The Salt River Bay area, St. Croix:

Combining archival data and historical maps in a GIS

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During 2006, as part of the preparation for our field work on the Galathea3-expedition, we have been purchasing and digitising historical maps of St. Croix and recent data for analysis in a Geographical Information System (GIS). One of the advantages of using GIS is the ability to combine spatial/geographical data with other types of information, from a variety of sources.

The maps collected and geo-referenced include:
Cronenberg and Jægersberg topographic-cadastral map of St. Croix 1750[1];
J. M. Beck's well known cadastral map of St. Croix from 1754, in this project a version updated 1767 is used;
P. L. Oxholm's topographic-cadastral map of St. Croix 1794[2];
USGS topographic maps from 1958 (with some updates, mostly roads and buildings 1977), these have served as the geometric reference for rectification of the older maps. In this way the maps are now available with geographical coordinates in the UTM system, making them compatible with geo-referenced information from other sources. A comparison of these map types mentioned here are shown on the last page of this paper.

Digitised themes from the maps include: roads, building, mills, quarter and plot boundaries, towns. We further have acquired terrain information for the entire island, in the form of digital line graph (DLG) data, also from the USGS. These data have been used to perform viewshed analysis and to delineate catchments, and they have the potential to be used for analyses of erosion/erodibility and sediment loads. The digitisation of the Oxholm map from 1794 includes a database structure, where each plot has been given a unique identifier based on the quarter to which it belongs and plot number It is thus possible to refer data a geographical component to a certain location and view and analyse spatial patterns. Information on ownership structure and estates have been extracted form the Oxholm map and from the "Geographic dictionary of the Virgin Islands of the United States" (J.W. McGuire, U.S. Coast and Geodetic Survey, 1925).

In our case we have been so fortunate as to have access to the record which St. Croix historian George Tyson have been compiling during the last decade, and which hold detailed information on population and land use at estate (plantation) level for the entire island. Of particular interest to the Galathea3-project is the Salt River Bay area, as it is of interest for all our focus subjects, tourism, cultural environments land use and maritime history. The catchment area (watershed), which will be used in further studies, was delineated from the elevation data, and is shown in Figure 1 below, together with the outlines of the estates for which Tyson have provided data from census and taxation lists.

[1] Daniel Hopkins (1989): An extraordinary eighteenth-century map of the Danish sugar-plantation island St. Croix. Imago Mundi, Volume 41, pp. 44-58.
[2] Daniel Hopkins (1993):Peter Lotharius Oxholm and late eighteenth-century Danish West Indian cartography. In "The Danish presence and legacy in the Virgin Islands", Svend E. Holsoe and John H. McCollum, eds.; Frederiksted, St. Croix: St. Croix Landmarks Society, pp. 29-56. Ref. 1 and 2 are also available in slightly modified form from the web site "Historical mapping of St. Croix", http://cas.umkc.edu/StCroix/index.html

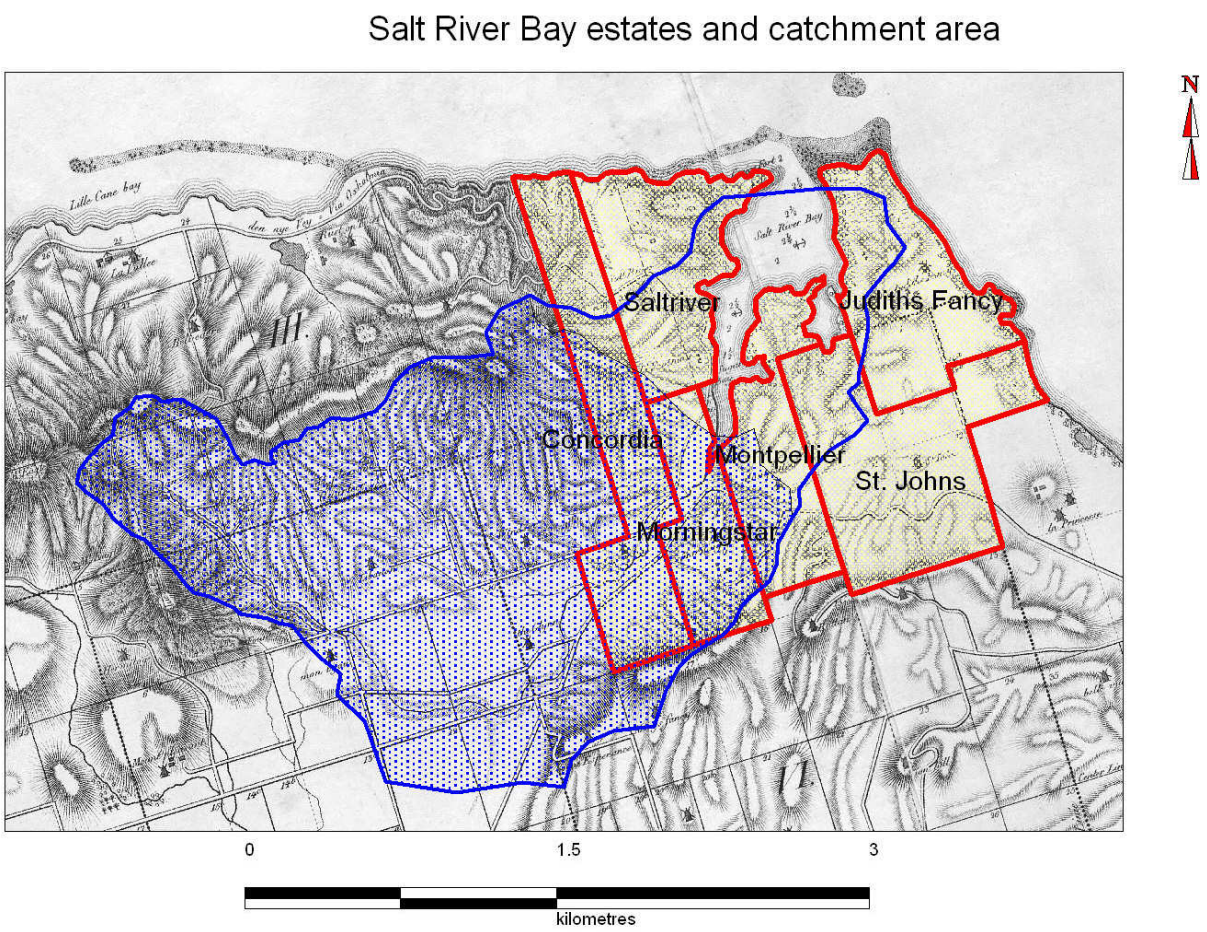

Figure 1 Outlines of estates around Salt River Bay, combined with hydrological boundaries. The thick, blue line indicates the watershed of the entire Salt River Bay, the tinted area shows the catchment of Salt River, entering the bay (through the marsh area with mangrove forest). Background map: Oxholm 1794, georefereced to UTM (zone 20).

Figure 2, below shows another example of, how the data can be arranged in a GIS. Population data for the six selected estates around the Salt River Bay are visualised with bar diagrams. The data from Tyson were received as worksheet files with data for almost every year of the period 1742 - 1924, thus making it possible to calculate 11-yrs moving averages (compensating for possible artificial fluctuations from year to year), which can be used to illustrate the trends in population on the estates. The first bar (in red) represents the year 1750, the last bar (pale yellow) the year 1910. These arrays of bars illustrate the relative population at the estates, of which the by far largest proportion were slaves. The spreadsheet also holds the numbers of free respectively slave population for each year, and this information could also be shown graphically. The largest absolute number for total population on an estate in a single year is 394 on St. Johns in the year 1767 (of which only 7 were free!), however due to a sharp decline to 223 the following year, the average number assigned to 1770 is only 274 (indcated buy the blue bar in the diagram for St. Johns).

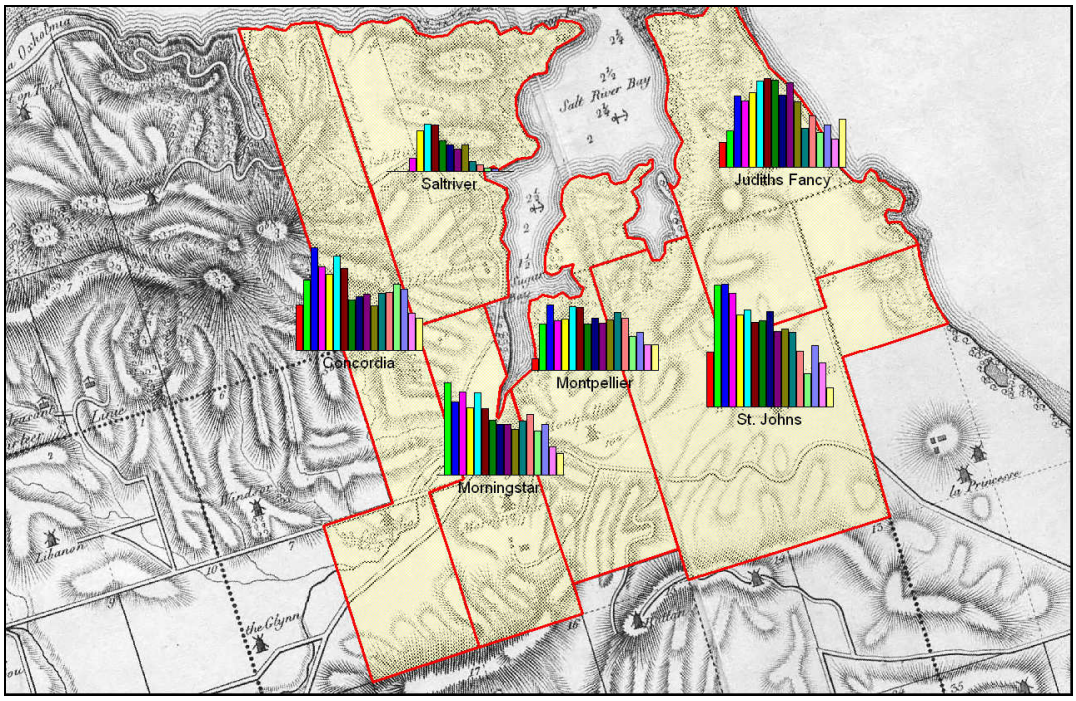

Figure 2 Population 1750 – 1910 on six estates around Salt River Bay.

Figures 2 and 3 should be seen together, in order to illustrate the relation between land use intensity and population in the single-crop plantation economy of St. Croix in the 18th and 19th century.

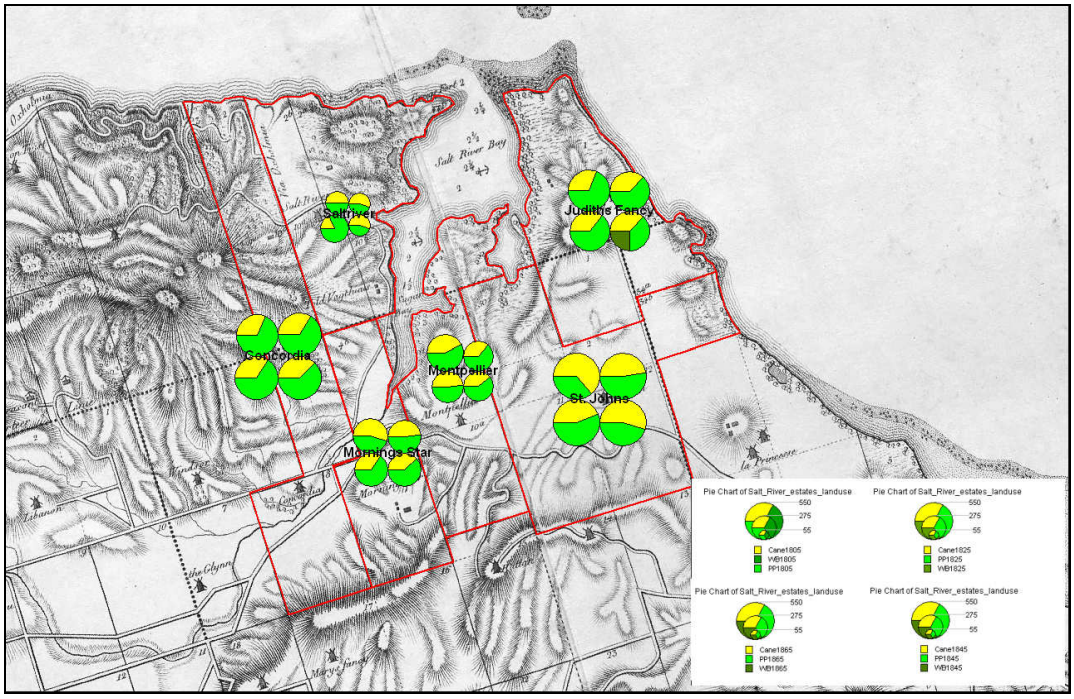

Figure 3 Land Use 1805 – 1865. From upper right corner and clockwise, the pies represent the years 1805, 1825, 1845 and 1865. Yellow represents area of cane fields, light green represents "pasture and provisions", while dark green represents woodland and bush. The latter category is unfortunately only available for some years. The size of the pies indicates the total plantation area.

The current status for digitising the lots from Oxholms map with information from McGuire (1925) is illustrated in Figure 4, below.

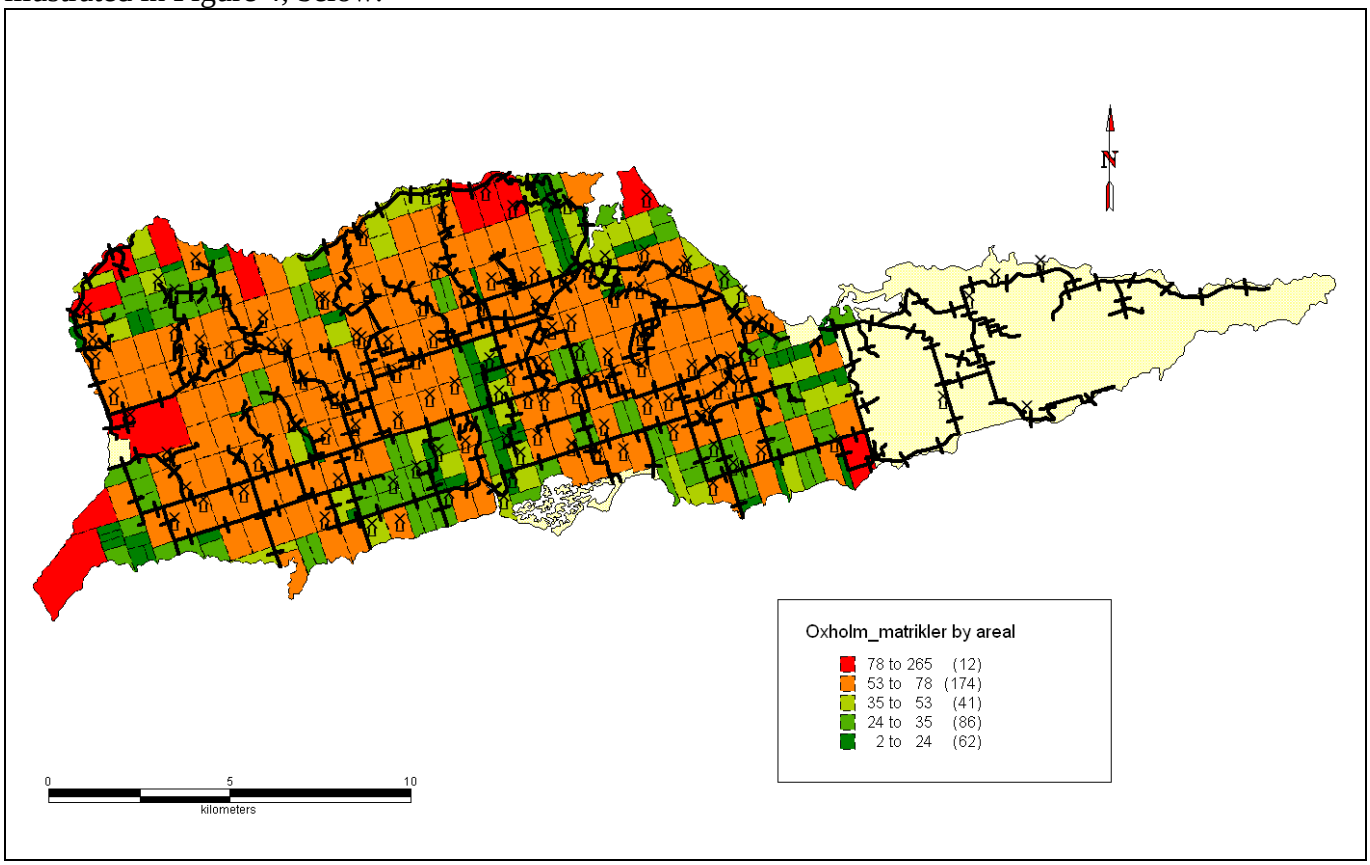

Figure 4 Digitisation status ultimo august 2006. The lost for most of the island have been captured, quarter East End A and B remains. The lots are coloured by size, see legend. Also shown is the road network as it appears on Oxholm's map and the windmills found therein.

Mapping of Salt River Bay, St. Croix

Cronenberg 1750:

J.M. Beck 1754 – 67:

Oxholm 1794:

USGS 1958 -77: