majority of households, including urban households, overcome service interruptions by privately purchasing water tanks for storage. These tanks are then filled by WASA based on a supply schedule which varies by settlement area or region. The socio-spatial inequity in accessing water runs counter to SDG 11.

Unequal access to central sewerage facilities in the GPOS metropolitan region has resulted from uneven infrastructure investment in the capital city. Approximately 77% population of the capital city of Port of Spain and close to 40% of other main urban regions are connected to the central sewerage system. In urban, suburban and peri-urban settlements approved by the planning agency, houses are not connected to the central sewer systems and rely on private sewage treatment plants and septic tanks to a lesser extent. Privately-operated plants are malfunctioning and infrequently maintained in the absence of enforcement by public health inspectors. In contrast, informal

urban communities use septic tanks. Public health and the physical environment such as rivers and coastal waters are polluted because of irregular maintenance of private sewerage treatment facilities and inadequately designed septic tanks.

Urban Mobility

A review of both policy and practice revealed that Trinidad's national transportation system is unsustainable. A driver that has contributed to the lack of a sustainable urban transportation system is that Port of Spain continues to be a primate city. The government's policy on decentralization has not been fully implemented and throughout the decade of 2000 onwards there has been a renewed concentration of government investment in offices in the Central Business District (Townsend, 2018). The implementation of a growth pole strategy and development of compact regional centers with alternative residential and employment opportunities as a means of reducing work-related travel distances have not been entirely successful. State interference and private sector pressure have encouraged low density urban development and urban sprawl that have led to less cost-effective public transport and higher energy consumption as a consequence of longer traveling distances.

Traffic congestion experienced in Trinidad is symptomatic of weak land use plan implementation and an inefficient, unsustainable transportation system (Furlonge, 2009). Heavy traffic occurs daily and is most severe along main arterials which are connected to the capital city and the Central Business District. Approximately 85% (221,000 vehicles) of the vehicles entering Port of Spain daily are private automobiles carrying a total of 330,000 persons (GENIVAR, 2006). The other 15% (39,000 vehicles) are a combination of public modes of mass transport such as public buses and privately-owned taxis and minibuses. In 2006, the Ministry of Transport and Works estimated that commuters were spending over 3 h a day traveling and sometimes as much as 6 h entering and egressing the capital city at peak times (See **Figure 3**). These long commuting hours undermine the population's productivity levels, safety, health, and well-being.

Inefficiencies of the public bus system have prompted over half the population of the GPOS Metropolitan Region to rely on private vehicles for a more reliable form of mobility. At the national level there are over 1 million private vehicles and with a current population of 1.4 million this is the equivalent of a ration of 1.3 persons to one vehicle. The transportation system exhibits a vicious circle of transportation. As more persons purchase cars and find them convenient for their trips, the public transit service loses passengers, becomes less frequent, slower, and unreliable due to traffic congestion (Furlonge, 2009). Internationally, Trinidad is in the top 12 countries with significant gasoline subsidies which is an additional factor that promotes high automobile ownership (Government of Trinidad and Tobago, 2017). Due to its wealth, the country has a high per capita car ownership of over 500 vehicles per 1,000 persons (Wright and Townsend, 2020).

Another major driver of unsustainable transportation is the practice of increasing road capacity over the last 30 years through major highway construction programmes in an attempt

to mitigate traffic congestion. It is a supply-led response rather than a demand-management approach. The former response is based on the assumption that congestion is the result of inadequate capacity and therefore focuses on increasing road capacity, whereas the latter response adopts measures such as road pricing to curb demand for additional road space. Major road building programmes have been accompanied by state failure to provide viable public transit options that are key components of a sustainable urban transportation system.

Market forces have prevailed allowing private operators to provide the majority of transport services in Trinidad (Furlonge, 2009). Approximately 90% of public transportation is provided by 25,000 privately owned four to five passenger sedans and 4,500 privately-owned nine to five seater para-transit vehicles (Townsend, 2018). Although it has the lowest fares, public buses are very unpopular, transporting <5% of transit users (Gleave, 2008).

Trinidad has a dedicated bus route called the Priority Bus Route which runs along the East West Corridor serving GPOS, the most densely populated part of the country. It is a novel approach introduced as far back as the 1980s for the exclusive use of buses, mini-buses and emergency vehicles. Its segregation from the highways used by private vehicles allows the trip along the bus route to be short and fast. The lack of scheduling makes it inefficient and during peak time the number of buses serving the route is inadequate to meet public demand. According to a survey conducted by Mycoo and Bharath (2016) persons found it unsafe at night to use buses that operated along the Priority Bus Route and complained of a lack of secure vehicular parking facilities around designated stops. Additionally, the design of transit terminals and parking facilities was deemed gender-insensitive and female passengers surveyed were less inclined to use the park and ride facilities (Mycoo and Bharath, 2016).

Currently, urban streets are not pedestrian friendly and there is limited walkability in urban centers (Caribbean Network for Urban and Land Management et al., 2014). The non-existence of dedicated bicycle lanes in the city of Port of Spain results in persons relying on motorized transport for urban mobility. Limited walkability affects the health and well-being of urban dwellers.

This section on policy review and practice revealed several shortcomings in the Trinidad context which relate to SDG 11 and targets set for 2015–2030. The lessons distilled from the gap between policy and practice have applicability to Caribbean SIDS that face a similar dilemma. The following section focuses on recommended actions for a New Urban Agenda for Caribbean SIDS.

Actionable Recommendations for a New Caribbean Urban Agenda to Attain SDG 11

The urban agenda is crucial according to the Sustainable Development Goals with as many as a half of all 169 SDG targets having an urban dimension (United Nations, 2018a,b). It is in this context that a New Urban Agenda for SIDS of the Caribbean is paramount to achieving SDG 11. A NUA should be relevant to the peculiarities of small geographical size, economic



FIGURE 3 | Urban Gridlock Traffic Entering Port of Spain.

vulnerability, environmental fragility, very high vulnerability to climate change and natural hazards, rapid urbanization trends, and urban poverty, if it is to be impactful in meeting SDG 11 targets. In particular, these countries are characterized by a unique urbanization pattern manifested in the existence of primate cities, low-elevation coastal zone cities, and informal urbanism. Rapid urbanization presents difficulties for Caribbean SIDS that must clear the backlog of housing, infrastructure and social services resulting from a high and accelerated demand relative to supply. Yet, a NUA for achieving SDG 11 cannot be tackled on a sectoral basis due to the cross-cutting themes which comprise this goal. Even the indicators and targets that are being used to measure progress in achieving the SDG 11 must be conceived as interdependent and should be pursued together, otherwise progress in one area may contradict progress in another. Key actions are communicated in this section to articulate priorities that are needed to fulfill SDG 11 in the context of a Caribbean SIDS specific NUA. The critical issues are prioritized and discussed in sequence as next steps for decision-makers to take in an effort to help these countries stay on track in meeting SDG 11 by 2030. It is important to note that these actions do not have a structural hierarchy, but rather are interdependent and mutually reinforcing. Further, these actions

must be taken using an integrated planning approach and not as standalone measures. Access to housing, water and sanitation are seen as top priorities followed by disaster risk reduction and climate change adaptation. Sustainable urban transportation and mobility follow next. Urban governance reform is necessary to address key issues such as housing, water and sanitation and would need to be considered simultaneously and not sequentially. Stakeholder participation, capacity building, and the use of new technologies in decision-making are integral components of urban governance.

Safe, Affordable, and Resilient Urban Housing

Across the Caribbean improved population access to affordable housing is a priority for governments. Housing is a basic need so that addressing the existing shortage of affordable housing is a necessary first step for decision-makers. In developing a strategy to improve housing delivery, it is essential that a NUA recognizes the nexus between housing and socio-economic development by linking urban housing policy with cross-cutting sustainable development goals, which pertain to poverty reduction, sensitivity to the ecology, economic development, health, well-being and social cohesion, climate change, and

water resources management (Habitat III Secretariat, 2016). Two approaches to deal with the existing housing shortage are a mix of direct government intervention and pro-market interventions in housing delivery.

Social housing needs to be placed high on the NUA by employing strategies such as rent-to-own schemes, more widespread use of the Caribbean tradition of the “gayap” concept, which utilizes self-help and the collective effort of a community to build housing. This is a best practice embraced by Caribbean urban communities that lowers the labor cost component of housing production.

Monitoring and evaluating (M&E) of housing demand is required to reduce the current shortage of urban housing. M&E indicators for tracking include the proportion of the national government’s budget allocated for urban housing, the housing budget as a percentage of qualitative and quantitative need, the housing-to-income ratio, availability of secondary mortgage markets vs. microcredit for housing, and the percentage of households living in informal settlements (Habitat III Secretariat, 2016).

Mortgage financing should be better adapted to serve low-income households. Mobilization of diaspora savings can be fully explored since the Caribbean is well-noted as a region where households rely on remittances to meet basic needs. These remittances may be used as a source of housing finance for low-income persons. The “Sou Sou” or partnership approach to indigenous savings used in Trinidad and Tobago and the “Partner” approach used in Jamaica are also innovative. It is recommended that these indigenous practices be enabled to help low-income households seeking co-funding (Carby, 2017).

Micro-financing to support housing for low-income households is under-developed in the Caribbean. Greater focus on developing the micro-financing industry is key to assist the housing sector otherwise a large percentage of low-income households will continue to live in informal settlements and in poor housing conditions. Additionally, rotating credit schemes are instrumental in incremental housing for low-income households. The “Sou Sou” and “Partner” approaches to financial resource mobilization have worked well in Trinidad and Jamaica. These approaches could serve as a model for housing finance elsewhere in the Caribbean especially for households unable to access funding from formal financial institutions.

In Caribbean SIDS that are applying direct state involvement in new housing production to close the housing shortage, action is needed to ensure that subsidies are adequately targeted to benefit low-income groups. Supply side strategies should be used to promote new housing construction. The state would also need to incubate new low-cost housing developers by offering packages that lower land purchasing costs and by subsidizing low-cost durable materials. Further, closer monitoring of the leakage of housing intended for low-income households to middle-income earners caused by cost overruns is suggested. Performance bonds and penalties should be applied to contractors that are unable to minimize cost overruns because of poor management of construction activity. Additionally, Caribbean governments acknowledge that the urban poor are building houses on a large scale and they should encourage

enabling approaches for self-help housing construction, which could take the form of subsidizing building materials.

Innovations in housing construction within Caribbean SIDS should be distilled and re-evaluated for best practices that are replicable within the region. Additionally, another consideration to improve access to urban housing is the provision of state subsidized building materials for low-income households. The adoption of low-cost building techniques and adherence to building codes and site development guidelines are recommended to achieve safe and resilient housing. A reformed housing policy is fundamental to emphasize energy efficiency and promote green buildings which are attainable by returning to the Caribbean’s vernacular architectural traditions. Historically, Caribbean housing was well-adapted to the tropical climate as such housing was designed to make buildings cooler and less dependent on expensive cooling technology. Free architectural design services and pro-bono planning advice by advocacy urban planners are recommended to assist poor urban households in designing and planning their houses.

Informal Urbanism and Rural-Urban Linkages

Burgeoning informal urbanism is the next priority that needs to be urgently addressed. Improved access to land is a critical component of addressing the informal urbanism dilemma that these countries face. Among the land tools to be considered are enumeration for tenure security, a comprehensive understanding of the continuum of land rights, informal settlement upgrading, citywide land use and settlement planning and land readjustment. Land readjustment has proven effective in local projects and can be scaled up to the urban and national levels. The Social Tenure Domain Model should be considered given its many advantages. The focus of this model is on building a pro-poor land information management system that models the relations between people and land. The model aims to develop a land administration system that can support all forms of land rights, social tenure relations and overlapping claims to land [United Nations Human Settlements Programme (UN-Habitat), 2012].

Given the high cost and low availability of urbanized plots, Caribbean governments are adopting *in-situ* regularization of urban informal settlements. These projects have proven costly in part because of the need to retrofit housing in compliance with high regulatory standards. Action is needed to revise standards to be realistic with existing living conditions. To ensure that informal urban settlements are safe and resilient, it is paramount that governments promote the design and implementation of realistic building codes which informal communities are more likely to adopt in housing construction. Further, action should be taken to provide beneficiaries with up-front subsidies to purchase materials or hire small contractors to fix roofs, install flooring, improve water, and sewer connections, or incrementally build room additions. Additionally, retrofitting critical infrastructure is recommended to promote human safety and resiliency to natural hazards. Community-involvement from the inception is a cornerstone for the upgrading of informal settlements.

Informal settlement upgrading within a broader urban planning and land management framework to manage existing informal settlement growth and future unplanned growth is fundamental. Such an approach would avoid the development of enclave settlements that are disconnected from adjacent settlements. A stronger integration of housing policies with urban development is fundamental.

Balanced spatial development through the creation of economic opportunities in lagging rural areas is fundamental to curbing rural urban migration to state lands where informal urban settlements proliferate. Stimulation of rural development by providing incentives for growth in the agricultural, fisheries, and tourism sectors and training for absorption of the rural labor force are actions for reducing migration to the capital cities, urban and peri-urban settlements. Reduced spatial inequality and poverty in communities across the urban-rural continuum should be accelerated to meet SDG 11.

Mechanisms for stimulating the urban informal economy, which is a major source of employment of the urban poor are pivotal to improve inclusivity in the urban economy and enhance income generation. Urban planning can accommodate a thriving informal urban economy through the designation of space to render the activities of this sector productive and profitable. In many Caribbean SIDS, policies have been sympathetic to the important role of the informal economy in poverty reduction, but more emphasis is needed in capturing data on the size of the informal sector to better plan for space allocation to meet the diverse needs of food vendors, hair salons, automobile repair operations, and cottage industries. Informal sector policy delivery need not be formidable if the informal sector is engaged in urban planning that is geared to ensuring inclusivity and resilience among the urban poor.

Safe and Affordable Urban Water and Sewerage Services

Urban settlements in several Caribbean SIDS rely on water and sewerage systems that were built more than 60 years ago and now need to be modernized. As part of the NUA, one step that should be taken for improved service reliability is to increase infrastructure investments targeted at replacing obsolete water distribution pipelines in Caribbean capital cities. Another required step to address service interruptions is the enforcement of planning regulations that mandate households to build cisterns as a supplementary water supply source as obtains in some water scarce Caribbean SIDS (Aladenola et al., 2016). Encouragement of informal and formal urban households to practice rainwater harvesting will also effectively reduce demands on water authorities and improve service reliability (Peters, 2017; Gohar et al., 2019). Additionally, implementation of metering and increasing block tariffs to reduce consumer wastage and improve reliability are recommended. The impact of a block tariff regime on poor urban households can be ameliorated through financial assistance using separate policy instruments such as water vouchers paid for by the state. Water demand management techniques will ensure equal access and affordability for disadvantaged groups in accordance with SDG

11. Behavioral change is necessary to minimize water wastage, and this is achievable by utilizing market instruments and public education. Improved understanding of the economic impacts of climate change on water use, water availability, livelihoods, and consumer welfare is essential to facilitate more efficient adaptation and mitigation measures aimed at improving water sustainability and allocation among competing water sector users (Gohar et al., 2019).

The health of the Caribbean's population, freshwater resources and coastal ecosystems which are important to tourism, is in jeopardy because central sewerage systems are limited in their coverage of urban areas. While some countries have borrowed loans to expand sewerage treatment greater investment is needed to provide coverage in peri-urban settlements. Sewerage treatment plants designed and operated by the private sector is recommended to remove the burden on the state to manage large sewerage treatment facilities. Further, tax incentives provided by the state for effluent treatment by the private sector would be an invaluable incentive to encourage private sector involvement.

Disaster Risk Reduction, Climate Change, and Urban Resiliency

The next major priority after meeting the basic needs of housing, water, and sanitation is the mainstreaming of disaster risk reduction and climate change adaptation into policy and practice to achieve more resilient urban settlements. The resilience of poor quality housing, often at risk from extreme weather, can be enhanced using structural retrofitting and interventions that reduce risks, such as flood-proofing houses or expanding drainage capacity to limit or remove flood risks. Housing and planning ministries should adopt new designs to increase the resilience of housing by: ensuring that the floor levels of housing are above recorded flood levels; improving standards for the foundations of housing to guarantee that structures can withstand dynamic water forces; and altering roof designs to ensure adequate resistance in high winds (Mycoo and Donovan, 2017). The future siting and design of housing should be informed by coastal hazard risk assessments and coastal setback requirements for new developments (Simpson et al., 2012) which form part of the retreat strategy for climate change adaptation. Donor agencies have funded several projects in the Caribbean to build hurricane-resistant housing. The main lesson drawn from these projects is that strong enforcement capacity by planning agencies is necessary to ensure household compliance in adopting the building code for hurricane-resistant housing. Too often there is hurried reconstruction of housing in the aftermath of hurricanes that fails to adhere to building regulations. The practice to build-back-better to ensure resiliency and sustainable housing is strongly recommended. Beckford (2018) suggests the establishment of a Caribbean Local and Traditional Knowledge Network as a mechanism to harness local traditional knowledge and integrate it in regional climate change and disaster risk reduction agendas.

Urban infrastructure in the Caribbean is highly vulnerable and with over 70% of its population living in the coastal zone, people and infrastructure are exposed to sea level rise and storm surge

associated with climate change. Adaptation strategies utilized to deal with coastal flooding and storm surges will depend on each island's land elevation and coastal configuration. At best, a mix of protection, accommodation, and retreat strategies require robust analysis to determine feasibility and financing requirements.

Action is essential to introduce nature-based solutions as part of the greening measures for Caribbean cities which will help them adapt to climate change. A study of Pacific Ocean cities also concluded that nature-based solutions played a critical role in building resilience to climate hazards (Zari et al., 2019). These measures can be operationalised by mainstreaming landscape architecture and design, planning laws and development standards into urban planning practice. The growing urban heat island effect associated with warmer temperatures due to climate change can be ameliorated with the introduction of broad canopied tropical trees in urban parks and on sidewalks to provide much needed shade and cooler temperatures. All urban parks should retain their function as "lungs of the city" providing clean air and cool temperatures. Most Caribbean capitals are coastal cities with waterfronts, rivers, and canals which have a major cooling effect and these features should be preserved and incorporated into city planning and design. Site development standards which reduce building and site coverage allow for plots to have more green space. It is recommended that planners more frequently use Tree Preservation Orders that exist in Caribbean planning laws to achieve more greenery and ecosystem provisioning services. All these greening actions constitute eco-therapy in that they improve human health and well-being. Nature based solutions also provide ecosystem provisioning services such as flood mitigation which is much needed in Caribbean cities where climate change and inadequate drainage infrastructure have reduced their adaptive capacity. Greening initiatives can be pursued as a public-private partnership allowing community-based programmes to undertake some of these projects in conjunction with corporate sector.

Safe and Sustainable Urban Transportation

More populated SIDS such as Jamaica and Trinidad are faced with worsening traffic which is impacting on economic productivity, public health, and well-being. The lessons learnt from Trinidad's experience with urban transportation and traffic congestion are transferrable to other islands that may suffer from inadequate transportation in the future. Caribbean SIDS such as Jamaica and Trinidad should acknowledge that current modes of urban transportation are unsustainable for islands with small land masses, fragile economies, and sensitive ecosystems. In Caribbean SIDS, opportunities for transformative urban mobility do exist and can promote low carbon urbanization (Soomauroo et al., 2020).

Urban planners need to design compact, mixed-use urban neighborhoods to decrease travel demands and enhance transport-land use integration. As a matter of priority, Caribbean city planners should aim to develop several small, but strong regional centres that offer residential, commercial, and recreational opportunities so as to reduce the pull of the primate city. Transit oriented development is ideal for more

persons living in areas with compact urban form and should be promoted. Compact urban form is considered suitable because it promotes high residential density with mixed land uses where residents can have access to economic, social, and cultural activities without traveling long distances as often happens where urban sprawl occurs. Additionally, a more compact urban form presents opportunities to achieve resource efficiency in land utilization and management while simultaneously minimizing negative externalities on other natural resources and reducing air pollution. It is especially relevant to Caribbean SIDS because of their finite land supply and rich biodiversity which is endangered by unsustainable land management practices. Promoting compact urban form will help protect rainforests and watersheds from urban sprawl and facilitate ecosystem provisioning services such as slowing surface water run-off, improving ground water infiltration, and reducing flooding in low-lying coastal cities. Additionally, the poor will have better access to economic opportunities and services within compact urban settlements.

Under the NUA, the best practice for promoting a compact urban form is the adoption of smart growth principles that mitigate sprawl and encourage walking and transit-oriented development. Planning tools for achieving a compact urban form include spatial techniques such as greenbelts and land use zoning regulations that promote the development of brownfield sites instead of greenfield sites. Intensification, a major strategy for achieving compactness, uses urban land more efficiently by increasing the density of development and activity.

A multi-modal transportation system is considered optimal to achieving inclusive, safe, resilient, and sustainable cities while giving commuters choices. Disincentives for automobile ownership using market instruments to achieve behavioral change should be combined with the availability of alternative feasible modes of urban transportation. Ways of making public mass transit systems more efficient, reliable, and affordable for low-income and disadvantaged households call for more research aimed at formulating robust policy implementation. Car-pooling in Caribbean SIDS where there are high levels of automobile ownership is also another option to drastically reduce traffic congestion in urban centers and the capital city. This will require public education and behavioral change.

Other forms of urban transportation that are economically viable such as water ferries would be an alternative option to road-based transportation. Ferries can be effective as a form of mass transit especially for islands that have extensive coastlines and several sheltered ports. A ferry service is effective if intermodal transfer is in place. Most importantly, sea-based transportation would limit carbon emissions and help promote low carbon urbanization, while minimizing the impact on the use of land and noise generation. The promotion of walkable cities is important and can be promoted by prohibiting vehicular traffic in central business districts and designing user friendly pedestrian walkways. Other forms of non-motorized transportation such as cycling are equally key to reducing traffic congestion and improving the public health issues such as obesity and cardiovascular disease.

The state's role in mitigating air pollution cannot be discounted. It can play its part in promoting vehicle emissions testing which can be achieved through the establishment of an emission inspection programme operated by the private sector. Caribbean governments should phase out unleaded gas, introduce incentives to convert to compressed natural gas, and promote the use of such hybrid cars. The private and state sectors should work in partnership to determine the feasibility of a work from home programme aimed at reducing traffic congestion. During the COVID-19 pandemic the stay at home and work from home policy caused a drastic reduction in traffic. The lessons from this public health crisis need to be distilled and mainstreamed into a traffic management policy for Caribbean SIDS.

Urban Governance, Knowledge, and Capacity Building

For urban governance to be effective in the Caribbean, a stronger level of institutional capacity and more resources are needed. To attain SDG 11 under a NUA, Caribbean SIDS should develop relevant indicator sets conducive to governance for sustainable development. The main criteria to be considered are that indicators should be innovative and aim to change behavior and should be integrated into mutually co-articulating sets (Hansson et al., 2019).

Urban governance also requires accelerated integration across central government agencies, local governments, and administrative sectors as well as dialogue among actors to avoid negative consequences of operating in silos. Opportunities should be created for new collaboration spaces. Without building synergies among these tiers of decision makers SDG 11 will be compromised.

As part of the NUA for attaining SDG 11 in the Caribbean, governments, and knowledge providers must collaborate to generate, maintain, and enhance knowledge on the socio-economic, ecological, governance, and cultural dimensions of Caribbean SIDS. Such partnerships will help develop baseline conditions and experiment with future development scenarios to guide urban development and management in keeping with SDG 11.

It is essential that in this decade, the education of urban and regional planners, transportation planners, economists, environmental managers, architects, and engineers address the shortcomings of existing planning processes and management through innovative curricula which emphasize the importance of inter-disciplinarity. Further, new modalities for knowledge dissemination by establishing urban observatories catering to both professional and community stakeholders, is recommended.

Policy formulation requires robust evidence that can only be generated by governments, research and development institutions, including universities, non-governmental bodies and the business sector and donors. These stakeholders should be encouraged to invest in research and development because it is integral to support and mainstream hard evidence into decision-making. A policy to increase the availability and accessibility of

information to all interested stakeholders is recommended to ensure transparent decision-making.

Institutional capacity building is necessary to undertake the preparation and implementation of city plans and policies consistent with SDG 11. City plans form a substantive part of the NUA, and together with National Action Plans, are essential for its operationalisation. Prioritizing ways of increasing additional human and technical resources is fundamental to facilitate plan making, monitoring, and evaluation. An expansion of a cadre of planning professionals practicing at both central and local government planning offices is possible through enhanced opportunities for tertiary institutions to offer degree programmes with private and public sector funding. The role of professional associations in the Caribbean states where they exist, and the Caribbean Professional Planning Network initiated by UNECLAC in 2001 remain paramount in continuing professional development and strengthening capacity to advance implementation of the NUA.

Inclusive Urbanization and Participatory Integrated Spatial Planning

For Caribbean SIDS without a holistic planning framework for land use optimisation, the preparation of national spatial development plans is paramount. Such plans are essential to promote a system of settlements that stimulate economic opportunities, deliver basic services efficiently to urban dwellers, conserve ecosystems, promote urban and metropolitan resiliency to climate change and natural hazards, and minimize biodiversity loss. Optimal allocation of land using an integrated spatial planning framework is imperative for SIDS given their limited land masses and fragile ecosystems that are in dire need of protection to support long term sustainable development. Obsolete national spatial development plans should be updated. Regular plan monitoring and review are strongly recommended to make plans and policies more fit for purpose and relevant to SDG 11. Such plans and policies are necessary to promote more rigorous decision-making and avoid the pitfalls of ad hoc decisions that have proven calamitous in the past. Barbados has updated its national physical development plan periodically and has completed the most recent one in 2017 using a sustainable development approach.

An integral aspect of the NUA is the preparation of different tiers of spatial plans. These plans should address urban planning and management for the capital city and a hierarchy of settlements including metropolitan regions, urban corridors, and small urban centers that serve hinterlands such as rural villages. National spatial plans and all urban plans and policies should be formulated to meet the goals and targets of SDG 11. Additionally, it is recommended that relevant criteria for inclusivity, safety, resiliency, and sustainability are reflected in these urban plans and policies and in accordance with the uniqueness of Caribbean SIDS.

To ensure the inclusivity of urban communities, the NSDS and regional and local area urban plans and policies reflect the needs and aspirations of all such stakeholders by a process of meaningful engagement that enables active participation.

The cornerstone of collaboration is increased through public education and awareness building utilizing both traditional and modern media.

Decision Support Tools and Technologies

Caribbean SIDS should embrace the utilization of decision support tools and new digital technologies to accelerate the design and delivery of more inclusive, liveable, safe, resilient, and sustainable city environments. Drawing on the best data, analytics, innovation, and technology is critical to conducting diagnostics of what is working and not working in the urban context. Emerging information communication tools (ICT) and techniques should be customized and implemented to enhance multi stakeholder engagement.

A National Spatial Data Infrastructure (NSDI) is recommended to support the implementation of a NUA. A major obstacle among Caribbean SIDS is data paucity which undermines the robustness of policy making and decision-making on urban issues. Data gaps exist because census data does not accurately reflect the status of the urban poor, their income levels and living conditions. An urban data revolution promoting the synthesis of place-based information should be encouraged.

Developing a NSDI depends on several factors. Understanding the geospatial ecosystem is a prerequisite for developing an appropriate NSDI framework. All stakeholders such as central and local government, the private sector, Non-Governmental Organizations, CBOs, and academia play a critical role in contributing to a national portfolio of geospatial data. Individuals and community groups can provide the metrics on needs and deficits in urban services and environmental conditions. It is a radical departure from relying on national censuses that are costly for some Caribbean states. A few of Caribbean SIDS have taken up the challenge of establishing a NSDI but they need to transition toward implementation to accelerate finding remedies for unsustainable urbanization practices. Institutional change is necessary to mainstream the use of NSDI in planning offices within the Caribbean where a reluctance to utilize the new technology prevails and its use is limited to mundane administrative activity rather than spatial analysis and problem solving.

Implementing a Caribbean NUA also requires data acquisition tools. The advent of a miniaturization of technologies and the proliferation of new mobile sensor platforms and lower cost sensors can result in dramatic increases in data collection and quality, and the ability to tailor sensors to specific data collection needs. Among the new apps is one that allows residents to alert planning agencies of city issues and to upload complaints to local government via their smartphone.

Several other technologies provide opportunities for monitoring, spatial analysis, and problem-solving. Professionals engaged in meeting SDG 11 should leverage opportunities for learning about these new technologies to co-create the urban future of Caribbean SIDS. GIS technology in most planning offices in the Caribbean holds promise for empowering urban planners to implement the NUA. A GIS-based land use modeling approach is useful in identifying vulnerable environmental

sites and communicating the rationale that supports planning guidelines and principles to stakeholders. It has been utilized successfully for this purpose in Antigua and Barbuda (GENIVAR et al., 2011). The new generation of professional planners as part of continuing professional development should seize training opportunities provided by tertiary institutions within the Caribbean. High-resolution satellite data offers many possibilities to perform urban planning functions. Satellite remote sensing is a powerful tool for timely and cost-effective development of information in a wide number of applications. GIS technology, smart maps, Google Earth and drones can be put to effective use in spatial analysis, synthesis, and visualization not only in spatial planning, but transportation planning, natural hazard risk management, and building climate change resilience. Additionally, more urban planners should employ 3D modeling because it allows them to test various scenarios and expedite the urban planning process. It is cost effective and provides more accurate data for evaluation and decision-making. Participatory mapping can also facilitate community engagement in environmental risk assessment, vulnerability assessments, and climate change adaptation. Landsat data, now freely available on the Internet and cloud mapping, also hold tremendous potential to improve spatial planning and environmental management in Caribbean countries.

CONCLUSION

Caribbean countries have adopted the UN SDGs roadmap to guide policymaking and take action to be on track in meeting the SDGs. Yet, in reviewing the performance of Trinidad it can be concluded that much work still needs to be done in the revision and refinement of policies and practice if SDG 11 is to be achieved by 2030. Transformative change in the form of a Caribbean specific NUA is pivotal to meeting this goal by the end of the decade. Forging a new pathway toward making cities inclusive, safe, resilient, and sustainable calls for bold and innovative solutions that are of relevance to SIDS. Building synergies between SDG 11 and the NUA is paramount for SIDS and calls for leveraging the advantages of urbanization and partnerships at the national and local levels and for addressing the social, economic, and planetary complexities of the 21st century that have direct impact on SDG 11. While there is no “one size fits all” because issues are island specific, the recommendations are to be adjusted to the context of each island. Upscaling and transferring recommendations depend on the problems facing individual SIDS. This also calls for a prioritization of action to be taken. Priorities for action are improving access to basic needs such as housing, water and sanitation, disaster risk reduction, and climate change adaptation. The next set of priorities are sustainable transportation and mobility integrated with a compact urban form. All of these issues should be tackled using an urban governance framework which facilitates integrated spatial planning and the adoption of new technologies as decision-support tools. COVID-19 is expected to delay the achievement of SDG 11 by 2030. It may warrant extending fulfillment of this goal beyond the current decade to allow SIDS a

chance to recover from the economic shocks associated with the pandemic. Opportunities for transformation abound given the resilience of SIDS. Deeper introspection on how to better plan for inclusive, safe, resilient, and sustainable settlements is inevitable to emerge from the crisis.

AUTHOR'S NOTE

Across the globe, countries have agreed that their cities should be inclusive, safe, resilient, and sustainable for all their citizens in keeping with the United Nations Sustainable Development Goal 11. In some Anglophone Caribbean cities, urbanization is accelerating at a rate that outstrips the capacity of their governments to meet even the basic needs of city dwellers. Housing shortages, landlessness, unreliable water supply, traffic congestion, flooding, and hurricane damage are among the problems faced by people living in Caribbean cities. Many drivers of unsustainable urbanization in these countries are undermining

progress in achieving Sustainable Development Goal 11 in this Decade for Action. Policies do exist to address Goal 11, but implementation remains difficult. Translating policy into practice faces several barriers. This paper firstly seeks to review existing policies and practice that impact on the attainment of United Nations Sustainable Development Goal 11 in the Anglophone Caribbean Small Island Developing States context. Secondly, it makes recommendations for action to position Anglophone Caribbean Small Island Developing States on a trajectory leading to the fulfillment of Goal 11. An Anglophone Caribbean specific New Urban Agenda for these states is recommended to help operationalise Goal 11.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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