

# **The Urban Sea and Coastal Zone Management**

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## **SUMMARY**

Within the coastal zone of Eastern Caribbean States, physical development is high and institutional resources are limited. By using theoretical land use variables, special coastal areas can be defined and given special attention and effort in a manner similar to that applied to urban land use planning. The result includes stronger hydrographic arguments within coastal zone management decision-making.

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## 1. INTRODUCTION

From time to time it is useful to critically examine institutions (we include here a broad spectrum of organisations and methods) and the way they assist in the management of development. Our institution of interest, Hydrography or the formal science of measurement in the marine environment, has clearly changed over the last 50 - 70 years. The lead line, sextant and paper chart, have given way to multibeam systems, GPS navigation, electronic charts and remote sensing as drivers of the practice. Even the way that we organise ourselves has been the subject of change. Arguably, it is technology rather than the form and use of the spaces in which the measurements occur that have been the most significant forcing factors for institutional change. The quantum leaps in the ability to measure more accurately have promoted optimism for the use, and indeed, misuse of marine spaces. In the Caribbean, evidence of such optimism lies in the growing lengths of coastline that can be considered developed and/or relied upon by urban economic systems. Ports and harbours, tourist beaches and reclaimed-land for urban infrastructure are now ubiquitous features of Caribbean island coastlines. The era of long empty stretches of untouched beaches and coastal area are nearly ended.

At the water's edge, the global response to the need for resource management is Integrated Coastal Zone Management (ICZM). ICZM is a strategy based on a desire for sustainable development that includes economic, social and natural processes. At the centre of ICZM strategies are people (their perceptions and needs), potential (particularly economic ones) and place (the nature and form of the spaces) arguments that inform decision-making. Along developed or urban coastlines, the single largest challenge is that of bringing balance to ICZM arguments in the face of strong economic ones. While hydrographers are not necessarily trained to collect and describe people or economic potential, the science of hydrography is, by its very nature, designed to offer physical descriptions of the coastal spaces. Several writers have commented on the need for hydrographic surveyors to include ICZM knowledge and training in their skill bank, and many universities and institutions where hydrography is taught, offer Coastal Zone Management as core courses.

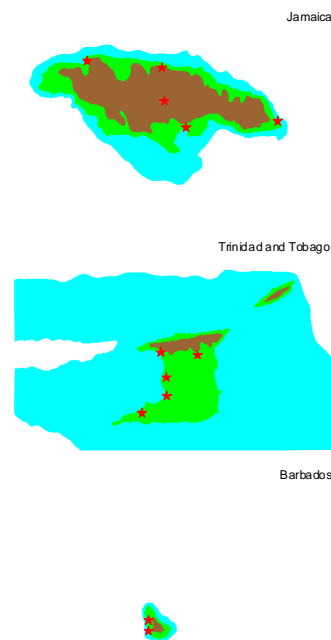
At the centre of this paper is a suggestion for the definition of certain coastal marine spaces and subsequent treatment in hydrographic practice in order to strengthen place arguments. The paper/presentation is by design brief and draws its evidence from the islands of the Eastern Caribbean but may have applicability to other small island states.

## 2 COAST FORM

'Scale' offers an interesting starting point for examining development in the Eastern Caribbean Island States. The reality of these islands is that they are extremely small. Often their Continental Shelf claim areas are significantly larger than their land areas. Everyone

lives, works or plays by the sea. Development therefore is upon it and more often than not, in the sea. Indeed much of the coastline, particularly along the islands' lee-sides, is highly developed. Marinas, land reclamation, ports and wharves, dredging, sea defence structures are everywhere. Coastal zone definition arguments therefore include the entire island-mass and continental shelf. While well intended, the institutional implications required of already technically weak, poorly staffed and under-funded Post-colonial State agencies to successfully administrate a coastal zone so defined, are debilitating. The traditional Land and Surveys Offices are barely able to manage record keeping for land titles and the generation of up-to-date topographic maps. To triple or sometimes quadruple the physical areas of responsibility by adding the width of the Continental Shelf offers nothing. As is often the case in many small economies, the allocation of scarce resources lies in the application of priority. The matter of coastal resource planning and administration is no different.

**Figure I: A Comparison of the sizes of three Caribbean Islands** (the island mass is shown in green with high land area upwards of the 200m, contour shown in brown. The continental shelf is shown in blue. Red stars indicate the location of the main towns and cities)



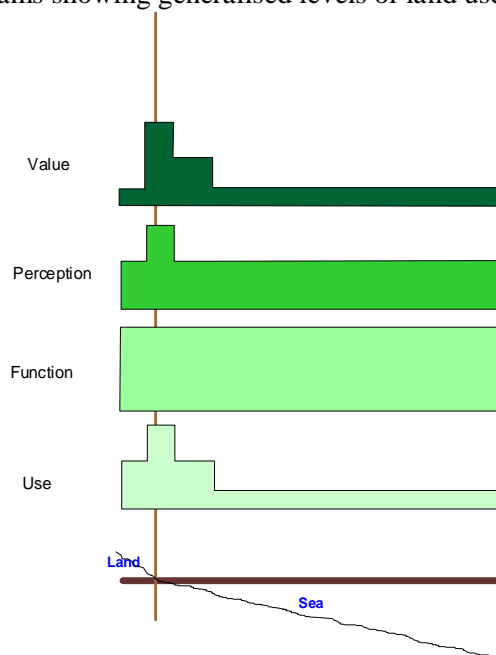
A review of land use theory suggests that the relative importance of spaces can be related to four (4) factors: *use, function, value* and *perception*. These parameters, a curious mix of quantitative and qualitative measurements, offer a basis characterising developable spaces. Numerous other theories for the examination of spaces exist, indeed, as many as there are theorists, but each remain some variation of that stated above with some adaptation for specific conditions. For example, theorist engaged in the examination of cities include harder descriptor for population, movement and vitality instead of the somewhat general term 'function.'

**Table I.** Definitions of four land use variables

<b>Use</b>	Present use, particularly as agricultural, residential, industrial, commercial or open space
<b>Function</b>	Its role with the natural system, as filter, buffer or other natural form
<b>Value</b>	Some measure of its worth in real market terms
<b>Perception</b>	What and how people perceive the space and its relationship to their daily lives.

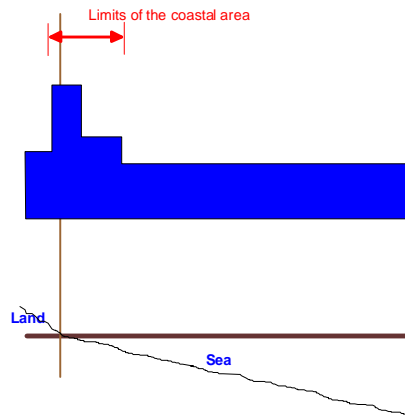
Through observation and enquiry, it is possible to apply the factors indicated above to Caribbean island-spaces along urban coasts. On non-urban or undeveloped coastlines, measurement of the variables is not always possible. The block diagrams shown in Figure II are made from such an enquiry carried out by the author. Here the tiers have been simplified to three tier levels - low, medium and high levels for each variable. When combined as shown in Figure III, the analysis accentuates the elevated tiers the coast - an area that may be given a higher priority or the subject of some special attention.

**Figure II.** Block diagrams showing generalised levels of land use variables



The challenge not tackled by this simple graphical form is the exact limits of the special area or the reasons for its elevated status. The answers to such questions lie in further examination and analysis of the collected data. The work completed for this study suggests the following key factors in determining the limits of special coastal area - proximity to urban areas, presence of coastal road, the intensity open sea conditions, the presence of sea defence structures and the size of the coastal population. In general the limits of this special coastal area was the nearest coastal road to about the 18m water-depth contour.

**Figure III.** Block diagrams showing generalised levels of combined land use variables



In management terms, the areas indicated by the analysis holds significant usefulness. In the main, the analysis suggests that physical land use planning and the level of detail associated with it should move seaward to include the special area. Local area plans, the assessment of the land bank and the development of land valuation systems should there formally include such spaces.

### **3. HYDROGRAPHY AND THE URBAN COASTAL AREA**

The case for the urban coastal area as part of land use planning is not a new one. In many developed countries the concept is well understood and practices in both formal and informal planning. In jurisdiction where it does hold there significant implications regarding hydrographic measurements. Some are listed below:

- The level of bathymetric detail required for proposed coastal development is increased. This level of detail include beach slope measurements, sand and sediment transport measurements, seabed features, both natural and manmade and shallow sub-seabed features.
- Long period tidal measurements are important to shoreline change, particularly in close proximity to high value coastal land.
- Hydrographic detail must form part of seabed lease surveys
- Environmental impact assessment must include detail hydrographic measurements and analysis along time and space scales.
- The form of hydrographic data reporting must enable participation by a wide range of coastal area stakeholders that include the man in the street. The inclusion and analysis of anecdotal evidence in hydrographic survey reports for example may allow stakeholders
- Hydrographic survey specifications must be developed for special coastal areas.

- The hydrographer must develop skills that allow him/her to better participate in the development process.

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