

Sector	Coastal Zone and Low-Lying Communities
Sub-sector/Category	Coastal Zone protection
Technology	GIS for operationalisation of land use plan
Scale of Application	National
Availability	GIS mapping/modelling are increasingly being used by planners around the world. With the increase in user friendliness and the number of functions of GIS software, and the marked decrease in the prices of GIS hardware, GIS is now an operational and affordable information system for planning. Recent advances in the integration of GIS with planning models, visualisation, and the Internet will make GIS more useful to urban planning (Chen, 2014). Map file databases often come included with GIS packages; others can be obtained from both commercial vendors and government agencies. GIS technology has been introduced in Guyana. Although not widely diffused throughout the country, it is being used by some key sectors and agencies, such as, the Forestry sector, EPA and the Guyana Lands and Surveys Department. There is also a handful of independent GIS services.
Technology Characteristics	
<i>Introduction</i> With support from the European Union, Guyana completed its National Land Use Plan (NLUP) in 2013. There is no Land Use policy at the moment, thus, the NLUP is used to guide land use decisions. According to the NLUP “the primary objective is to provide a strategic framework to guide land development in Guyana”. The plan builds upon a number of national policies and strategies that have a direct relevance for land use and land management and to enable financial resources to be targeted at optimal land uses at the regional level (NLUP, 2013). These include the National Development Strategy (NDS 1996), the Poverty Reduction Strategy (PRS 2000, 2004, 2011), the Land Use Baseline Document (1996) which led to the Draft Land Use Policy (2004, 2007), the National Competitiveness Strategy (NCS 2006) and the Low Carbon Development Strategy (LCDS 2010). The need to make land-use decisions on a national and regional scale in a single system, make GIS a great tool for integrating in planning processes. In Guyana the vast majority of data that can be mapped and used in a plan is at the national level i.e. small scale, of 1:1 million or smaller. The output maps for the NLUP will be at 1:2.5m and 1:1m scales. GIS technology for Land Use Planning (LUP) can be best summarised as “Geographic information system (GIS) is a technological tool for comprehending geography and making intelligent decisions. GIS organises geographic data so that a person reading a map can select data necessary for a specific project or task. Data can be used to develop thematic maps which can help to make decision about that particular sector or issue. With an ability to combine a variety of datasets in an infinite number of ways, GIS is a useful tool for nearly every field of knowledge from archaeology to zoology. Many countries have an abundance of geographic data for analysis, and governments often make GIS datasets publicly available” (ESRI, 2011).	
Institutional /Organizational	The Guyana Lands & Surveys Commission will be the lead Agency responsible for the implementation of this technology. However, there will be a high level of collaboration with other sector agencies since the LUP is a shared implementation approach among the various sectors. Also, data will be shared with institutions with GIS capacity for their use.
Adequacy for Current Climate	This technology is not climate dependent.

Size of Potential Beneficiary	At the policy making level, this will be useful for land use planners and decision makers. Guyana has an existing Land Use Plan and its use can be greatly enhanced through the spatial analyses of land resources and its multiple uses. Communities and investors are also primary beneficiaries.
Disadvantages	• Lack of/ inadequate data and capacity may limit the intended use of the technology; • As a multi-criteria tool, there will be a need for a range of data types, criteria etc which may need to be collected; and • Low level of interest due to high cost and complexity of the technology.
Endorsement by experts	Decades after Canadian Roger Tomlinson's (acknowledged father of GIS) breakthrough, this technology is everywhere. It is a proven technology which has gained traction worldwide with the internet and open source services. ESRI, is a leader in GIS products and services and is accessible online. It is widely used by all categories of stakeholders, planners, educators, students, researchers etc.
Capital Costs	
Cost to implement/Operate/Maintain	<i>Implementation:</i> • Expected to be high and will include procurement of computer systems and accessories, training, data collection/updating. Software will be open sourced. May need to hire additional staff for this unit. Will require capacity building in GIS/Modeling land use and risk mapping; and • Estimated, cost for hardware (equipment) is US\$60,000. <i>Operation/Maintenance:</i> • Recurring costs will include, periodic training, maintenance of equipment and salaries for staff. However, existing resources such as data and skills will be utilised; and • Estimated cost over a five year period: US\$554,600.
Development Impacts – direct/indirect benefits	
Adaptation benefits	Spatial mapping/modelling makes it possible to estimate the widest range of impacts of existing trends of population, and of economic and environmental change. For example, a range of environmental scenarios can be investigated through the projection of future demand for land resources from population and economic activities.
Economic Impacts	• Generate employment since additional staff may be required; • Promote investment opportunities; and • Can increase budgetary allocations of institutions.
Social Impacts	• Reduce loss suffered from natural disaster such as flood & forest fires due to improved planning; • Reduce incidence of land use/development conflict; • Control overcrowding and illegal settlement; and • Increase awareness of land use challenges and climate change.
Environmental Impacts	• Contribute to the reduction of the impact due natural disaster such as flood, forest fires etc; • Improve understanding of natural resources and predict changes; • Protect vulnerable habitats and ecosystems; • Guide the sustainable harvesting of natural resources; and

	• Improve urban and rural planning.
Local Context	
Status of Technology	There is a Land Use Policy and Planning Section, a Land Information and Mapping Division and an IT Unit within the GLSC. Current GIS capacity include, Senior & Junior GIS Specialist, GIS Technicians, Cartographer and IT personnel. To date, a number of digitized maps have been developed by the GL&SC for sectors such as, water resources, available land, vegetation types etc.
Market potential	The results of this technology can be diffused readily among institutions, which can then make more informed decisions about their sector. Various socio-economic, demographic and environmental scenarios can be investigated through GIS mapping and projections.
Acceptability to stakeholders	As a multi-criteria decision-making analytical tool, GIS mapping/modelling of land use is highly acceptable among planners. Other stakeholders, such as educators and researchers have also expressed the need for improved planning of the country's towns, cities and communities.
Opportunities and Barriers	<i>Opportunities:</i> • Improved understanding of Guyana's resources and land use changes; and • Promote implementation of National Land Use Plan; <i>Barriers:</i> • May not be a high priority of government; and • Often slow to implement due to the high capital cost and lack of specific skills in the sector/country;
Time Frame	Medium to long term
References	
1. Chen, Jiapei (2014). GIS – based multi-criteria analysis for land use suitability assessment of the City of Regina. <i>Environmental Systems Research</i>. Volume 3, Number 1, Page 1. 2. Economic Commission for Latin America and the Caribbean (ECLAC) (2005): Guyana – Socio Economic Assessment of the damages and losses caused by the January – February 2005 flooding. 3. ESRI, 2011. Urban and Regional Planning- Best practices. https://www.esri.com/library/bestpractices/urban-regional-planning.pdf 4. Government of Guyana, (2012): Guyana Second National Communication to the United Nations Framework Convention on Climate Change. 5. Guyana National Land Use Plan, 2013. Guyana Lands and Surveys Commission	