i-Tree – STRATUM
Complete Street Tree Inventory
Newborn, GA

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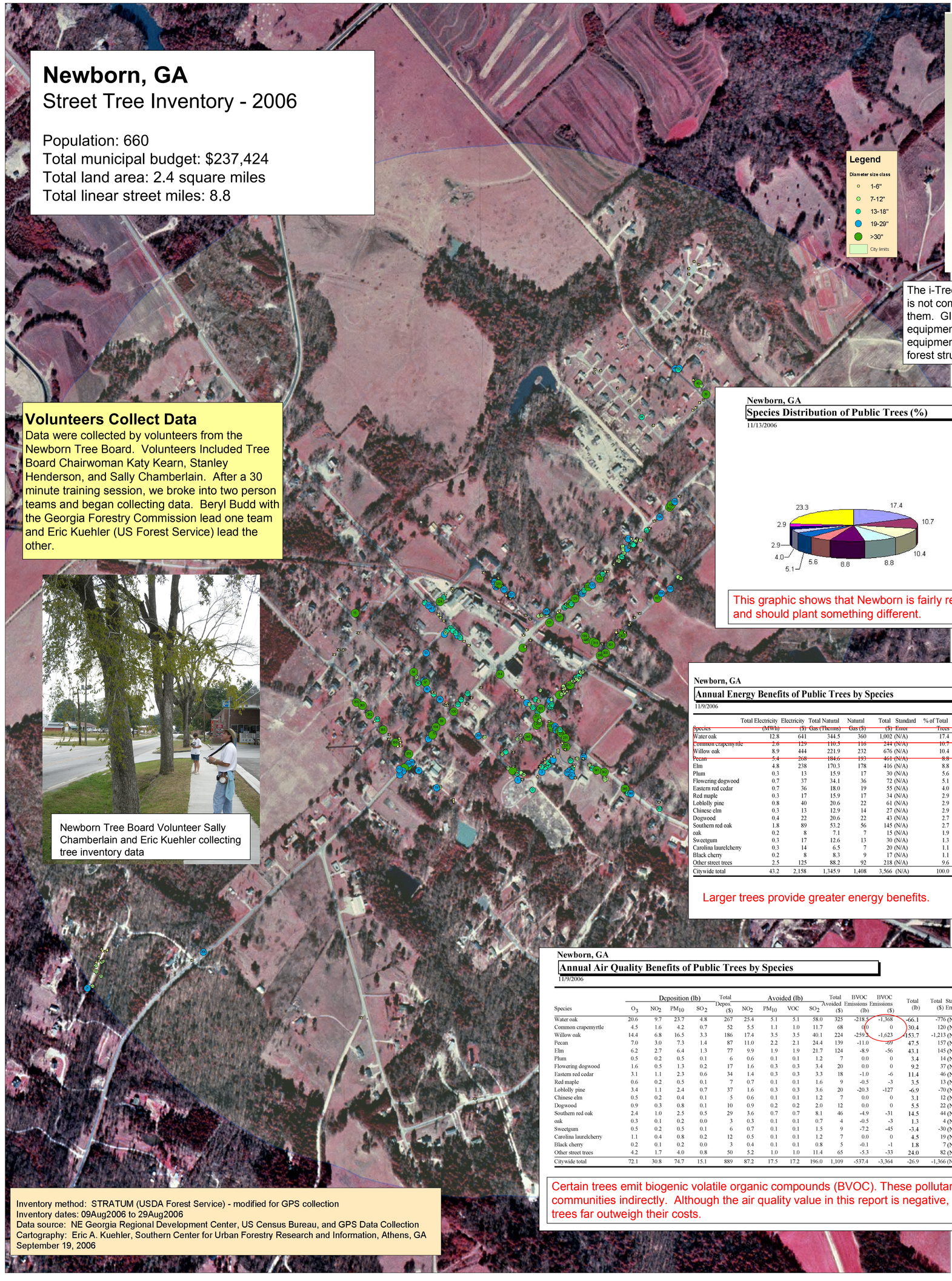


Newborn, GA
Street Tree Inventory - 2006

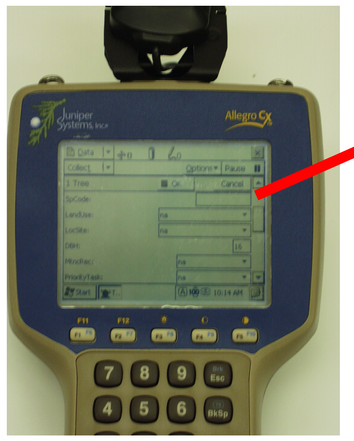
Population: 660
Total municipal budget: $237,424
Total land area: 2.4 square miles
Total linear street miles: 8.8

Volunteers Collect Data
Data were collected by volunteers from the Newborn Tree Board. Volunteers Included Tree Board Chairwoman Katy Kearn, Stanley Henderson, and Sally Chamberlain. After a 30 minute training session, we broke into two person teams and began collecting data. Beryl Budd with the Georgia Forestry Commission lead one team and Eric Kuehler (US Forest Service) lead the other.

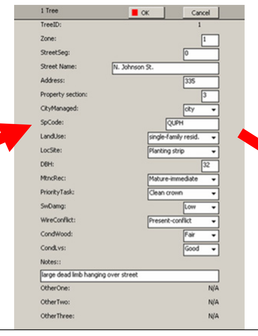
Newborn Tree Board Volunteer Sally Chamberlain and Eric Kuehler collecting tree inventory data

Inventory method: STRATUM (USDA Forest Service) - modified for GPS collection
Inventory dates: 09Aug2006 to 29Aug2006
Data source: NE Georgia Regional Development Center, US Census Bureau, and GPS Data Collection
Cartography: Eric A. Kuehler, Southern Center for Urban Forestry Research and Information, Athens, GA
September 19, 2006

How Data Were Collected



The i-Tree Software Suite currently supports only the PocketPC platform on PDA's and is not compatible with GIS technology. PDA's are expensive and not everyone has access to them. GIS technology is very useful for locating trees in a community. Using available GPS equipment, we set out to demonstrate that data could be easily collected using non-supported equipment and imported into the STRATUM software to gain valuable information about urban forest structure as well as the economic and ecological benefits of street trees.



Survey questions were answered for each tree. It took less than one minute to get all the data needed for each tree. The data were then stored in a database and downloaded later.

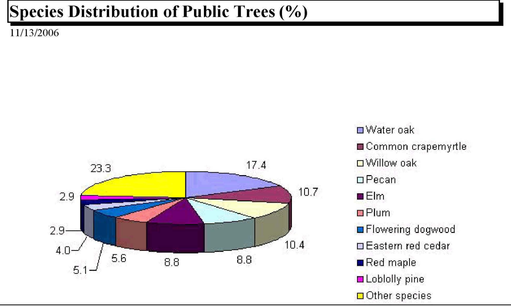
No Budget? Start Here
If your community or volunteer group has no equipment or budget for equipment, you can collect data using paper tally sheets then enter it into MS Excel spreadsheet.

TreeId	Zone	StreetSeg	CityManag	SpCode	LandUse	LocSite	DBH	MtncRec	Priorit
1	1	0	1	QUNI	1	7	37	4	
2	1	0	1	QUPH	4	5	48	4	
3	1	0	1	JUVI	5	1	28	4	
4	1	0	1	JUVI	5	4	2	1	
5	1	0	1	PRCA	5	4	13	4	
6	1	0	1	LA6	5	4	36	4	
7	1	0	1	ULS	5	2	21	4	
8	1	0	1	ACRU	4	2	6	2	
9	1	0	1	ULPA	4	2	6	2	
10	1	0	1	ULS	4	2	14	4	
11	1	0	1	ULS	4	2	21	4	
12	1	0	1	ULS	4	2	18	4	
13	1	0	1	ULS	4	2	17	4	
14	1	0	1	QUPH	4	2	36	4	
15	1	0	1	QUPH	4	2	4	1	
16	1	0	1	ACRU	1	2	4	1	
17								4	
18								4	
19								4	
20								0	
21								1	

After data are collected, they can be downloaded into A MicroSoft Excel spreadsheet then imported into a MicroSoft Access database for STRATUM to use.

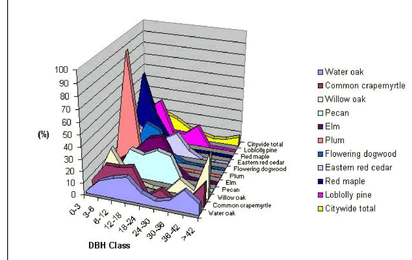
STRATUM Reports Generated

Newborn, GA
Species Distribution of Public Trees (%)
11/13/2006 1



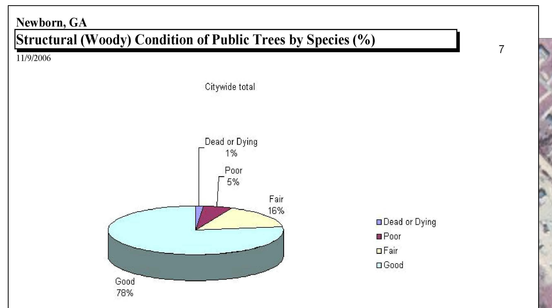
This graphic shows that Newborn is fairly reliant on water oak and should plant something different.

Newborn, GA
Relative Age Distribution of Top 10 Public Tree Species (%)
11/13/2006 2

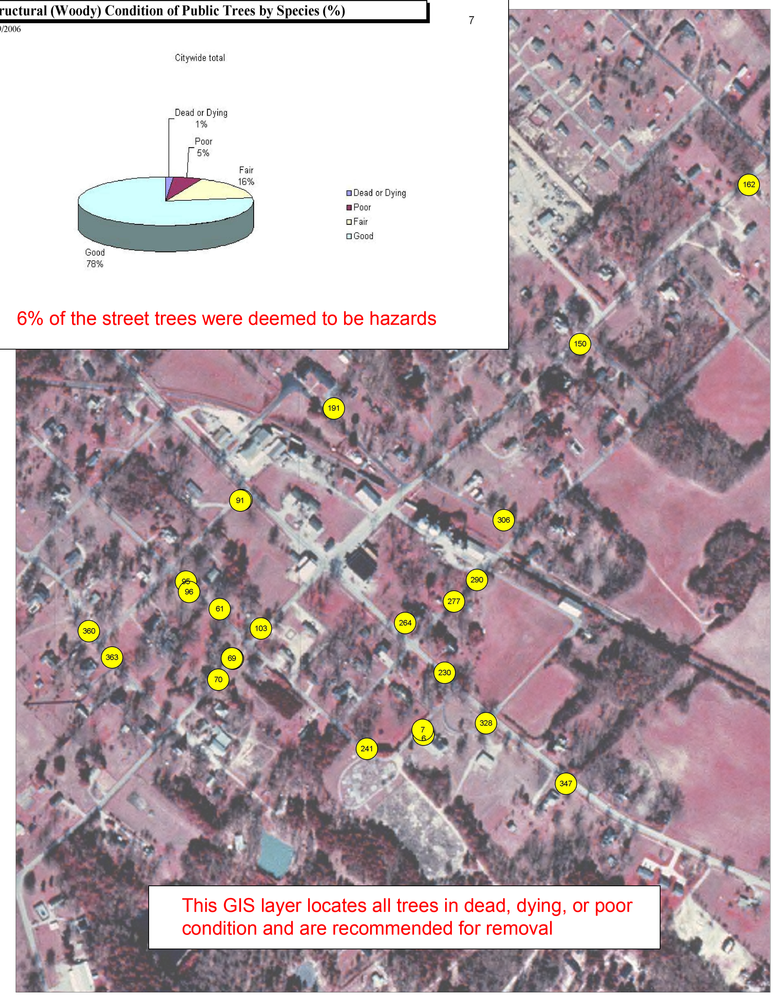


This chart indicates a need to plant larger type trees to replace the inevitable loss of existing urban trees. Large trees provide the greatest benefits.

Newborn, GA
Structural (Woody) Condition of Public Trees by Species (%)
11/9/2006 7



6% of the street trees were deemed to be hazards



This GIS layer locates all trees in dead, dying, or poor condition and are recommended for removal

Newborn, GA
Annual Energy Benefits of Public Trees by Species
11/9/2006 4

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therm)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Water oak	12.8	641	344.5	360	1,002	(N/A)	17.4	28.1	15.41
Common crapemyrtle	2.6	129	110.5	116	244	(N/A)	10.7	6.9	6.10
Willow oak	8.9	444	221.9	232	676	(N/A)	10.4	19.0	17.33
Pecan	5.4	268	184.6	193	461	(N/A)	8.8	12.9	13.96
Elm	4.8	238	170.3	178	416	(N/A)	8.8	11.7	12.61
Plum	0.3	13	15.9	17	30	(N/A)	5.6	0.8	1.43
Flowering dogwood	0.7	37	34.1	36	72	(N/A)	5.1	2.0	3.81
Eastern red cedar	0.7	36	18.0	19	55	(N/A)	4.0	1.5	3.66
Red maple	0.3	17	15.9	17	34	(N/A)	2.9	0.9	3.05
Loblolly pine	0.8	40	20.6	22	61	(N/A)	2.9	1.7	5.55
Chinese elm	0.3	13	12.9	14	27	(N/A)	2.9	0.7	2.41
Dogwood	0.4	22	20.6	22	43	(N/A)	2.7	1.2	4.34
Southern red oak	1.8	89	53.2	56	145	(N/A)	2.7	4.1	14.49
oak	0.2	8	7.1	7	15	(N/A)	1.9	0.4	2.17
Sweetgum	0.3	17	12.6	13	30	(N/A)	1.3	0.8	6.01
Carolina laurelcherry	0.3	14	6.5	7	20	(N/A)	1.1	0.6	5.09
Black cherry	0.2	8	8.3	9	17	(N/A)	1.1	0.5	4.28
Other street trees	2.5	125	88.2	92	218	(N/A)	9.6	6.1	6.04
Citywide total	43.2	2,158	1,345.9	1,408	3,566	(N/A)	100.0	100.0	9.53

Larger trees provide greater energy benefits.

Newborn, GA
Total Annual Benefits, Net Benefits, and Costs for Public Trees
11/9/2006 3

	Total ($)	Standard Error	$/tree	Standard Error	$/capita	Standard Error
Benefits						
Energy	3,566	(N/A)	9.53	(N/A)	5.40	(N/A)
CO2	1,135	(N/A)	3.03	(N/A)	1.72	(N/A)
Air Quality	-1,366	(N/A)	-3.65	(N/A)	-2.07	(N/A)
Stormwater	15,815	(N/A)	42.29	(N/A)	23.96	(N/A)
Aesthetic/Other	11,617	(N/A)	31.06	(N/A)	17.60	(N/A)
Total Benefits	30,767	(n0)	82.26	(n0)	46.62	(n0)
Costs						
Planting	0		0.00		0.00	
Contract Pruning	0		0.00		0.00	
Pest Management	0		0.00		0.00	
Irrigation	0		0.00		0.00	
Removal	1,400		3.74		2.12	
Administration	600		1.60		0.91	
Inspection/Servic	0		0.00		0.00	
Infrastructure	0		0.00		0.00	
Litter Clean-up	0		0.00		0.00	
Liability/Claims	0		0.00		0.00	
Other Costs	0		0.00		0.00	
Total Costs	2,000		5.34		3.03	
Net Benefits	28,767	(n0)	76.92	(n0)	43.59	(n0)
Benefit-cost ratio	15.38	(n0)				

These street trees provide roughly $29K in benefits to the community. For every $1 Newborn spends on trees, they get $15.38 back in return. However, the town is not putting much money into their urban forest, and eventually there will be fewer trees to provide these benefits. **This is not sustainable.**

Newborn, GA
Annual Air Quality Benefits of Public Trees by Species
11/9/2006 5

Species	Deposition (lb) O_3	NO_2	PM_{10}	SO_2	Total Depos. ($)	Avoided (lb) NO_2	PM_{10}	VOC	SO_2	Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($)	Standard Error	% of Total Trees	Avg. $/tree
Water oak	20.6	9.7	23.7	4.8	267	25.4	5.1	5.1	58.0	325	-218.5	-1,368	-66.1	-776	(N/A)	17.4	-11.94
Common crapemyrtle	4.5	1.6	4.2	0.7	52	5.5	1.1	1.0	11.7	68	0.0	0	30.4	120	(N/A)	10.7	3.01
Willow oak	14.4	6.8	16.5	3.3	186	17.4	3.5	3.5	40.1	224	-259.3	-1,623	-153.7	-1,213	(N/A)	10.4	-31.10
Pecan	7.0	3.0	7.3	1.4	87	11.0	2.2	2.1	24.4	139	-11.0	-69	47.5	157	(N/A)	8.8	4.76
Elm	6.2	2.7	6.4	1.3	77	9.9	1.9	1.9	21.7	124	-8.9	-56	43.1	145	(N/A)	8.8	4.39
Plum	0.5	0.2	0.5	0.1	6	0.6	0.1	0.1	1.2	7	0.0	0	3.4	14	(N/A)	5.6	0.65
Flowering dogwood	1.6	0.5	1.3	0.2	17	1.6	0.3	0.3	3.4	20	0.0	0	9.2	37	(N/A)	5.1	1.95
Eastern red cedar	3.1	1.1	2.3	0.6	34	1.4	0.3	0.3	3.3	18	-1.0	-6	11.4	46	(N/A)	4.0	3.09
Red maple	0.6	0.2	0.5	0.1	7	0.7	0.1	0.1	1.6	9	-0.5	-3	3.5	13	(N/A)	2.9	1.17
Loblolly pine	3.4	1.1	2.4	0.7	37	1.6	0.3	0.3	3.6	20	-20.3	-127	-6.9	-70	(N/A)	2.9	-6.39
Chinese elm	0.5	0.2	0.4	0.1	5	0.6	0.1	0.1	1.2	7	0.0	0	3.1	12	(N/A)	2.9	1.11
Dogwood	0.9	0.3	0.8	0.1	10	0.9	0.2	0.2	2.0	12	0.0	0	5.5	22	(N/A)	2.7	2.20
Southern red oak	2.4	1.0	2.5	0.5	29	3.6	0.7	0.7	8.1	46	-4.9	-31	14.5	44	(N/A)	2.7	4.43
oak	0.3	0.1	0.2	0.0	3	0.3	0.1	0.1	0.7	4	-0.5	-3	1.3	4	(N/A)	1.9	0.60
Sweetgum	0.5	0.2	0.5	0.1	6	0.7	0.1	0.1	1.5	9	-7.2	-45	-3.4	-30	(N/A)	1.3	-6.03
Carolina laurelcherry	1.1	0.4	0.8	0.2	12	0.5	0.1	0.1	1.2	7	0.0	0	4.5	19	(N/A)	1.1	4.80
Black cherry	0.2	0.1	0.2	0.0	3	0.4	0.1	0.1	0.8	5	-0.1	-1	1.8	7	(N/A)	1.1	1.65
Other street trees	4.2	1.7	4.0	0.8	50	5.2	1.0	1.0	11.4	65	-5.3	-33	24.0	82	(N/A)	9.6	2.29
Citywide total	72.1	30.8	74.7	15.1	889	87.2	17.5	17.2	196.0	1,109	-537.4	-3,364	-26.9	-1,366	(N/A)	100.0	-3.65

Certain trees emit biogenic volatile organic compounds (BVOC). These pollutants cost communities indirectly. Although the air quality value in this report is negative, the benefits from trees far outweigh their costs.

Newborn, GA
Annual Stormwater Benefits of Public Trees by Species
11/9/2006 6

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Water oak	541,501	5,361	(N/A)	17.4	33.9	82.48
Common crapemyrtle	47,946	468	(N/A)	10.7	3.0	31.69
Willow oak	459,146	4,548	(N/A)	10.4	28.8	116.61
Pecan	162,666	1,611	(N/A)	8.8	10.2	48.80
Elm	136,555	1,352	(N/A)	8.8	8.6	40.97
Plum	4,414	44	(N/A)	5.6	0.3	2.08
Flowering dogwood	13,254	131	(N/A)	5.1	0.8	6.91
Eastern red cedar	15,895	157	(N/A)	4.0	1.0	10.49
Red maple	8,399	83	(N/A)	2.9	0.5	7.56
Loblolly pine	29,312	290	(N/A)	2.9	1.8	26.38
Chinese elm	4,827	48	(N/A)	2.9	0.3	4.34
Dogwood	7,728	77	(N/A)	2.7	0.5	7.65
Southern red oak	65,609	650	(N/A)	2.7	4.1	64.96
oak	3,343	33	(N/A)	1.9	0.2	4.73
Sweetgum	11,334	112	(N/A)	1.3	0.7	22.42
Carolina laurelcherry	6,374	63	(N/A)	1.1	0.4	15.78
Black cherry	3,085	31	(N/A)	1.1	0.2	7.64
Other street trees	76,448	757	(N/A)	9.6	4.8	21.04
Citywide total	1,597,355	15,815	(N/A)	100.0	100.0	42.29

Large canopies intercept more rainfall thus reducing stormwater runoff. These dollar values represent the avoided costs of having to construct stormwater treatment facilities.

Recommendations for Newborn, GA

1. Plan for the next 50-100 years
   a. Plant larger type trees
   b. Plant long living trees
   c. Maintain existing large trees
2. Remove poor trees to reduce liability
3. Encourage residents to plant long living trees
4. Use i-Tree's MCTI application to manage urban forest