Sea Level Rise 2120 – New Orleans Underwater?

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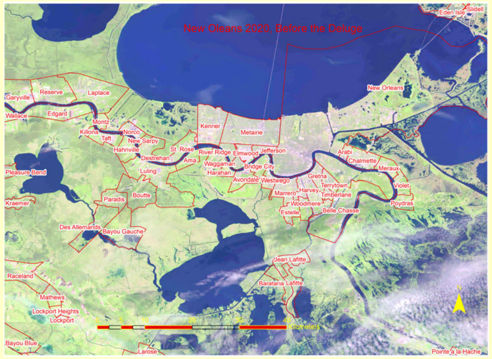


Methods: In this exercise I opened ArcMap and inserted a basemap placeholder for metro New Orleans. I visited the USGS Map Downloader website and obtained four 1 arc second digital elevation models covering metro New Orleans. Using the mosaic to raster tool I stitched them together to make one large raster file. Since I would be making calculations with this file's offshoots, I converted the projection to NAD83 UTM 15N. Using the map algebra tool I selected elevations less than or equal to 0.3 meters and created a new file named *rastercalc*. Using the reclassify tool I changed the values which are greater than 0.3 meters to NoData so that only the elevation values less than or equal to 0.3 meters will be illustrated in the data file. I named this *file reclass_rast1*. I then changed this raster file to a polygon using the raster to polygon tool, and named it *RasterT_Reclass1*.
Already I could see the flooding which would take place in New Orleans, but I needed to get rid of my basemap because we are not allowed to use basemaps in GSP 370! I visited Data.Gov and downloaded the Tigerline 2019 Louisiana shapefile to demarcate and label the different city boundaries of metro New Orleans. Since I would be making calculations with this file I converted the projection to NAD83 UTM 15N. For a background I visited USGS Earth Explorer and downloaded a Landsat 8 RGB Satellite photo from 2022 and placed it on the map. I exported before and after flood maps for this poster. Using the intersect tool I joined the 0.3 meter sea level rise polygon with the Tigerline2019 polygon. To reduce excess data, I clipped the intersect polygon to include only the cities and flood areas in the map area. In an edit session, I merged all the flood polygons into their respective cities and then calculated the flood areas for the cities. The Tigerline 2019 attribute table conveniently included area measurements for land and water. I exported a table to excel and calculated the percent flooding of each city, and prepared a table for the poster.

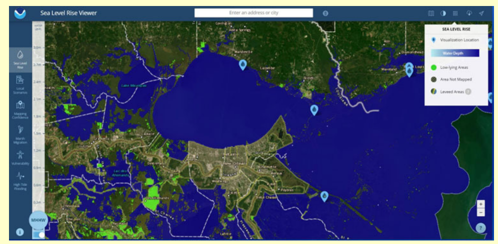
Introduction: In my literature review on coastal freshwater wetland forests I noted that sea level rise due to global warming occurs at approximately three millimeters per year. Over a century that amounts to 30 cm. In this presentation I run a GIS model on what New Orleans will look like in 2120.

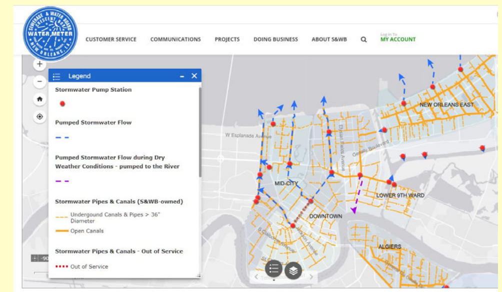
Photo credit: Tony Gill, 9/10/2005

Results: My before and after maps clearly illustrate the devastating effects of a 0.3 meter sea level rise on metro New Orleans. The percent flooding table illustrates the level of flooding cities in the map area would incur.

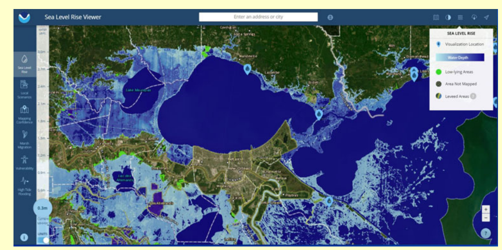
Discussion: I checked with the NOAA Sea Level Map Viewer and saw a very different picture than the model I made. With a 0.3 meter sea level rise, metro New Orleans was not underwater. The reason is, while most of New Orleans is below sea level, it has a series of levees and sea walls which protect it from flooding. It also has 24 pumping stations which pump water out of the city into Lake Pontchartrain 24 hours a day, 7 days a week. Without these pumping stations; however, New Orleans would be under water, and that is what my work illustrates. This actually happened during Hurricane Katrina in 2005 when the levee breached and the pumps failed. Even though this New Orleans sea level rise exercise doesn't portray reality, it was a good practice in using digital elevation model data to make maps showing flooding effects as well as creating tabular flood data for the towns affected by the flood.

		Flooded Cities		
NAME	**AREA LAND**	**AREA WATER**	**Flood Area_M2**	**% Flooded**
Ama	9069800	2392283	1746937	15.24
Arabi	4545260	712437	2885111	54.87
Avondale	14393015	1120080	10924192	70.42
Barataria	11098818	1336371	7790723	62.65
Bayou Gauche	33286519	7571001	32720308	80.08
Belle Chasse	64532220	8970052	60366041	82.13
Boutte	35698283	151373	5939531	16.57
Bridge City	10826861	2758102	3704499	27.27
Chalmette	18581793	2044579	9381091	45.48
Des Allemands	25768649	5920849	25968146	81.95
Destrehan	15455657	2614626	6346102	35.12
Edgard	29485282	6322071	28097	0.08
Elmwood	9774295	688569	1131565	10.82
Estelle	12012804	22865	5497557	45.68
Gretna	10451961	1191856	7501350	64.42
Hahnville	14394619	2462952	410154	2.43
Harahan	5209738	1251905	78938	1.22
Harvey	16800217	1300667	13235441	73.12
Jean Lafitte	15180411	934482	11620160	72.11
Jefferson	7011838	1470333	949130	11.19
Kenner	38540032	600053	33240616	84.93
Lafitte	12519252	4077191	13159904	79.29
Laplace	54118465	2993171	5012912	8.78
Luling	60323095	3072114	9828318	15.50
Marrero	18646513	1518181	5937544	29.45
Meraux	10743155	1717881	8093135	64.95
Metairie	60239662	109316	53036019	87.88
New Orleans	438830826	467267624	744977173	82.22
New Sarpy	2940279	626800	1231102	34.51
Norco	8917257	1521245	457510	4.38
Paradis	16650044	623320	12163602	70.42
Poydras	10115439	938781	2957964	26.76
Reserve	37708045	2976048	5587248	13.73
River Ridge	7240937	1944144	754446	8.21
St. Rose	16420689	2886869	3046090	15.78
Taft	12902892	1700918	24419	0.17
Terrytown	9495028	78446	9513288	99.37
Timberlane	3894049	643	3893554	99.97
Violet	10168163	1678821	6067069	51.21
Waggaman	14261358	2743125	3592201	21.13
Westwego	8070418	1241824	4385131	47.09
Woodmere	9457524	500830	9358559	93.98





Canal Street is flooded a day after Hurricane Katrina blew through August 30, 2005 in New Orleans, Louisiana.
Getty Images



References:
1) USGS Map Downloader, https://apps.nationalmap.gov/downloader/
2) Tigerline Shapefile, https://catalog.data.gov/dataset/tiger-line-shapefile-2019-state-louisiana-current-place-state-based
3) USGS Earth Explorer, https://earthexplorer.usgs.gov/
4) NOAA Sea Level Rise Viewer, https://www.climate.gov/maps-data/dataset/sea-level-rise-map-viewer
5) New Orleans Sewage and Water Board, https://www.swbno.org/Stormwater/Overview

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