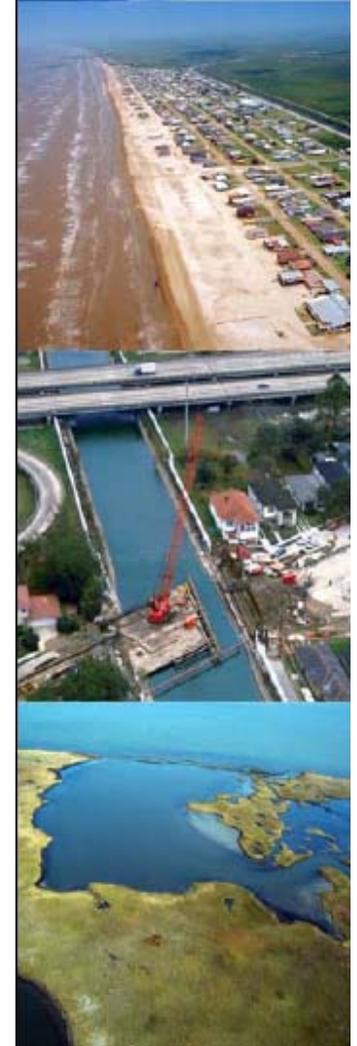


Louisiana Coastal Protection and Restoration (LACPR)

Economic Analysis

15 May 2007





Overview

- *The Economic Analysis has many components that are found in traditional storm damage reduction studies*
- *However, NED (asset damage) is not the lone decision criteria*
- *Metric set has been expanded to include regional economic impacts, risk to health/safety*
- *Forecasts of multiple future scenarios for population and development patterns*



Key Metrics

- **National Economic Dev. (NED)**
 - Expected Annual Damage (EAD)
 - Single Event Damages
 - 100 yr.
 - Katrina
 - Low Cat 5
 - High Cat 5
 - Residual Damages (EAD with project)
- **Population At Risk**
- **Regional Economic Impacts**
 - Employment, Income, Gross Regional Output



Fundamentals

- Where are the assets – homes, businesses, other infrastructure, agriculture?
- Where are the people?
- What/Where are the storm risks?
- How do these things change over time?



Time Considerations

- 2010 Base Year
- 50 year period of analysis
 - 10 year time steps
- 4 7/8% Discount Rate
- 2006 Price Levels



Where are the assets?



Data Management

- Using GIS to manage data sets and automate the process of marrying asset info with ground elevation data, storm surge levels to create stage-frequency curves.
- 64000 Census Blocks
- Aggregated to ~300 planning sub-units



Asset Database

- Structure Inventory was developed using HAZUS-MH (FEMA model)
- Census Block, Not Individual Structures
- HAZUS Model provides number and value of structures in each Census Block
- Using Structure mix from prior Feas Studies, inventory is allocated to:
 - # of Stories
 - Type of Residential
 - Elevation above ground



Inputs to EAD Calculations

- Asset Database
 - Residential, Industrial, Commercial, Public, Agricultural, Infrastructure, Vehicles
- Depth-Damage Relationships
 - How much damage results with each 1-foot increment of flood depth
- Storm Model Data
 - Exceedence Frequency and Single-Event



Single Event Damages

- Essentially a what-if question
 - 100 yr.
 - Katrina
 - Low Cat 5
 - High Cat 5
- Residual Damages
 - How big is the catastrophe under these conditions?



Where are the people?



Population At Risk - Metrics

- Resident Population
 - Estimated number of people that reside within the geographical area exposed to storm surge flooding
- Threatened Population
 - Portion of the resident population that remains at direct risk from catastrophic storm surge after evacuation plans have been implemented in the face of a specific storm threat.



Population At Risk - Evaluation

- Resident Population
 - Stage-population curves
- Threatened Population (post-evacuation)
 - Based on recent evacuation studies
 - Post-Katrina, Post-Rita
 - La Dept Homeland Security and Emergency Preparedness
 - Apply IPET methods to post-evacuation population to estimate potential fatalities



Population Projections

- Population forecasts developed by State consultants - Calthorp
- By Census Block:
 - Population
 - Number of Households
 - Total Employment (non-agricultural)
- For Years:
 - 2000
 - 2nd Quarter 2005 (pre-Katrina)
 - 4th Quarter 2005 (post-Katrina)
 - 2050



Population Projections –cont'd

- Start point was 1 July 2006 population data from Louisiana Tech University
- Moody's US Macro Model
 - Forecasts population and number of households based on total employment in the area
 - Estimates for 5 MSA's and 35 Parishes in South Louisiana



Planning Unit 1 Population

Parish	Year 2000	Pre-Katrina	Post-Katrina	Year 2050
Ascension	65,818	74,878	85,935	143,808
East Baton Rouge	150,269	150,473	166,346	158,547
Iberville	6,726	6,528	7,230	4,131
Jefferson	257,501	256,192	210,433	299,633
Livingston	31,723	37,670	40,790	66,148
Orleans	427,892	410,814	117,240	432,573
Plaquemines	3,025	3,239	1,763	4,647
St. Bernard	67,229	65,382	30,245	80,329
St. Charles	24,081	24,966	23,474	21,380
St. James	12,434	12,447	12,894	17,014
St. John the Baptist	39,570	41,520	41,520	44,384
St. Tammany	122,492	129,472	114,474	228,161
Tangipahoa	28,456	29,512	30,599	76,030
West Baton Rouge	2,000	2,022	2,162	1,759
	1,239,216	1,245,115	885,105	1,578,544



Three Population Forecasts

- Two population forecasts based on strength of the local economy
 - High Employment = lure nontraditional industries
 - Business as Usual = traditional industries
- A 3rd estimate was prepared by District staff



Development Patterns

- Three forecasts of development patterns developed by Calthorp
 - Compact Development = high-density
 - Development primarily within 5 MSA's
 - Multi-family residential increases
 - Reduced sprawl
 - Dispersed Development = similar to today
 - Spread out along trans corridors between MSA's
 - Single-family residential dominates
 - Hybrid



Asset Database

- Calthorp provided, by census block:
 - Number and type of residential units in 2050
 - Number of office, retail, and industrial buildings, with total sq. footage in 2050
- Using same techniques as previously described, the econ team developed stage-damage functions by census block for 2050.
- Intervening years are interpolated.



Sample View of Stage-Damage Tables

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	A	B	C	D	E	F	G	H	I	J	K	L	
1													
2													
3													
4	2050 Stage-Damage Information												
5	SPU1					SPU2					SPU3		
6	Stage (ft)	BAU-Compact	High-Compact	BAU-Dispersed	High-Dispersed	Stage (ft)	BAU-Compact	High-Compact	BAU-Dispersed	High-Dispersed	Stage (ft)	BAU-Compact	Hi
7	0.0	\$0	\$0	\$0	\$0	0.0	\$0	\$0	\$0	\$0	0.0	\$0	
8	1.0	\$169	\$305	\$152	\$305	1.0	\$127	\$229	\$114	\$229	1.0	\$165	
9	2.0	\$12,645	\$24,601	\$11,400	\$24,601	2.0	\$9,484	\$18,451	\$8,550	\$18,451	2.0	\$12,329	
10	3.0	\$34,338	\$67,574	\$46,382	\$101,847	3.0	\$25,754	\$50,681	\$34,787	\$76,385	3.0	\$33,480	
11	4.0	\$77,469	\$154,034	\$141,317	\$312,897	4.0	\$58,102	\$115,526	\$105,987	\$234,672	4.0	\$75,532	
12	5.0	\$101,050	\$201,025	\$172,112	\$380,724	5.0	\$75,787	\$150,769	\$129,084	\$285,543	5.0	\$98,524	
13	6.0	\$139,687	\$278,510	\$245,225	\$541,177	6.0	\$104,766	\$208,883	\$183,919	\$405,883	6.0	\$136,195	
14	7.0	\$177,262	\$353,812	\$320,414	\$707,982	7.0	\$132,946	\$265,359	\$240,310	\$530,987	7.0	\$172,830	
15	8.0	\$206,232	\$411,825	\$361,484	\$798,876	8.0	\$154,674	\$308,869	\$271,113	\$599,157	8.0	\$201,076	
16	9.0	\$252,402	\$504,481	\$411,655	\$910,248	9.0	\$189,301	\$378,361	\$308,741	\$682,686	9.0	\$246,092	
17	10.0	\$282,530	\$564,938	\$452,729	\$1,001,576	10.0	\$211,898	\$423,704	\$339,547	\$751,182	10.0	\$275,467	
18	11.0	\$292,370	\$584,622	\$466,138	\$1,031,292	11.0	\$219,277	\$438,467	\$349,604	\$773,469	11.0	\$285,061	
19	12.0	\$306,696	\$613,374	\$484,525	\$1,072,118	12.0	\$230,022	\$460,031	\$363,394	\$804,089	12.0	\$299,029	
20	13.0	\$319,351	\$638,784	\$496,763	\$1,099,258	13.0	\$239,513	\$479,088	\$372,572	\$824,444	13.0	\$311,368	
21	14.0	\$325,420	\$650,923	\$505,509	\$1,118,600	14.0	\$244,065	\$488,192	\$379,132	\$838,950	14.0	\$317,284	
22	15.0	\$330,097	\$660,261	\$513,570	\$1,136,433	15.0	\$247,573	\$495,196	\$385,178	\$852,325	15.0	\$321,844	
23	16.0	\$334,923	\$669,936	\$519,801	\$1,150,270	16.0	\$251,192	\$502,452	\$389,851	\$862,703	16.0	\$326,550	
24	17.0	\$340,427	\$680,971	\$526,097	\$1,164,158	17.0	\$255,320	\$510,728	\$394,573	\$873,119	17.0	\$331,917	
25	18.0	\$343,566	\$687,260	\$530,078	\$1,172,922	18.0	\$257,675	\$515,445	\$397,558	\$879,691	18.0	\$334,977	
26	19.0	\$345,340	\$690,794	\$532,550	\$1,178,358	19.0	\$259,005	\$518,096	\$399,412	\$883,768	19.0	\$336,707	
27	20.0	\$346,527	\$693,156	\$533,682	\$1,180,840	20.0	\$259,896	\$519,867	\$400,262	\$885,630	20.0	\$337,864	
28	21.0	\$347,714	\$695,535	\$534,665	\$1,183,017	21.0	\$260,785	\$521,651	\$400,999	\$887,263	21.0	\$339,021	
29	22.0	\$347,995	\$696,097	\$534,913	\$1,183,563	22.0	\$260,997	\$522,073	\$401,185	\$887,672	22.0	\$339,295	
30	23.0	\$348,075	\$696,255	\$534,974	\$1,183,699	23.0	\$261,056	\$522,191	\$401,231	\$887,774	23.0	\$339,373	
31	24.0	\$348,110	\$696,326	\$535,001	\$1,183,758	24.0	\$261,082	\$522,245	\$401,251	\$887,819	24.0	\$339,407	
32	25.0	\$348,110	\$696,326	\$535,001	\$1,183,758	25.0	\$261,082	\$522,245	\$401,251	\$887,819	25.0	\$339,407	
33	26.0	\$348,110	\$696,326	\$535,001	\$1,183,758	26.0	\$261,082	\$522,245	\$401,251	\$887,819	26.0	\$339,407	
34	27.0	\$348,110	\$696,326	\$535,001	\$1,183,758	27.0	\$261,082	\$522,245	\$401,251	\$887,819	27.0	\$339,407	
35	28.0	\$348,110	\$696,326	\$535,001	\$1,183,758	28.0	\$261,082	\$522,245	\$401,251	\$887,819	28.0	\$339,407	



Population Scenarios

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	A	B	C	D	E	F	G	H	I	J	K
1											
2											
3											
4	2050 Stage-Population at Risk Information										
5	SPU1					SPU2					SPU3
6	Stage (ft)	BAU-Compact	High-Compact	BAU-Dispersed	High-Dispersed	Stage (ft)	BAU-Compact	High-Compact	BAU-Dispersed	High-Dispersed	Stage (ft)
7	0.0	0	0	0	0	0.0	0	0	0	0	0.0
8	1.0	3,626	6,317	7,093	6,198	1.0	4,893	6,862	7,817	9,326	1.0
9	2.0	6,057	9,783	11,227	9,995	2.0	8,076	11,108	12,417	13,820	2.0
10	3.0	7,687	11,686	13,636	12,321	3.0	10,146	13,735	15,125	15,985	3.0
11	4.0	8,779	12,730	15,039	13,746	4.0	11,493	15,361	16,719	17,029	4.0
12	5.0	9,511	13,303	15,858	14,619	5.0	12,369	16,367	17,658	17,532	5.0
13	6.0	10,002	13,617	16,334	15,154	6.0	12,939	16,990	18,210	17,775	6.0
14	7.0	10,331	13,790	16,612	15,482	7.0	13,310	17,375	18,535	17,891	7.0
15	8.0	10,552	13,885	16,774	15,683	8.0	13,551	17,613	18,726	17,948	8.0
16	9.0	10,699	13,937	16,868	15,806	9.0	13,708	17,761	18,839	17,975	9.0
17	10.0	10,799	13,965	16,923	15,881	10.0	13,810	17,852	18,905	17,988	10.0
18	11.0	10,865	13,981	16,955	15,927	11.0	13,876	17,908	18,944	17,994	11.0
19	12.0	10,909	13,990	16,974	15,955	12.0	13,920	17,943	18,967	17,997	12.0
20	13.0	10,939	13,994	16,985	15,973	13.0	13,948	17,965	18,981	17,999	13.0
21	14.0	10,959	13,997	16,991	15,983	14.0	13,966	17,978	18,989	17,999	14.0
22	15.0	10,973	13,998	16,995	15,990	15.0	13,978	17,987	18,993	18,000	15.0
23	16.0	10,982	13,999	16,997	15,994	16.0	13,986	17,992	18,996	18,000	16.0
24	17.0	10,988	13,999	16,998	15,996	17.0	13,991	17,995	18,998	18,000	17.0
25	18.0	10,992	14,000	16,999	15,998	18.0	13,994	17,997	18,999	18,000	18.0
26	19.0	10,994	14,000	16,999	15,999	19.0	13,996	17,998	18,999	18,000	19.0
27	20.0	10,996	14,000	17,000	15,999	20.0	13,997	17,999	19,000	18,000	20.0
28	21.0	10,998	14,000	17,000	15,999	21.0	13,998	17,999	19,000	18,000	21.0
29	22.0	10,998	14,000	17,000	16,000	22.0	13,999	18,000	19,000	18,000	22.0
30	23.0	10,999	14,000	17,000	16,000	23.0	13,999	18,000	19,000	18,000	23.0
31	24.0	10,999	14,000	17,000	16,000	24.0	14,000	18,000	19,000	18,000	24.0



Impacts to the Regional economy



Regional Economic Impacts

- Same model and process as IPET
 - Assisted by external consultant
- REMI Model
 - Custom-Built Model of the Regional Economy
 - Storm Damage = Loss of Capital
 - Population Displaced = Lost Employment & Customer Base
- Three Measures of Effects
 - Employment
 - Capital Stock
 - Gross Regional Product
- Baseline and Each Alternative will be modeled



Summary

- Three Key Metrics
 - Damage to Assets
 - Risk to Population
 - Regional Economy
- Some quantitative uncertainties, some too big and handled as scenarios
- Limitation on ability to fine-tune damage calculations
- Illuminates trade-offs between plans and between metrics