MANAGING THE SEA DEFENSES ALONG GUYANA'S COAST
A GIS/RDBMS APPROACH

The coast of Guyana stretches some 430 km and occupies about 7% of the total area of the country. We are all aware that most of it (if not all) is below the high tide sea level and about 90% of the population as well as economic and administrative activities are concentrated there. Figure 1 shows the possible impact of a 1 meter rise in sea level. The coast and everything that is located on it is therefore at the mercy of the ocean. However, the coastal plain is protected in part by both natural and man-made structures with the government spending millions of dollars every year maintaining old sea defences and constructing new ones. Therefore, effectively managing these sea defence structures is important for both social and economic reasons. A Geographic Information System (GIS) can help in the effective management of sea defences as illustrated in the Sea Defence Management Information System (SDMIS) developed by the EPA in collaboration with the Guyana Sea Defences Project Execution Unit of the Ministry of Public Works and Communications. The SDMIS is a pilot project that focuses on the island of Leguan.

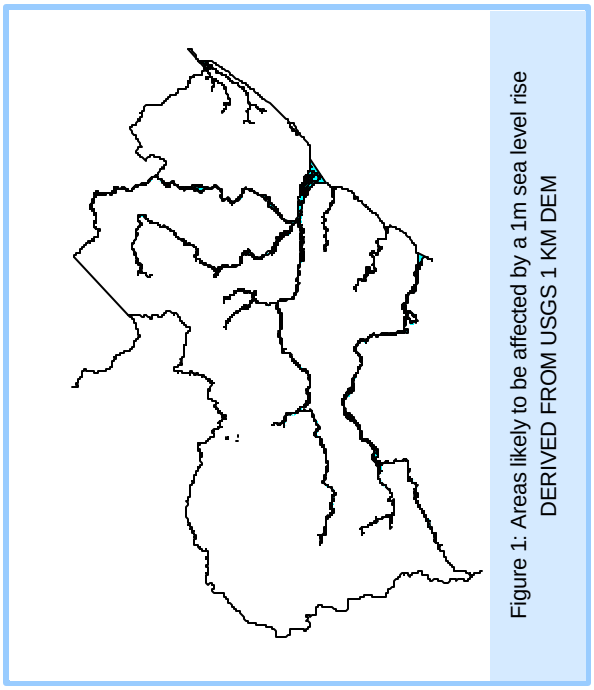

Figure 1: Areas likely to be affected by a 1m sea level rise
DERIVED FROM USGS 1 KM DEM

The SDMIS uses a GIS / database approach. The database (Microsoft Access 2000 in this case) stores attributes or characteristics of the sea defence structures such as its condition, the type of structure, construction year, its length and residual life among others. The GIS visually displays the sea defence outline while at the same time it links to the database so that a user of the system can see the attributes of a sea defence structure by selecting it. See Figure 2. Users can also display photographs of any segment as illustrated in Figure 3. The highlight of the system, however, is the ability to query the database and display the results visually in the GIS. See Figure 4.

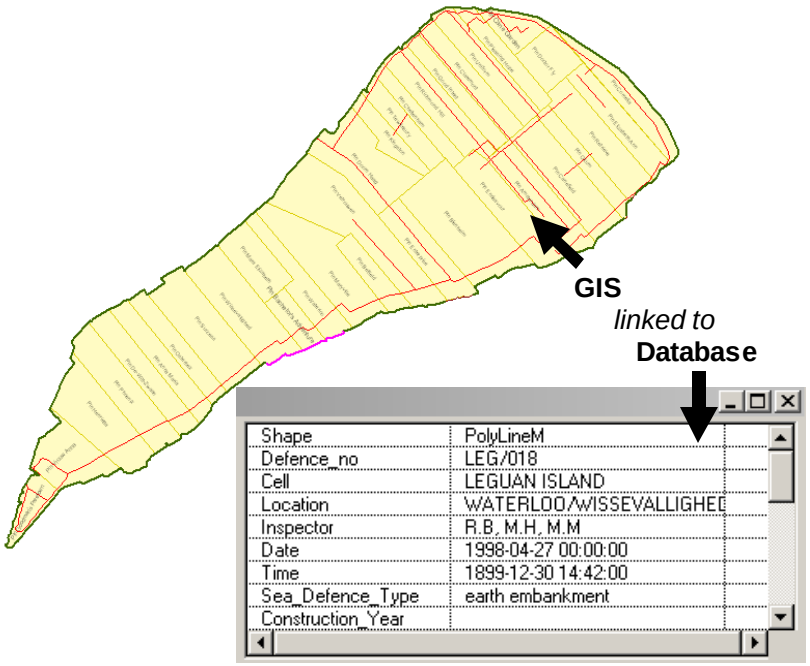

Figure 2: Linking a GIS to a database. The lower window shows attributes for the pink segment (selected)

Figure 3: Displaying photographs for sea defence segments

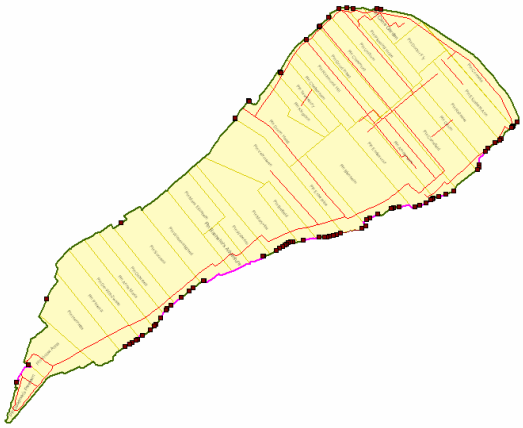

Figure 4: Querying the database and displaying it visually in the GIS. Selected areas (in pink) show structures whose condition are bad and structures whose priority are critical

In addition to all the wonderful things the system described above can do an application utilising GIS can be designed very flexibly. This means that even though it was designed for one purpose, other users / developers can extend its functionality or use its data in other ways. As an example, Figure 5 below shows a summary table and chart that were prepared in Microsoft Excel using data from the sea defence database.

Sum of length (m)		
structure condition	Total	% of total
bad	6695.30	18.7696
fair	8908.80	24.9749
good	774.00	2.16983
poor	19292.90	54.0857
Grand Total	35671.00	

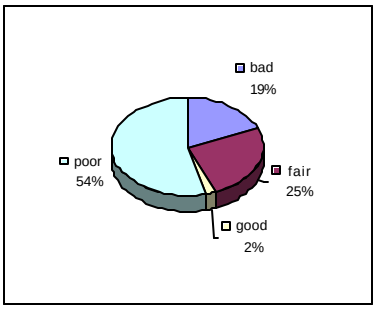

Figure 5: Preparation of summary tables and charts in Microsoft Excel

As you may have realized by now, a GIS is a very powerful decision making tool. It allows people to do so much with so little. However, some technical knowledge is required to use it effectively although almost anyone (with a basic computer background) can do basic things within a few days. The above covers just the tip of the iceberg when it comes to the capabilities of a GIS. Like Jack Dangermond, President of ESRI (a leading supplier of GIS software) said, "The application of GIS is limited only by the imagination of those who use it".

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